MARMARA ÜNİVERSİTESİ YAYINEVİ

ETT2018

8th International İstanbul Textile Conference

Evolution of Technical Textiles

8. Uluslararası İstanbul Tekstil Konferansı

Teknik Tekstillerin Evrimi

14-16 APRIL NİSAN

Tüyap Fair and Exhibition Center

Tüyap Fuar ve Kongre Merkezi



BOOK OF ABSTRACTS

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Marmara Üniversitesi Yayınları No:854

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MARMARA ÜNİVERSİTESİ

MARMARA
ÜNİVERSİTESİ

PREFACE

Owing to the success of the 7th International Istanbul Textile Conference which was held in 2016 in Istanbul for the textile and apparel industry, we want to take this opportunity to discuss and share the new development in technical textiles and apparel industry by inviting you again to the city where East meets West, to a place steeped in culture and history. Istanbul is proved to play host on this auspicious occasion to the 8th International Istanbul Textile Conference on Evolution of Technical Textile (ETT2018) with a theme of "Recent Advances in Innovation and Enterprise in Technical Textiles and Clothing".

It is clear that the role being played by textile in the applied materials science is considerable and that there is still ample scope for further development. For this conference, the focus is on looking beyond the gadgets and the broad spectrum of papers demonstrates when, where and how technical textiles are selected for their true value and applications. The conference will provide a unique opportunity to meet leading personalities with research, management and technology experience from all over the world and to discuss with them any ideas and proposals in your particular field. The ETT2018 is intended to intensify and promote cooperation.

As usual the papers cover a wide spectrum of issues, all of which are pertinent to the successful use and application of technical textile. The papers represent current research on technical textile issues and within the nine conference themes, contributions cover:

- Medical Textiles
- Technical Textiles
- Smart and Interactive Textiles
- Surface Coatings
- Advances in Apparel Design
- Ecological Textiles
- Composites Materials
- Textile Innovations
- Computer Technology for Textiles and Apparel

A selection of papers – those agreed by a panel of reviewers and the editors, will be published in a special conference edition of the Journal of Marmara University Institute of Pure and Applied Sciences.

I wish you a most interesting conference.

Prof.Dr.Mehmet AKALIN

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Dipl. Eng. Akdere, Musa: *RWTH Aachen University, Germany*

MARMARA ÜNİVERSİTESİ YAYINEVİ

SCIENTIFIC PROGRAM

MARMARA ÜNİVERSİTESİ

SATURDAY – 14 APRIL 2018

KARADENİZ HALL

08:00 – 09:00 Registration
09:00 – 09:30 Conference Opening Ceremony – With Welcome Speeches

PLENARY SESSION
KARADENİZ HALL

09:30 – 11:00

Chair Person: Prof.Dr. Mehmet Akalın *Marmara University, Turkey*		
ETT-K1	**Prof.Dr. Thomas Gries**	*RWTH Aachen University, Germany*
ETT-K2	**Prof.Dr. Yusuf Menceloğlu**	*Sabancı University, Turkey*
ETT-K3	**Prof.Dr. Yusuf Ulcay**	*Uludağ University, Turkey*
ETT-K4	**Prof.Dr. Tanveer Hussain**	*National Textile University, Pakistan*
ETT-K5	**Prof.Dr. Tahir Shah**	*National Textile University, Pakistan*

11:00 – 11:15 COFFEE BREAK

PARALLEL SESSIONS
KARADENİZ HALL

11:15 – 12:30 (Advances Design)

Chair Person: Prof. Dr. Dariush Semnani; *Isfahan University of Technology, Iran*		
ETT0034	***Bending Behavior of Nanoprepreg 3D Carbon/Epoxy MWCNT Composites***	***Kadir Bilisik;*** Department of Textiles, Erciyes University, Kayseri, Turkey
ETT0104	***Development of recycled acrylic fibers - A technical and economic approach***	***Sascha Schriever;*** Institute for Textile Technology of RWTH Aachen University, Aachen, Germany
ETT0187	***Characterization of nylon based nanofiber membranes***	***Meltem Yanilmaz;*** Textile Engineering, Istanbul Technical University, İstanbul, Turkey
ETT0020	***The Dervish Sound Dress; a garment using wearable technology with sound vibrations***	**Hedy Hurban;** Department of Art and Humanities, Plymouth University, Plymouth, U.K
ETT0048	***Carbon fibre precursor production with NaSCN(aq.) as a sustainable solvent***	**Stefan Peterek;** Institute for Textile Technology of RWTH Aachen University, Aachen, Germany

SATURDAY – 14 APRIL 2018

MARMARA HALL

11:15 – 12:30 (Smart and Interactives)

Chair Person: Dr. Adnan Ahmed Mazari; *Technical University of Liberec, Czech Republic*		
ETT0056	***An Investigation of the Activation of Multi Colour Changing Photochromic Textiles***	***Dilusha Chathura De Zoysa Rajapakse;*** School of Arts and Design, Nottingham Trent University, UK
ETT0057	***Schizophonic Machine: wearable schizo-interface, an exercise of possible listenings***	***Maria Lucilia Borges;*** Journalism Department, Universidade Federal de Ouro Preto, Campus Mariana, Brazil
ETT0069	***Potential Use of 3D Printing Technology for Conductive Thread Assembly on Textiles***	***Nese Topcuoglu;*** Istanbul Technical University
ETT0072	***Smart Water Vapour Permeability of Cellulose Nanowhisker Reinforced Thermo-moisture Responsive Polyurethane Nanocomposite Films***	***Nazife Korkmaz Memiş;*** Departmant of Textile Engineering,Süleyman Demirel University, Isparta, Turkey
ETT0099	***Microencapsulation Of The Thermochromic System Prepared With Phenolphthalein Color Developer***	**Müyesser Selda Tözüm;** Department of Textile Engineering, Usak University, Usak, Turkey

BÜYÜKADA HALL

11:15 – 12:30 (Reinforcement Fibres)

Chair Person: Dr. Navneet Soin; *The University of Bolton, the U.K.*		
ETT0075	***Analysis of the stabilization process during carbon fiber manufacturing***	***Musa Akdere;*** Institute for Textile Technology of RWTH Aachen University, Aachen, Germany
ETT0134	***Polyethylene based Carbon Fibers: Future Prospects and Challenges***	***Tim Alexander Röding;*** Institut für Textiltechnik (ITA) der RWTH Aachen University, RWTH Aachen University, Aachen, Germany
ETT0169	***Effect of PVP addition on PVA/Boron Carbide Nanofibers by Electrostatic Spinning for Interactive Wound Dressing Application***	***Mehmet Fahri Sarac;*** Department of Mechanical Engineering, Suleyman Demirel University, Isparta, Turkey.
ETT0221	***Investigation on the doping possibilities of microcapsules in solution spinning***	***Ismail Ivedi,;*** Department of Textile Engineering, Dokuz Eylül University, Izmir, Turkey
ETT0178	***Effect of selected fire retardant additives on the flammability of epoxy resin for aircraft composites***	**Fadime Karaer;** Anadolu University, Faculty of Engineering, Eskişehir, Turkey

12:30 – 14:00 LUNCH – INTEREXPO HALL

SATURDAY – 14 APRIL 2018

PARALLEL SESSIONS

KARADENİZ HALL

14:00 – 15:15 (Surface Coating)

Chair Person: Dr. Amit Rawal; *Indian Institute of Technology, Delhi (IITD), India*		
ETT0051	***Effect of different coating conditions on sound insulation property of magnetite containing nonwoven materials***	***Ilhan Ozen;*** Department of Textile Engineering, Erciyes University, Kayseri, Turkey
ETT0070	***Plasma Grafting of Reactive B-Cyclodextrin onto the Cotton Fabric***	***Malihe Nazi;*** Department of Textile and Leather, Standard Research Institute, Karaj, Iran
ETT0115	***Application Of The Microcapsules With Reactive Shell To Modified Cotton Fabrics***	***Sennur Alay Aksoy;*** Textile Engineering, Suleyman Demirel University, Isparta, Turkey
ETT0172	***Investigation of the opportunity to use of silicone-based chemicals to be developed elasticity of the woven fabrics***	***Fatoş Ceren Akınc;*** Matesa Textile R&D Center, Kahramanmaraş, Turkey
ETT0231	***Leather: Could it be an alternative liner for the prosthetic leg users?***	***Arife Candas Adıgüzel Zengin;*** Ege University, Engineering Faculty, Leather Engineering Department, İzmir, Turkey

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Ecological Textiles)

Chair Person: Sascha Schriever; *RWTH Aachen University, Germany*		
ETT0242	***Nonwoven Based Innovative Self Sufficient Tent***	***Umut Burak Dalbudak***; HASSAN Tekstil San ve Tic. A.S., Esenyurt, Istanbul, Turkey
ETT0017	***Cost efficient production of high performance carbon fibers***	***Franz Pursche;*** Institut für Texiltechnik (ITA) der RWTH Aachen University, Germany
ETT0028	***Utilizing an Alternative Paradigm for the Development of Bacterial Cellulose in the Textile and Apparel Industry***	***Luis Quijano;*** Department of Family and Consumer Sciences, Liberty University, Lynchburg, United States of America
ETT0039	***Improved Biobased Fibres For Clothing Applications***	***Maria Pilar Diego;*** Yünsa Worsted &Woolen Production And Trading Co.,Tekirdag, Turkey
ETT0050	***Greenhouse trials of agrotextile nonwoven structures possessing controlled water and fertilizer release properties***	**Gamze Okyay;** Department of Textile Engineering, Erciyes University, Kayseri, Turkey

SATURDAY – 14 APRIL 2018

MARMARA HALL

14:00 – 15:15 (Surface Coating)

Chair Person: Prof.Dr. Erhan Öner; *Marmara University, Turkey*		
ETT0032	***Mechanical and Impact Properties of Packaging-Waste/E-Glass/Epoxy Sandwich Composites for Construction Applications***	***Gaye Yolacan Kaya;*** Department of Textile Engineering, Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey
ETT0009	***Bi-stretch woven fabrics with auxetic behavior***	***Adeel Zulifqar;*** *Institute of Textile and Clothing, Hong Kong Polytechnic University, Hong Kong*
ETT0049	***Combining Laser- and Textile-Technology for Just-in-Time production of Composites***	***Sebastian Oppitz;*** Composite Division, Institut für Textiltechnik of RWTH Aachen University
ETT0117	***The Smart Fabric Inspection Machines***	***Serkan Boz;*** Emel Akın Vocational High School, Ege Üniversitesi, Izmir, Turkey
ETT0095	***Effect of shear thickening fluids on mechanical properties of glass and carbon preforms for textile composites***	**Erdem Selver;** Textile Engineering, Kahramanmaras Sutcu Imam Uni. Turkey

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Computer Technology for Textiles and Apparel)

Chair Person: Prof. Dr. Engr. Md. Humaun Kabir; *IBAIS University, Bangladesh*		
ETT0013	***Improving Pattern Design for Women's Upper Body Clothing***	***Tanya Louise Dove;*** Institute of Textiles and Clothing, Hong Kong Polytechnic University, Hong Kong
ETT0014	***The investigation of clothing fit using 3D virtual prototyping***	***Kristina Ancutiene;*** Department of production engineering, Kaunas university of technology, Kaunas, Lithuania
ETT0066	***Comparison of the Workplace through the String Diagram Method and Simulation Program in the Manufacturing of Apparel***	***Mehmet Küçük;*** Ege University, Engineering Faculty, Textile Engineering Department, Izmir, Turkey
ETT0078	***The Readiness of the Textiles and Apparel industry of Bangladesh-Vision 2021***	***S M Farhana Iqbal;*** Department Yarn Engineering, Bangladesh University of Textiles, Dhaka, Bangladesh
ETT0148	***The Effect Of Interlining On Properties Used In Fabric Modelling For 3d Virtual Garment Simulation And Compare Different Measurement Systems***	**Selma Dolanbay Doğan;** Department of Textile Design, Selçuk University, Konya, Turkey

SATURDAY – 14 APRIL 2018

BÜYÜKADA HALL

14:00 – 15:15 (Nanotechnology)

Chair Person: Prof.Dr. Kadir Bilişik; *Erciyes University, Turkey*		
ETT0021	***Microwave energy-based fabrication of hierarchically structured carbon nanotube/ fibrous material composites***	***Selcuk Poyraz;*** Textile Engineering, Namik Kemal University, Tekirdag, Turkey
ETT0038	***PAN/AgNO3 Electrospun Nanofibers with Improved Conductivity for Sensor Applications***	***Sebnem Duzyer;*** Textile Engineering Department, Uludag University, Bursa, Turkey
ETT0195	***Characterization of electrospun nanofibers coated spunbond nonwoven media***	***Fulya Yılmaz;*** *Department of Textile Engineering, Usak University, Turkey*
ETT0094	***Development of a durable anti-microbial silica based nanoparticles treatment for textile for the healthcare industry***	***Nadia Sid;*** Functional resin and coating, TWI Ltd, Cambridge, United Kingdom
ETT0102	***Electrospun Polyvinylidene Fluoride (PVDF) Nanofibers***	***Derman Vatansever Bayramol*;** Department of Textile Engineering, Namık Kemal University, Tekirdağ, Turkey

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Technical Textiles)

Chair Person: Dr.Ramazan Erdem ; *Akdeniz University, Turkey*		
ETT0133	***Investigation Of Antibacterial Properties Of Polyurethane-Chlorhex Nanofibers Obtained By Electrospinning Method***	***Erdem Tezcan;*** Istanbul Aydin University, Faculty of Engineering, Biomedical Engineering Department, Istanbul, Turkey
ETT0036	***Investigation of Sound Insulation Parameters of Nonwoven Surfaces Obtained From Chicken Feather Fibers Using Low Melt Fibers***	***Süreyya Kocatepe;*** Department of Textile Engineering, Erciyes University, Kayseri, Turkey
ETT0058	***Thermophysiological comfort properties of car seat materials***	***Funda Buyuk Mazari;*** Department of Clothing, Technical University of Liberec, Czech Republic
ETT0158	***Eco-friendly cotton fabric finishes using natural dyes***	***Sondes Gargoubi;*** Laboratory of Textile Engineering - LGTex, University of Monastir, Monastir, Tunisia
ETT0193	***Investigation of Water Permeability of Ultrasonic Seaming on PU Coated Fabrics***	***Ayşe Şevkan Macit;*** Textile Engineering Department, Uşak University, Uşak, Turkey

17:00 – 18:00 POSTER PRESENTATION SESSION

(First Part: 35 Posters; see details at the poster list)

*** The poster presentation certificate will be given during the poster session.**

*** Poster Session Chairs:** Dr. Mustafa Sabri Özen; Dr. Erhan Sancak; Dr. Muhammet Uzun

SUNDAY – 15 APRIL 2018

09:00 – 10:00 Registration

PLENARY SESSION
KARADENİZ HALL

09:00 – 11:00

Chair Person: Prof. Dr. Tanveer Hussain; *National Textile University, Pakistan*		
ETT-Invited-1	**Dr. Amit Rawal**	*Indian Institute of Technology, Delhi (IITD), India*
ETT-Invited-2	**Prof. Dr. Dariush Semnani**	*Isfahan University of Technology, Iran*
ETT-Invited-3	**Prof. Dr. Gordana Colovic**	*The College of Textile, Serbia*
ETT-Invited-4	**Dr. Navneet Soin**	*The University of Bolton, U.K*

11:00 – 11:15 COFFEE BREAK

PARALLEL SESSIONS
KARADENİZ HALL

11:15 – 12:30 (Medical Textiles)

Chair Person: Prof. Dr. Serdar Salman; *National Defense University, Turkey*		
ETT0085	***Investigation of the Permeability Properties of Commercially Available Reusable and Disposable Surgical Gowns***	***Hatice Kübra Kaynak;*** Textile Engineering Department, Gaziantep University, Turkey
ETT0086	***Process Development For Controlling Of The Viscosity Increase Of The Ozonated Oils Used Medical Textiles***	***Koray Pektaş;*** **T**extile Engineering Department, Kahramanmaras Sutcu Imam University, Turkey
ETT0105	***Investigation barrier properties of Linear Low Density Polyethylene (LLDPE) spunbond fabrics***	***Esin Sarioglu;*** Textile Engineering Engineering Faculty,Gaziantep University, Turkey
ETT0121	***Examination of a plant extract for smart wound dressings***	***Ayben Pakolpakcil;*** Textile Engineering Department, Uludag University, Bursa, Turkey
ETT0155	***The Investigation of Antimicrobial Properties of Ag–Alginate Coated Polyester/Viskose Nonwoven Fabric***	***Kübra Yıldız;*** Department of Fashion Design, Sebinkarahisar School of Applied Science, Giresun University, Turkey

SUNDAY – 15 APRIL 2018

MARMARA HALL

11:15 – 12:30 (Smart and Interactives)

Chair Person: Tanya Louise Dove; *Hong Kong Polytechnic University, Hong Kong*		
ETT0100	***Polymerization and characterization of N-vinylcaprolactam based thermoresponsive polymers for textile applications***	***Sena Demirbağ;*** Department of Textile Engineering, Usak University, Usak, Turkey
ETT0118	***Conductive Cotton Yarn For Wearable Electronics***	***Demet Yılmaz;*** Department of Textile Engineering, Suleyman Demirel University
ETT0122	***Pressure Sensing Behavoir of PEDOT:PSS Coated Polyester Fabrics***	***Ayşe Didem Erol;*** Textile Engineering, Kahramanmaras Sutcu Imam University, Turkey
ETT0123	***Smart Costume Design With Wearable Electronics***	***Merve Balkış;*** Fashion Design Department, Gazi University, Ankara, Turkey
ETT0136	***Temperature Sensing Behavior of PEDOT: PSS Coated Smart Textiles***	***Hidayet Köse;*** Textile Engineering, Kahramanmaras Sutcu Imam University, Turkey

BÜYÜKADA HALL

11:15 – 12:30 (Nanotechnology)

Chair Person: Prof. Dr. Gordana Colovic: *The College of Textile, Serbia*		
ETT0152	***Preparation and Cotton Fabric Applications of Chitosan-Silver Nanocomposite***	***Merve Türemen;*** Department of Chemical Engineering, Ankara University, Turkey
ETT0173	***PVP/Gelatin/Lavander Essential Oil Based Nanofiber Production With Green Electrospinning Approach***	***Hülya Kesici Güler;*** Department of Textile Engineering, Süleyman Demirel University, Isparta, Turkey
ETT0015	***Investigation on the effect of garment fit on thermal transfer performace of clothing by combining non-contact measuring tools***	***Sertaç Güney;*** Department of Textile Engineering, Süleyman Demirel University, Isparta, Turkey
ETT0062	***Electrospinning of Composite Fibers with Limunescence Properties***	***Ramazan Erdem;*** Textile Technologies, Akdeniz University, Antalya, Turkey
ETT0202	***Syethesis of PVC/ Zn2(NO2)3 nanofibers for the production of PVC/ZnO hybrid nanofibers***	***Yakup Aykut;*** Uludağ University, Bursa, Turkey

12:30 – 14:00 LUNCH - INTEREXPO HALL

SUNDAY – 15 APRIL 2018

KARADENİZ HALL

14:00 – 15:15 (Advances Design)

Chair Person: Dr. İlhan Ozen; *Erciyes University, Turkey*		
ETT0045	***Improving Liquid Transfer Performance of Cotton Woven Fabrics Woven with Different Constructional Parameters***	***Büşra Özkan;*** Uludag University, Textile Engineering Department, Bursa, Turkey
ETT0068	***Cultural Sustainability In Textile: Checked Fabric Of Malatya***	***Hilal Bilgiç;*** Yeşilyurt Vocational School, Inönü University, Malatya, Turkey
ETT0088	***Properties of Weft Knitted Fabrics Made from Dual Core-Spun Yarns***	***Abd Elmonem Faheem Fouda;*** Textile Engineering Department, Faculty of Engineering, Mansoura University, Mansoura, Egypt
ETT0089	***Effect of Lateral Fabric Resistance on The Axial Compressive Force of The Industrial Sewing Needle***	***Ibrahim El Hawarry;*** Alexandria University, Faculty of Engineering, Textile Engineer, Egypt
ETT0114	***A Study About The Effect Of Dual-Core And Core Materials On Yarn And Some Fabric Properties***	***Sevim Hümeyra Çelikkan;*** Department of Textile Engineering, Süleyman Demirel University, Turkey

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Ecological Textiles)

Chair Person: Musa Akdere; *RWTH Aachen University, Aachen, Germany*		
ETT0083	***Multidirectional Investigation Of Organic Cotton Fabrics Dyed With Gall Oak***	***Emine Torgan Güzel;*** Gazi University, Institute of Fine Arts, Ankara, Turkey
ETT0092	***Dyeing of Silk Fabric with Natural Dye Extracted from Leaves and Stem Bark of Dalbergia sisso***	***Muhammad Tahir Hussain;*** Department of Applied Sciences, National Textile University, Faisalabad, Pakistan
ETT0012	***Optimization of ring spinning process parameters of cotton yarn***	***Mohammad Ali Zeeshan;*** *Baluchistan University, Quetta*
ETT0157	***Textile-Based Wearable Pedometer***	***Asli Atalay;*** Department of Textile Engineering, Marmara University,Istanbul, Turkey
ETT0082	***Reproduction Of The Ottoman Palace Fabrics Using Natural Dyes***	***Recep Karadağ;*** Marmara University, Faculty of Fine Arts, Textile Department, Natural Dyes Laboratory

SUNDAY – 15 APRIL 2018

MARMARA HALL

14:00 – 15:15 (Composite Materials)

Chair Person: Stefan Peterek; *RWTH Aachen University, Aachen, Germany*		
ETT0124	***Design of an Alternative Heat Insulation Wall Fabric With Hot Melt Adhesives in Different Forms***	***Ayse Özkal;*** Department of Textile Engineering, Pamukkale University, Denizli, Turkey
ETT0128	***Utilizing Recycled High Density Polyethylene Caps of Polyethylene Terephthalate Bottles in Composite Plates***	***Ipek Yalçın Eniş;*** Department of Textile Engineering, Istanbul Technical University, Istanbul, Turkey
ETT0168	***How Mathematical Models Can Improve Process Chain Designing***	***Florian Brillowski;*** Institute for Textile Technology of RWTH Aachen University, Aachen, Germany
ETT0174	***Selection method for grippers for handling of reinforcing textiles in automated composite process chains***	***Hans Christian Frueh;*** Institut für Textiltechnik, RWTH Aachen University, Aachen, Deutschland
ETT0207	***Investigation on SO_2 Adsorption Capacity of Graphene Oxide Fibers with Activated Carbon Particles and Metal Salt***	***Pelin Altay;*** Istanbul Technical University, Textile Engineering Department, Istanbul, Turkey

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Computer Technology for Textiles and Apparel)

Chair Person: Dr. Gülden Turhan; *Marmara University*		
ETT0041	***An Automatic Mechatronic System Design for Powder Dyestuff Systems in Textile Industry***	***Ozgur Turay Kaymakci;*** Yildiz Technical University, İstanbul, Turkey
ETT0044	***Methods of line balancing in garment industry: review paper***	***Ibrahim Abdo Elhawary;*** Department of Textile,Alexandria University,Faculty of Engineering,Alexandria,Egypt.
ETT0090	***Novel techniques to analyse the comfort of car seats***	***Adnan Ahmed Mazari;*** Department of Clothing, Technical University of Liberec, Czech Republic
ETT0067	***The Effects of Different Types of MWCNTs on the Mechanical Properties of Textile-Based Composites***	***Hande Sezgin;*** Department of Textile Engineering, Istanbul Technical Uni., Turkey
ETT0147	***3D Revolution in the Fashion Industry***	***Candan Ayla;*** Department of Fashion and Textile, Faculty of Fine Arts and Architecture, Gedik University, Istanbul, Turkey

SUNDAY – 15 APRIL 2018

BÜYÜKADA HALL

14:00 – 15:15 (Protective Textiles and Composite Materials)

Chair Person: Prof.Dr.Mustafa E. Üreyen; *Anadolu University*		
ETT0065	***Improving the Water Resistance of Filament Woven Fabrics with Microfilament Yarns***	***Maher Alsayeed;*** Textile Engineering Department, Gaziantep University, Turkey
ETT0177	***Sound Absorbing Properties of Nonwoven Fabrics Produced from Biofibres for Automotive Applications***	***Mustafa Sabri Özen;*** Department of Textile Engineering, Marmara University, Technology Faculty, Istanbul, Turkey
ETT0198	***Potential of Using Sandwich Panels of Flax Fibers Waste in Thermal Insulation and Other Applications***	***Alaa Arafa Badr;*** Textile Engineering Department, Faculty of Engineering, Alexandria University, Egypt
ETT0064	***The globalization of the Egyptian cotton industry quality via the engineering units, part2: the impact of the latest Egyptian cottons generation on the yarn quality factor***	***Ibrahim Abdou Elhawary;*** Textile Engineering Department, Alexandria University, Egypt
ETT0132	***Investigation Of Antibacterial Properties of PVA/Gelatin/ Benzalkonium Chloride Composite Nanofibers Obtained By Electrospinning Method***	***Onur Yolay;*** Department of Nutrition and Dietetics, Istanbul Aydin University, Istanbul, TURKEY

15:15– 15:30 COFFEE BREAK

15:30 – 16:45 (Biologically Inspired Textiles and Technical Textiles)

Chair Person: Dr. Muhammad Tahir; *National Textile University, Faisalabad, Pakistan*		
ETT0084	***Lotus Effect Inspired Materials: Contact Angle Validation on Modified Ramie Yarn for Self-Cleaning Textile***	***Adi Surya;*** Materials Science and Engineering Department, Institut Teknologi Bandung, West Java 40132, Indonesia
ETT0175	***Microclimate regulation with spacer fabrics***	***Musa Akdere;*** Institute for Textile Technology of RWTH Aachen University, Aachen, Germany
ETT0037	***Investigation on Unevenness, Hairiness And Frictional Properties of Some Regenarated Cellulosic Yarns***	***Oğuz Demiryürek;*** *Textile Engineering Department, Erciyes University, Kayseri, Turkey*
ETT0140	***Sensory carbon rovings used for leakage detection in water pipes made of textile reinforced concrete***	***Gözdem Dittel;*** Institut für Textiltechnik, RWTH Aachen University, Aachen, Germany
ETT0143	***Investigation of thermal degradation of Wool/PA blends by TGA and MCC***	***Elif Kaynak;*** Anadolu University, Faculty of Engineering, Chemical Engineering Department, Eskişehir, Turkey

17:00 – 18:00 POSTER PRESENTATION
(Second Part: 30 Posters; see details at the poster list)

*** The poster presentation certificate will be given during the poster session.**

*** Poster Session Chairs:** Dr. Mustafa Sabri Özen; Dr. Erhan Sancak; Dr. Muhammet Uzun

18:30 – 20:30 COCTAIL AND GALA DINNER - INTEREXPO HALL

MONDAY – 16 APRIL 2018

PARALLEL SESSIONS

KARADENİZ HALL

10:00 – 11:15 (Technical Textiles)

Chair Person: Prof.Dr. Müge Yükseloğlu; *Marmara University*		
ETT0125	***An Investigation on Thermal Conductivity Properties of Epoxy Based Twill Fabrics Carbon Composites***	***Oğuz Eryilmaz;*** *Department of Textile Engineering, Marmara University, Istanbul, Turkey*
ETT0131	***Artistic Design With Technical Textiles***	***Çimen Bayburtlu;*** Marmara University, İstanbul, Turkey
ETT0154	***Perspective Of Printing Industry To The Technical Textiles: Wallpaper***	***Gülhan Acar Büyükpehlivan;*** Marmara University, İstanbul, Turkey
ETT0058	***Analyzing the Effect of Air Gap Created by Insertion of Shape Memory Alloy Springs Between Fabric Layers of Protective Clothing Against Convective and Radiant Heat***	***Elif Yilmaz;*** *Emel Akın Vocational School, Ege University, Izmir, Turkey*

MARMARA HALL

10:00 – 11:15 (Technical Textiles)

Chair Person: Dr. Mustafa Sabri Özen; *Marmara University*		
ETT0162	***Level of Recognition of Technical Textile Terms by University Students***	***Gülden Turhan***; Department of Textile Engineering, Marmara University, Istanbul, Turkey
ETT0146	***Electronic Textiles (E-Textile)***	***Tuğçe Işgören;*** Institute of Pure and Applied Science, Marmara University, Istanbul,Turkey
ETT0101	***Historical Development of Swimsuit as a Textile Product and Its Effects on Swimming Performance***	***Ismail Yüce;*** Trakya University, Edirne, Turkey
ETT0159	***Ultrasonic assisted surface treatment of okra fibers***	***Büşra Ardıç;*** Deparment of Polymer Science and Technology, Marmara University, Istanbul

MONDAY – 16 APRIL 2018

BÜYÜKADA HALL

10:00 – 11:15 Student Presentation Section

Chair Person: Dr. Erhan Sancak; *Marmara University*		
ETT0120	***A Review on Bio-Nanofiber Membranes with Herbal Exract Blends***	***Nilşen Sünter Eroğlu;*** Institute of Pure and Applied Science, Marmara University, Istanbul,Turkey
ETT0129	***Antibacterial Properties Of Poliurethane / Benzalkonium Chloride Nanofibers***	***Ayşe Feyza Arslan;*** Institute of Pure and Applied Science, Marmara University, Istanbul,Turkey
ETT0225	***Stab and Slash Resistance in Protective Garments***	***Abdulkadir Pars;*** Institute of Pure and Applied Science, Marmara University, Goztepe, Istanbul,Turkey
ETT0229	***Production and Characterization of Cartilage Tissue Scaffolds by 3D Printing***	***Fatma Betul Erdileri;*** Department of Bioengineering, Faculty of Engineering, Marmara University, Goztepe, İstanbul, Turkey

KARADENİZ HALL

11:30-12:00 ETT2018 Conference Closing Ceremony

12:00-17:00 ITM2018 and HIGHTEX 2018 Exhibitions Technical Visit Free Session

SATURDAY – 14 APRIL 2018

[P-0010] - Comparison of Virtual Try-On in Different 3D Virtual Garment Simulations
Sertaç Güney[1], Kristina Ancutiene[2], Fatma Gürsoy[3], Ibrahim Üçgül[1]
[1]Department of Textile Engineering, Süleyman Demirel University, Isparta, Turkey
[2]Department of Production Engineering, Kaunas University of Technology, Kaunas, Lithuania
[3]Department of Fashion Design, Selçuk University, Konya, Turkey

[P-0026] - A comparison Between the Manual Method and the 3D Programs in the Preparation of Models Draping on the Dress Form
Shadia Hassan Salem[1], Abir Abdelhamid Ibrahim[2]
[1]Department of Home Economics, Faculty of Specific Education, Mansoura University, Mansoura, Egypt.
[2]Department of Clothes and Textile, Faculty of Home Economics, Helwan University, Cairo, Egypt.

[P-0030] - "Utilizing the Aesthetics of Al Musannaf Using 3D Techniques in Design on the Mannequin"
Abir Abdelhamid Ibrahim
Department of Clothes and Textile – Faculty of Home Economics – Helwan University - Cairo – Egypt.

[P-0031] - Utilizing the Aesthetics of Al Musannaf Using 3D Techniques in Design On the Modeling"
Abir Abdelhamid Ibrahim
Department of Clothes and Textile – Faculty of Home Economics – Helwan University - Cairo – Egypt.

[P-0043] - Polyethylene based carbon fiber costing
Tim Alexander Röding, Musa Akdere, Thomas Gries
Institut für Textiltechnik (ITA) der RWTH Aachen University

[P-0046] - Melt spinning of carbonnanoparticle-modified polyamide for technical applications
Merle Orth, Musa Akdere, Thomas Gries
Institut für Textiltechnik der RWTH Aachen University

[P-0053] - Modular machine set-up for the production of split tows and hybrid rovings
Klaus Vonberg, Musa Akdere, Thomas Gries
Institut für Textiltechnik, RWTH Aachen University, Aachen, Germany

[P-0054] - Improve Mechanical Dynamical Properties and Impact Resistance of Polyvinyl Alcohol by Halloysite Nanotubes and Additives
Kourosh Sayar Dogahe, Mohammad Haghighat Kish, Somaye Akbari
Department of Textile Engineering, Amir Kabir University of Technology, Iran, Tehran

[P-0055] - Polyethylene Terephthalate (PET) Based Nanofibrous Vascular Access
Maryam Yousefzadeh[1], Sahar Jafari[2], Maryam Rahmatinezhad[1], Atefeh Solouk[2]
[1]Textile Engineering Department, Amirkabir University of Technology, Tehran 1591634311, Iran
[2]Biomedical Engineering Department, Amirkabir University of Technology, Tehran 1591634311, Iran

[P-0061] - The Effectiveness of using Camera in entering of Clothing Pattern on Graphics Programs
Shadia Salah Salem
Home Economics Department –Faculty of Specific Education-Mansoura University-Egypt

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[P-0071] - Composite Nanostructures in Energy Applications
Havva Baskan[1], Ismail Borazan[2]
[1]Department of Textile Engineering, Istanbul Technical University, Istanbul, Turkey
[2]Department of Textile Engineering, Bartın University, Bartın, Turkey

[P-0073] - The Effect of Cross-linking Agent on the Efficiency of Immobilized B-Cyclodextrins on Cotton
Malihe Nazi[1], Reza Mohammad Ali Malek[2], Fatemeh Bokaeiee Zavareh[2]
[1]Department of Textile and Leather, Standard Research Institute, Karaj, Iran
[2]Textile Engineering Department, Amirkabir University of Technology, Tehran, Iran

[P-0074] - Investigation of the oil absorption of keratin-polypropylene composite
Ali Mianehro, Fatemeh Dadashian
Department of textile, Amirkabir university of technology, Tehran, Iran

[P-0076] - High efficient reactive filtration technology for exhaust air in waste water treatment plants
Lukasz Debicki[1], Thomas Gries[1], Andreas Obermayer[2], Frank Magdeburg[2]
[1]Institut für Textiltechnik der RWTH Aachen University, Germany
[2]Unitechnics KG, Schwerin, Germany

[P-0077] - Tensile Properties of Paper-Waste Derived Lignin Film Reinforced Carbon/PP(Polypropylene) Flexible Laminates
Gaye Yolacan Kaya[1], Yıldırım Çiftçi[1], Nurcan Kurtoğlu[1], Mehmet Daşdemir[2], Yasemin Korkmaz[1]
[1]Department of Textile Engineering, Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey
[2]Department of Textile Engineering, Gaziantep University, Gaziantep, Turkey

[P-0079] - Recycling and Reuse of Clothing and Textiles in Textiles Industry
Norah Nasser Bin Krad
Department of Uk, Heriot- Waatt University, Edinburgh, Uk

[P-0087] - Effects of drought stress in the presence of agrotextile material possessing high water absorption capacity and controlled fertilizer release property
Ilhan Ozen[1], Gamze Okyay[1], Abdullah Ulas[2]
[1]Department of Textile Engineering, Erciyes University, Kayseri, Turkey
[2]Department of Soil Science and Plant Nutrition, Erciyes University, Kayseri, Turkey

[P-0093] - In situ thermoplastic coating of melt spun glass fibres
Alexander Lüking, Richard Haas, Musa Akdere, Robert Brüll, Davide Pico, Thomas Gries
Institut für Textiltechnik RWTH Aachen University, Aachen, Germany

[P-0097] - Micro Capsules towards a better Recyclability of Multi-Material Textile Bonds
Martin Pelzer[1], Gries Thomas[1], Günday Türeli Nazende[2], Rakus Sigrun[3], Bayer Rene[3]
[1]Institut für Textiltechnik der RWTH Aachen University (Germany)
[2]MJR PharmJet GmbH, Überherrn (Germany)
[3]Opti-Polymers GmbH, Rudolstadt (Germany)

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[P-0103] - High performance textiles in space suit
Ayse Feyza Arslan[1], Nuray Oz Ceviz[2], Sevhan Muge Yukseloglu[3]
[1]Institute of Pure and Applied Sciences, Marmara University, Istanbul, Turkey
[2]Clothing Production Technology, Vocational School of Technical Sciences, Marmara University, Istanbul, Turkey
[3]Department of Textile Engineering, Faculty of Technology, Marmara University, Istanbul, Turkey

[P-0108] - Textiles Emitting Far Infrared Rays
Suat Canoglu[1], Ismail Yuce[2], Sevhan Muge Yukseloglu[1]
[1]Textile Engineering, Faculty of Technology, Marmara University, Istanbul, Turkey
[2]Institute of Pure and Applied Sciences, Marmara University, Istanbul, Turkey

[P-0111] - Wound Dressing Materials Made of SF Nanofibers
Sevhan Muge Yukseloglu, Suat Canoglu
Department of Textile Engineering, Faculty of Technology, Marmara University, Istanbul, Turkey

[P-0135] - One Bath Dyeing of PBT/Nylon Blended Seamless Fabrics
Fatma Filiz Yıldırım, Esra Gelgec, Şaban Yumru, Mustafa Çörekcioğlu
OZANTEKS Tekstil San. ve Tic. A.Ş. R&D Center, Denizli, Turkey

[P-0141] - Effect of yttria addition on the microstructure and mechanical properties of alumina doped hydroxyapatite
Suleyman Serdar Pazarlioglu, Serdar Salman
Department of Metallurgy and Materials Engineering, Marmara University, Istanbul, Turkey

[P-0144] - The Standing and Significance of Technical Textiles in Manufacturing of Sportswear
Fatma Çitoğlu
Marmara University

[P-0145] - The Effect of Different Washing Methods in Frequently Used Denim Fabrics on the Fabric Characteristics and the New Generation Denim Fabrics: An Industry 4.0 Application
Fatma Çitoğlu, Nuray Öz Ceviz
Marmara University

[P-0149] - Lanthanum oxide doped hydroxyapatite-alumina composites as a bioceramic
Suleyman Serdar Pazarlioglu, Serdar Salman
Department of Metallurgy and Materials Engineering, Marmara University, Istanbul, Turkey

[P-0151] - The Role of Textile Sector in Personal Protective Equipments
Bekir Oral[1], Erkan Işgören[2]
[1]Department of Property Protection, Vocational School of Technical Sciences, Marmara University, Istanbul, Turkey
[2]Department of Textile Engineering, Faculty of Technology, Marmara University, Istanbul, Turkey

[P-0163] - Camera-based onloom quality control of woven fabrics with complex jacquard patterns
Andreas Münkel[1], Musa Akdere[1], Thomas Gries[1], Oliver Rippel[2], Dorit Merhof[2]
[1]Institute of Textile Technology, RWTH Aachen University, Aachen, Germany
[2]Institute of Imaging & Computer Vision, RWTH Aachen University, Aachen, Germany

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[P-0165] - Price perceptions for smart textile products according to different economic indicators
Gülden Turhan, Mehmet Akalın
Department of Textile Engineering, Marmara University, Istanbul, Turkey

[P-0166] - Effect of microwave energy on sound absorption of chemical treated agricultural fibers
Ayben Adalet Izgi[1], Burcu Yılmaz Şahinbaşkan[2], Nigar Merdan3, Emine Dilara Koçak2
[1]Deparment of Polymer Science and Technology, Intitute of Pure and Applied Sciences, Marmara University, Istanbul
[2]Department of Textile Engineering, Faculty of Technology, Marmara University, Istanbul
[3]Department of Fashion and Textile Design, Istanbul Commerce Univesity, Istanbul

[P-0167] - Electrochemical cleaning of welds with carbon fiber brushes
Felix Pohlkemper, Franz Pursche, Sebastian Oppitz, Thomas Gries
Institut fuer Textiltechnik of RWTH Aachen University, RWTH University, Aachen, Germany

[P-0171] - Improvement Study of Comfort and Protection Properties of Arabic Shemagh Textile
Muna Mohd Hijji
College of Design, Umm Alqura University, Makkah,Saudi Arabia

[P-0176] - Development of Self-Reinforced Bio-Polymer Composites
Musa Akdere[1], Thomas Köhler[1], Christian Vierkötter[1], Justine Beauson[2], Kevin Moser[3], Hans Knudsen[4], Thomas Gries[1]
[1]Institute for Textile Technology of RWTH Aachen University, Aachen, Germany
[2]Technical University of Denmark, Department of Wind Energy, Roskilde, Denmark
[3]Fraunhofer Institute for Chemical Technology ICT, Pfinztal, Germany
[4]Comfil ApS, Gjern, Denmark

[P-0180] - The categories of sports and exercise-related products purchased in the UK and the reasons for their preference
Gülden Turhan, Mehmet Akalın
Department of Textile Engineering, Marmara University, Istanbul, Turkey

[P-0181] - Functional Nanofibers for Wearable Electronics
Maryam Yousefzadeh
Textile Engineering Department, Amirkabir University of Technology, Tehran 1591634311, Iran

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[P-0194] - Cellulose and Protein Waste based Recycled Wallpaper Design
Gülenay Kadıoğlu, Seda Sargın, Muhammet Uzun
Textile Engineering, Faculty of Technology, Marmara University, Goztepe, Istanbul, 34722, Turkey

[P-0197] - Virtual 3D prototyping between fashion design and modern garments production
Danijela Paunović[1], Olga Stojanović[1], Nikola Maksimović[1], Mina Paunović[1], Vesna Marić[2]
[1]*The Collage of Desigdn, Technology and Management, Belgrade, Serbia*
[2]*The School of Textile Design, Belgrade, Serbia*

[P-0199] - The Investigation Of Heating Effect Of Reduced Graphene Oxide Coated Nonwoven Fabric
Nergis Demirel Gültekin, Ismail Usta
Department of Textile Engineering, Marmara University, İstanbul, Turkey

[P-0201] - Bleaching of SeaCell® Active/Cotton Blend Fabrics with Hydrogen Peroxide
Bekir Cenkkut Gültekin
Department of Textile Engineering, Marmara University, İstanbul, Turkey

[P-0203] - Use of Technological Fibers in Clothing Design, Innovative Appearances and Expectations
Demet Öznaz[1], Çimen Bayburtlu[2], Mustafa Selçuk Uzmanoğlu[1]
[1]*Department of Desing, Marmara University, Technicial Vocational High School, İstanbul Türkiye*
[2]*Department of Jewelry Desing, Marmara University, School of Jewelry Technology and Design İstanbul Türkiye*

[P-0205] - Study of the optical illusion on body image perception
Amine Haj Taieb[1], Hela Ennouri[2]
[1]*Textile Design Department, Sfax University, Sfax, Tunisia*
[2]*LGTEx, ISET University, Ksar Hellal, Tunisia*

[P-0206] - Effects of carbon nanotube-phosphorus based flame retardant combinations on flammability of polypropylene
Ayfer Irem Koca[1], Mustafa Erdem Ureyen[2], Gamze Yuksel[1], Fadime Karaer[3]
[1]*Anadolu University, Graduate School of Sciences, Department of Advanced Technologies, Iki Eylul Campus, Eskisehir 26555, Turkey*
[2]*Anadolu University, Civil Aviation Research Center, Iki Eylul Campus, Eskisehir 26555, Turkey*
[3]*Anadolu University, Faculty of Engineering, Environmental Engineering Department, Iki Eylul Campus, Eskisehir 26555, Turkey*

[P-0209] - Investigation of Color and Function Characteristics of Natural Colors Obtained From Roses
Bervan Demir[1], Mehmet Akalin[2]
[1]*Institute of Science, Marmara University, Istanbul, Turkey*
[2]*Faculty of Technology, Marmara University, Istanbul, Turkey*

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[P-0210] - 3D Bioprinted Syntethic Blood Vessels Scaffolds For Cardiovascular Tissue Engineering
Mehmet Onur Aydogdu[1], Muhammet Uzun[2], Oguzhan Gunduz[3]
[1]Department of Metallurgical and Materials Engineering, Master of Science, Institute of Pure and Applied Sciences, Marmara University, Goztepe Campus 34722 Istanbul, Turkey
[2]Department of Textile Engineering, Faculty of Technology, Marmara University, Goztepe Campus 34722 Istanbul, Turkey
[3]Department of Metallurgical and Materials Engineering, Faculty of Technology, Marmara University, Goztepe Campus, 34722 Istanbul, Turkey

[P-0211] - Effect of Voltage on Scaffold Using EHD Bioprinting Hybrid System
Esra Altun[1], Oguzhan Gündüz[2]
[1]Department of Metallurgical and Materials Engineering, Master of Science, Institute of Pure and Applied Sciences, Marmara University, Turkey
[2]Department of Textile Engineering, Faculty of Technology, Marmara University, Turkey
[3]Department of Metallurgical and Materials Engineering, Faculty of Technology, Marmara University, Turkey

[P-0212] - Investigation of lipolytic slightly halophilic bacteria on salted goatskins
Pinar Caglayan, Meral Birbir
Division of Plant Diseases and Microbiology, Department of Biology, Faculty of Arts and Sciences, Marmara University, Istanbul, Turkey

[P-0213] - Proteolytic slightly halophilic bacterial numbers on salted goatskins belonging to different countries
Meral Birbir, Pinar Caglayan
Division of Plant Diseases and Microbiology, Department of Biology, Faculty of Arts and Sciences, Marmara University, Istanbul, Turkey

[P-0214] - The antibacterial effect of green synthesized silver nanoparticles on cotton fabric
Ebru Bozacı[1], Aslı Demir[1], Esen Özdoğan[1], Fatma Ayhan[2]
[1]Textile Engineering Department, Ege University, Izmir, Turkey
[2]Department of Chemistry, Faculty of Science, Muğla Sıtkı Koçman University

[P-0215] - Investigation of Heat Conductivity of Chicken Feather and Pumice Stone Reinforced Composite Materials
Sabih Ovalı, Ilsu Sayar, Evin Orhan, Melike Nur Genç, Elif Özer, Muhammet Uzun
Marmara University, Faculty of Technology, Department of Textile Engineering, Istanbul, Turkey

[P-0216] - Protective Fabric Development for the Upholstery Sector
Ramazan Gömeç, Hasan Sağır
Aydın Mensucat Döşemelik Kumaş San. ve Tic. A.Ş. İstanbul/Turkey

[P-0218] - Pomegranate Tannin Based Nanofibers for Wound Dressings Design
Deren Aksoy, Hazal Güler, Muhammet Uzun, Metin Yüksek
Marmara University, Faculty of Technology, Textile Engineering, Istanbul/Turkey

[P-0220] - Production of the Fluorescent Coloured Cotton Fabrics for High Visibility Clothing
Erhan Öner, Nida Beyazay
Department of Textile Engineering, Marmara University, İstanbul, Turkey

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[P-0222] - From Oak to Fabrics Testing and Analyzing Study of cork coated Textile structure
Nihal Sungur[1], Rabia Balci[2], Naime Karanfil[2], Muhammet Uzun[2]
[1]Textile and Clothing Technology,Hs Niederrhein Germany
[2]Department of Textile Engineering, Faculty of Technology Marmara University Turkey

[P-0223] - Development of Novel Barium Sulphate Reinforced Composites for Stab and Slash Resistance Applications
Atakan Yanıkömer, Kerem Köse, Muhammet Uzun
Textile Engineering, Faculty of Technology, Marmara University, Goztepe, Istanbul, 34722, Turkey

[P-0226] - Development Of Composites Feinforced With Hybrid Aramid And Carbon Woven Fabrics For Drone Body
Ayşegül Kurt, Serdar Salman, Erhan Sancak, Nihal Uzun, Esra Kaya, Hilal Uluköylü
Metallurgy And Material Engineering, Technoloyg of faculty, Marmara University

[P-0227] - Development Of Composites Reınforced Wıth Carbon Woven Fabrıcs For Drone Body
Hilal Uluköylü, Serdar Salman, Erhan Sancak, Esra Kaya, Ayşegül Kurt, Nihal Uzun
Metallurgy and Material Engineering, Faculty Of Technology, Marmara University

[P-0233] - Gaining easy cleanability attribute for fabrics made of different raw materials and in different constructions
Mahir Torsun
Kadifeteks Mensucat San. A.Ş., İstanbul

[P-0234] - Production of Flame-Retardant Polypropylene Yarn And Identification of Production Parameters
Mahir Torsun
Kadifeteks Mensucat San. A.Ş., İstanbul

[P-0235] - Production of airplane seat fabric that meets aviation standards
Mahir Torsun
Kadifeteks Mensucat San. A.Ş., İstanbul

[P-0236] - Outdoor Fabric Development
Adem Mutlu, Mahir Torsun
Kadifeteks Mensucat San. A.S., İstanbul

[P-0237] - Decorative Rug Development
Adem Mutlu, Mustafa Kebabci
Kadifeteks Mensucat San. A.Ş., İstanbul

[P-0238] - Development of new upholstery fabric by giving radiance feature to upholstery fabric
Murat Bozkurt, Abdulkadir Yagız
Kadifeteks Mensucat San. A.S., İstanbul

[P-0239] - Development of Functional Upholstery Fabric with AntistaticFeatures
Murat Bozkurt, Abdulkadir Yagız
Kadifeteks Mensucat San. A.S., İstanbul

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[P-0240] - Characteristic properties of Astrakhan furs produced from lambskins
Nilay Örk, Irfan Akça, Gökhan Zengin, Arife Candaş Adıgüzel Zengin, Behzat Oral Bitlisli
Ege University, Engineering Faculty, Leather Engineering Department, 35100, İzmir, Turkey

[P-0241] - Increasing Leukocyte Hormone in the Body by Adding Ginger Nanofiber to Artificial Kidney
Dicle Ayça Ertek[1], Muhammet Uzun[2], Metin Yüksek[2]
[1]*Textile Engineering Department, Textile Engineering Faculty Technical University of Liberec, Czech Republic*
[2]*Textile Engineering Department, Technology Faculty Marmara University, Turkey*

[P-0243] - Printability of Bamboo Jersey Fabrics in Thermal Transfer Printing System
Sinan Sönmez[1], Muhammet Uzun[2], Ahmet Akgül[1]
[1]*Marmara University, Scholl of Applied Sciences, Department of Printing Technologies İstanbul, Turkey*
[2]*Marmara University, Faculty of Technology, Department of Textile Engineering, İstanbul, Turkey*

MARMARA ÜNİVERSİTESİ

MARMARA ÜNİVERSİTESİ YAYINEVİ

KEYNOTE/INVITED SPEAKER TEXTS

MARMARA ÜNİVERSİTESİ

ETT-K2

Multi-Walled Hollow Nanofibers and Their use as Reinforcing/Healing Agents in Nanocomposites

Jamal Seyyed Monfared Zanjani[1,2], Burcu Saner Okan[1,2], Mehmet Yildiz[1,2] and Yusuf Menceloglu[1,2]

[1]Faculty of Engineering and Natural Sciences, Materials Science and Nano Engineering, Sabanci University, Tuzla, Istanbul 34956, Turkey.

[2]Sabanci University Integrated Manufacturing Technologies Research and Application Center & Composite Technologies Center of Excellence, Teknopark İstanbul, 34906 Pendik, İstanbul

Man-made fibers with enhanced performance, multi-functionality, and flexible design have played a key role in technological developments in recent years. Fiber reinforced polymeric composites is one of the proliferating industries closely depending on man-made fibers. The most common fibers used in these composites are glass or carbon fibers with their own unique advantages. However, both carbon or glass fibers reinforced polymeric composites are extremely vulnerable to crack initiation and growth, and subsequent mechanical properties degradation. To address this problem and prolong the effective lifetime of the composite structures, self-healing capability can be integrated into the composites through embedment of multi-walled polymeric fibers with self-healing functionality. The self-healing fibers repair cracks deep inside the composite structure by delivering a reactive liquid healing agent encapsulated in their cores into the fractured areas. Herein, we make use of a direct, one-step tri-axial electrospinning process to fabricate multi-walled polymeric fibers with a novel architecture. Different healing agents were encapsulated inside the fibers with two separate protective walls. The incorporation of continues electrospun fibers in the composite structure provides exceptional property of continuous and repeated delivery of healing agent in the damaged area. Presence of an extra layer in the fiber structure facilitates the encapsulation of healing agents and extends the efficiency of the healing functionality. We first take a systematical optimization approach to produce tri-axial hollow electrospun fibers with tunable fiber diameters and surface morphology. Next, the effect of tri-axial hollow fibers as a primary reinforcement and co-reinforcement in the presence of glass fibers is scrutinized from a material selection point of view. Furthermore, multi-walled fibers were utilized to encapsulate different healing agents inside the fibers and successful and recurring self-healing ability were achieved while preserving the mechanical properties of the composites.

Presented at Man-Made Fibers Congress on September, 13-15, 2017, Dornbirn

ETT-INVITED-3

Ergonomic Production Strategy in Future Garment Industry

Gordana Colovic

The College of Textile – Design, Technology and Management, Belgrade SE-ERGO, Belgrade

Abstract: The value of ergonomics is beyond health and safety. This paper emphasizes how ergonomics can add value to a garment company's business strategy. Ergonomics increases the efficiency and productivity of production or business system, improves health, safety and comfort of a man in his working environment. Ergonomics can contribute to many different company strategies and can support the objectives of different business functions. Ergonomic production strategy provide the greatest long-term effectiveness through high-impact and permanent ability to work in the garment industry.

From the standpoint of the interest of fashion companies, taking care of health and safety contributes to increased productivity and efficiency in a way that:

1. directly affects the maintenance of working capacity,
2. reduces the cost for replacement of absent workers due to disability,
3. eliminates the costs of any fines for violating the legal safety norms at work,
4. eliminates the possible costs of compensation for occupational injury and disability,
5. has a positive effect on the company's image in the public and the labor market,
6. reduces employee dissatisfaction with unacceptable conditions, etc.

Keywords: ergonomics, strategy, garment industry, productivity

ETT-INVITED-4

Triboelectricity: New Paradigms for Potential Wearable Energy Harvesters

Navneet Soin,[1] Pengfei Zhao,[1] Prashanthi Kovur[2] and Jikui Luo[1]

[1]School of Engineering, University of Bolton, Bolton BL3 5AB, United Kingdom
[2]Ingenuity Lab, Department of Chemical and Materials Engineering, University of Alberta, Canada

Wearable energy harvesting devices and architectures are becoming ever more desirable for the realisation of flexible and wearable electronics. The recently invented triboelectricity-effect based generators offer significantly higher power output than the previously developed piezoelectric energy harvesters. Unlike the piezoelectric materials which rely on the non-centrosymmetric materials to create a net polarisation charge, the triboelectric materials rely on the difference in the electronegativity of materials and electrostatic induction to produce the electrical output.

The talk will focus on the research work carried out at the University of Bolton including the development of all fibre 3-D piezoelectric textiles (with a power output of 5 μWcm^{-2})[1] to the more recent work on triboelectric energy harvesters (with power outputs of nearly 40 Wm^{-2})[2-5]. Using a variety of materials including polyvinylidene fluoride (PVDF), polyamide (PA), polytetrafluoroethylene (PTFE) and in-depth advanced analysis techniques such as electrostatic force microscopy, the effect of addition of specific nanomaterials and surface architecture on enhanced triboelectric output will be discussed. Strategies on the inclusion of these architectures for development of energy harvesting textiles will also be discussed.

[1] "Novel "3-D spacer" all fibre piezoelectric textiles for energy harvesting applications", N Soin, TH Shah, SC Anand, J Geng, et al *Energy & Environmental Science,* 2014, 7 (5), 1670-1679

[2] "High performance triboelectric nanogenerators based on phase-inversion piezoelectric membranes of poly (vinylidene fluoride)-zinc stannate (PVDF-ZnSnO 3) and polyamide", N Soin, P Zhao, K Prashanthi, J Chen et al, *Nano energy*, 2016, 30, 470-480

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MARMARA ÜNİVERSİTESİ YAYINEVİ

ORAL ABSTRACTS

MARMARA ÜNİVERSİTESİ

ETT0009

Bi-stretch Woven Fabrics with Auxetic Behavior

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Auxetic fabrics are a special kind of textile materials which possess negative Poisson's ratio. Opposite to most of conventional fabrics, auxetic fabrics get bigger in the transversal direction when stretched or get smaller when compressed. A number of fascinating properties are also linked with auxetic behavior, such as enhanced porosity under extension, excellent formability to curved surface, high energy absorption ability. The comfort and shape fitting ability of sportswear can also be enhanced by using auxetic fabrics. Due to lateral shrinkage of conventional fabrics an additional pressure is exerted on the skin by the fabric which limits the muscular movement, causing discomfort and bad fitting at joint parts of the body. Since the deformation behavior of the auxetic fabrics will be consistent with that of the body, there will be no additional pressure and muscular and joint movement will not be restricted. The shape fitting will also be improved. To fabricate the auxetic fabrics by using readily and inexpensively available conventional fibers, yarns and machinery have gained extraordinary curiosity of researcher in recent past years. However this approach is adopted to fabricate knitted fabrics and uni-stretch woven fabrics only. Bi-stretch woven fabrics with negative Poisson's ratio are possible, but special structural geometries capable of inducing auxetic behavior should be realized into fabric structure. Such geometries can be realized by creating differential shrinkage phenomenon in to the fabric structural unit cell. In this study, a new class of bi-stretch auxetic woven fabric with different geometries and deformation behaviors possessing negative Poisson's ratio is designed and produced by employing the phenomenon of differential shrinkage while, using the available conventional weaving technology and conventional yarns. The developed bi-stretch woven fabrics exhibited negative Poisson's ratio over a wide range of tensile strain.

Keywords: Auxetic, differential shrinkage, negative Poisson's ratio, transverse strain

ETT0012

Optimization of Ring Spinning Process Parameters of Cotton Yarn

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Cotton is most commonly used natural fiber and have major contribution in yarn manufacturing. This yarn subsequently utilized for the production of fabrics, garments and other textile products. The quality of end product is depending on the selection of appropriate spinning process and production parameters. Numerous methods and process are involved for the production of yarn. Ring spinning machine is most useful machine for the production of cotton spun yarn. It is required to optimize the process parameters of ring machine to enhance production of yarn without disturbing the yarn quality. In this study, the process parameters (spindle speed, twist, yarn diameter) were studied which affect the yarn quality. These parameters have been optimized by applying the multiple linear regression analysis.

Ring frame is considered to be important because of the last machine involve for the production and quality of the yarn. The ring spun processes parameters, affecting the spun yarn quality parameters like evenness and yarn imperfection. In this research work, the models for predicting the most significant ring spun yarn quality parameters were constructed by utilizing USTER evenness tester data. Count of yarn, yarn twist and spindle speed were selected as predicator as its major effect on yarn characteristics. The 135 ring yarns samples have been produced from 3 dissimilar yarn count at three different spindle speeds and twist level on the identical spinning machine, position and condition Each yarn was spun in three yarn counts (8 Ne, 16 Ne and 24 Ne) at three different Twist multipliers (3.8, 4.0 and 4.2) and spindle speed (9500 rpm, 10500rpm and 11500 rpm). The multiple regression method has been used to find out the relation amongst the process parameters and yarn quality characteristics. The high values of R2 (the coefficient of determination) shows the relationships in the prediction model

Keywords: count, imperfection, spindle speed, Twist.Multipilier

ETT0013

Improving Pattern Design for Women's Upper Body Clothing

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To produce clothing, the most important question would be 'What sizes do I make, to cater for the target population most accurately?' states Chan (2014). From the consumer's perspective, the sizing and labelling of clothing can cause confusion over not knowing what size they should purchase. Retailers decide their own body measurement charts, which are developed from an idealistic fit model size, as shown in Faust and Carrier (2010), commonly a UK10B cup. For the size range, the bust suppression for the bust cup size remains the same, at a B cup, according to Bye (2008). White and Scurr (2012) claim body sizes have changed substantially, with many UK women now purchasing a D cup bra or larger. With technological advancements in bra design, sizing up, lifting and shaping, many women are larger than the B cup-clothing model, either naturally or enhanced. Therefore one of the fundamental challenges women encounter, is not what size am I? It is what size will fit my bust.

Fit, proper fit, is not about size or measurements; it's all about shape. The body is three-dimensional, and when clothing patterns are developed that actually represent the three-dimensional shape of bodies, clothing will fit increase sharply (Gribbin, 2014). Creating size charts, the bust measurement is seen as a total girth body measurement, without the consideration for a woman's bust cup size. This research will develop a sizing system with bust cup size integration in the pattern construction, which respects the contours of a woman's body. The focus will be on fitted clothing, where the pattern cutting of the garment needs to conform to a woman's 3D shape. The outcome will be a sizing system of sizes within sizes, enabling women to purchase upper body clothing relative to their bust cup and body size.

Keywords: Clothing sizes, Close fitting garments, Experimental pattern cutting, Bust cup size integration, New sizing system

ETT0014

The Investigation of Clothing Fit Using 3D Virtual Prototyping

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Clothing industry rapidly turns to 3D virtual simulation to present realistic 3D view of garment and to simulate mechanical behaviour of fabrics. 3D garment and virtual prototyping nowadays are one of the most interesting topics in textile engineering and 3D garment CAD. Virtual prototyping provides the opportunity to check garment fit in various fabrics and sizes. For fit purpose, the values of distance ease, the shape of simulated garment and strain distribution in it could be analysed without actually producing the garment.

The aim of this research was to investigate virtual clothing fit in respect to fabrics mechanical properties by determining distance ease between body and garment. In this research 3D women mannequin was covered with virtual garment stitched in Modaris 3D (CAD Lectra) software. Garment fitting was done using seven fabrics mechanical properties of which were defined using KES-F.

In this research ease allowance value at bust, waist and hip girths in 2D basic construction was changed from 0 cm to 8 cm (step 1 cm) and garment distance ease between body and 3D virtual garment was measured. Distance ease distribution in virtual garment was investigated too. It was displayed by colours, where red colour represents tight areas, while blue colour represents loose areas. The cross-sections of body and garment were analysed also.

By increasing of 2D patterns ease allowance, 3D garment distance ease changes proportionally but differently using various fabrics. This could be described by a second degree polynomial function. Distance ease value in 3D garment was lower than ease allowance value used in 2D patterns because of mechanical behaviour of fabrics. Correlation analysis between 3D distance ease and mechanical parameters showed that tensile strain in weft direction had strong positive relation. However, correlation with bending and shear rigidity, also thickness and area density were less significant.

Keywords: Virtual prototyping, clothing fit, 3D CAD, fabrics

ETT0015

Investigation on the Effect of Garment Fit on Thermal Transfer Performace of Clothing by Combining Non-Contact Measuring Tools

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[2]*Deparment of Fashion Design, İstanbul Arel University Vocational School, İstanbul, Turkey*

Compression sportswear are generally produced from knitted strecth fabrics, which get extended on wearing and remain in the extended state. Since they are worn next to skin and are direct contact with the body surface, their thermal comfort properties are effective on overall clothing comfort. In this paper, an investigation has been made to evaluate the effect of garment fit and fabric extension on the thermal transfer performance of clothing. The method using the combination of infrared thermal camera and 3D virtual garment simulation has been developed considering the fabric extension and clothing surface temperature of different body parts without contacting body and clothing surface directly. Two type T-shirts were produced by changing the bust and waist measurements and their thermal transfer performance were investigated in wear trials on subjects having different size (Small-Medium and Large size) in a standart enviromental chamber. Fabric extension results were taken from virtual avatar having the same body measurements as subject in 3D virtual garment simulation. Temperatures changes on different body parts according to the wearing protocol were investigated in thermal camera software (Flir Tools). The experimental results show that compression garment fit and fabric extension influence the heat transfer and clothing surface temperatures. In the sportswear industry, Optimal garment fit should be defined for designing sportswear, especially for performance sportswear.

Keywords: compression sportswear, garment fit, thermal comfort, 3D virtual simulation

Infrared thermal camera measurement



Clothing surface temperatures were measured in thermal camera software (Flir Tools)

ETT0017

Cost Efficient Production of High Performance Carbon Fibers

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Despite their outstanding lightweight construction potential, carbon fibers are rarely used today in mass applications. One of the main reasons is the high price of 12 – 25 € / kg, caused by the energy and therefore cost-intensive production process. A main cost driver is the process of stabilization with long residence times between 60 - 100 minutes at temperatures up to 280 °C.

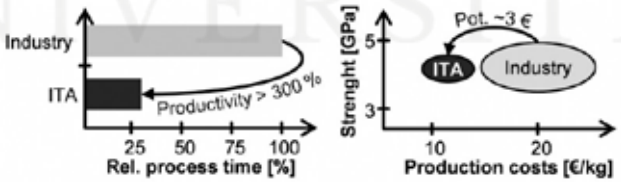
The aim of this research is to reduce the stabilization time in order to reduce the total production costs. Specifically, the process parameters temperature, residence time and draw ratio are adapted to the chemical and thermal precursor properties. As different precursors differ in their properties, a methodical procedure has been developed by which process parameters of stabilization and carbonization are developed for a given precursor and its specific properties.

As a result, a stabilization time of 22 minutes is achieved with process stability and process reliability. The minimum possible stabilization time is 15 minutes. However, such low residence times lead to an increased evolution of toxic gases, which lead to an insufficient process stability. At a residence time of 22 minutes, a tensile strength of 4.1 GPa and a modulus of 220 GPa is achieved. The mechanical properties excel the level of common industrial carbon fibers (e.g. Toray T300, Toho Tenax HTS 40).

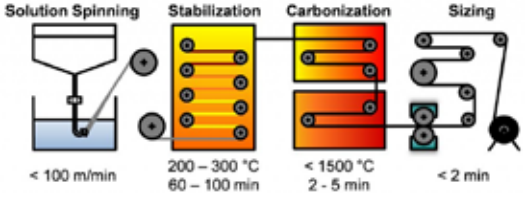
One big advantage of the method is the use of existing, conventional plant technology, whereby the transfer to industrial production lines is possible without additional investment costs. A reduction in production costs of up to 3 € / kgCF is possible. Conceivable are 2 different variants: On the one hand the startup of a new production line with smaller furnaces and thus reduced investment costs. On the other hand, the acceleration of the production speed of existing production lines.

Keywords: Carbon fibre, CFRP, Stabilization, Carbonization

Main results for a stabilization time of 22 Minutes



Process chain of carbon fibre production



ETT0020

The Dervish Sound Dress; A Garment Using Wearable Technology with Sound Vibrations

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Department of Art and Humanities, Plymouth University, Plymouth, United Kingdom

The Dervish Sound Dress is a conceptual fashion garment derived from influences surrounding the Turkish Mevlevi *sema* performance.

The Mevlevi order originated around the 13th century through Jalal-addin Muhammed Rumi, a Persian poet and Sufi mystic. After his death, his followers gathered and performed poetry with music and movement, which eventually evolved into the 'turning' practice known as the 'Whirling Dervish'. The performance was never intended to be an attraction for tourists, as it has become nowadays, when it is accessible for the public to view it; rather the ritual is meant to be a spiritual expression of love and devotion for God. The music that is used during the *sema* enhances the Dervish's experience of striving to attain a higher level of consciousness and connection to his faith.

The Dervish Sound Dress would act as the instrument itself, with sensors, actuators and e-textiles following the gestural movements of the performer. The dress is meant to bring the wearer a more intimate experience with music, similar to the way in which a Dervish experiences music through a transcendental state of turning, focusing on the sound and movement during a performance. The concept is derived from the experience felt when one plays an instrument, such as a guitar, which is placed close to the body, or the reverberation that is felt in the fingers when one plays the piano. To translate this emotion into a garment that can be worn not just as a performance piece, but to experience the sensation created by musical vibrations, would be valuable to the wearer.

Keywords: wearable technology, computer music, fashion, e-textiles

ETT0021

Microwave Energy-based Fabrication of Hierarchically Structured Carbon Nanotube/Fibrous Material Composites

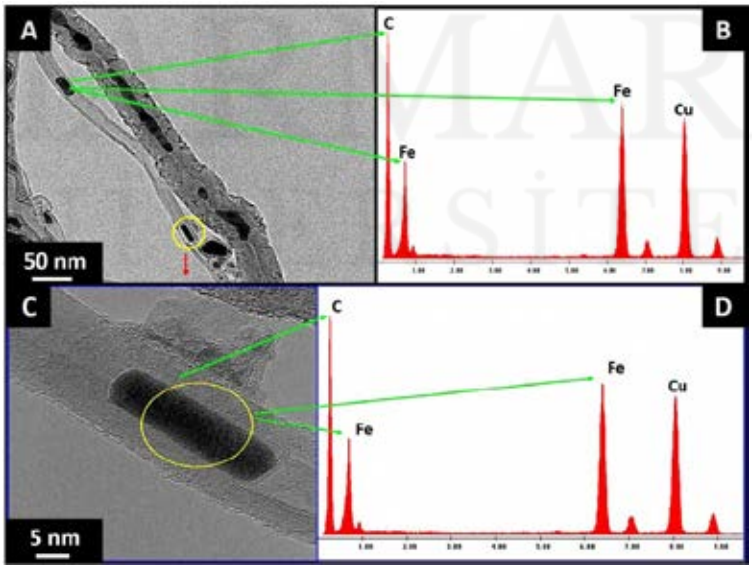
Selcuk Poyraz

Department of Textile Engineering, Corlu Faculty of Engineering, Namik Kemal University, Tekirdag, Turkey

Through a facile, simple, yet efficient, affordable and ultrafast (max. 60 s) microwave (MW) energy-based heating process, hierarchically structured composites made up of fibrous textile materials decorated with multi-walled carbon nanotube (MWCNT) forest were produced at ambient conditions in one-step. Morphological features of the as-produced composites were characterized in details by using scanning and transmission electron microscopy (SEM, TEM) and the elemental analysis (EDX) techniques. Both the composite material characterization results and the versatile and easily controllable nature of the above mentioned process strongly support its promising success for the fabrication of such hierarchically structured composites that could be effectively used for the next generation advanced engineering applications.

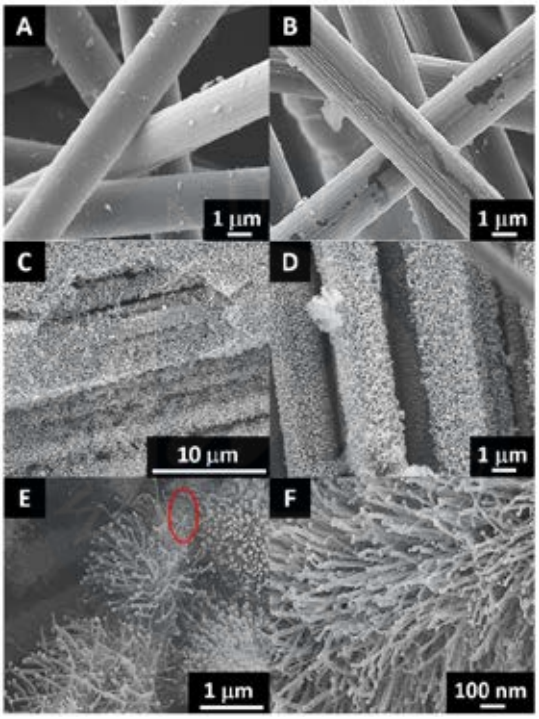
Keywords: Microwave energy, Carbon nanotube, Fibrous material, Hierarchical composite

A. TEM image of the catalyst iron NPs encapsulated within the as-grown MWCNTs, B. the EDX diffractogram of the catalyst iron NP and the as-grown MWCNT, C. HR-TEM image of the marked area in A, and D. the EDX diffractogram of the marked area in C



SEM images of; A.-B. CFs before and after MW pre-treatment, C.-D. hierarchically structured CNT/CF com-

posites, E. CFs covered by the as-grown CNT forest on their surfaces, F. zoomed-in view of the marked area in E



MARMARA ÜNİVERSİTESİ

ETT0028

Utilizing an Alternative Paradigm for the Development of Bacterial Cellulose in the Textile and Apparel Industry

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[2]*Creative Industries, Queensland University of Technology, Brisbane, Australia*

This conceptual paper discusses and advocates for a new design paradigm to be implemented, aimed at the development and implementation of bacterial cellulose within the textile and apparel industry using different methods of garment production. Bacterial cellulose has received emerging attention due to its unique structural properties. Unlike plant cellulose, bacterial cellulose consists of nearly pure cellulose and is created without the impurities commonly found in plant cellulose. However, bacterial cellulose currently has a restricted applicability due to its limited capabilities as a textile. The research conducted constructed an alternative design paradigm for bacterial cellulose synthesizing Stegall's four philosophies for an ecologically-intentional design. Furthermore, the following three scenarios in the development of bacterial cellulose were created consisting of an ecologically-intentional design: community led, international research collaborations, and corporate-focused.

Keywords: bacterial cellulose, development, ecologically-intentional design, paradigm, sustainability

ETT0032

Mechanical and Impact Properties of Packaging-Waste/ E-Glass/Epoxy Sandwich Composites for Construction Applications

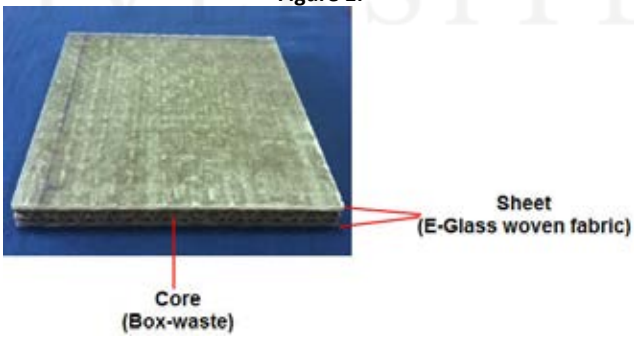
***Gaye Yolacan Kaya*, Neslihan Hayta**

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Using textile structural composites improves day by day in various industries due to their high specific strength and modulus, good fatigue and corrosion resistance. The most important reasons for the increased use of textile structural composites are the increased expectations for product performance and demand for lightweight materials in global markets. Rapid economic growth, urbanization, rising in population and welfare level lead to an increased amount of waste production. In Turkey, the annual average of solid waste is 25 million tons and 20% of this waste consists of packaging waste. In this study, a new sandwich material was developed for construction applications with low cost and high performance by using box wastes as core and E-Glass woven fabric as sheet materials. The mechanical properties were investigated by 3-point bending test and their impact behaviour was compared after low-velocity impact tests in different energy levels. The core material had negligible bending and impact resistance. The bending strength/modulus of sandwich composites was dramatically higher than those of sheet material. Low-velocity impact results showed that absorbed energy and damaged area increased with increasing impact energy level. It could be concluded that the developed sandwich composites absorb more energy with small damaged areas and therefore can be considered as damage resistant materials for constructional applications as door and siding. The thermal insulation properties of these new sandwich composites will be also investigated in future researches.

Keywords: sandwich composites, packing-waste, E-Glass/epoxy composites, bending strength, impact resistance

Figure 1.



View of packaging-waste/E-Glass/epoxy sandwich composite.

ETT0034

Bending Behavior of Nanoprepreg 3D Carbon/Epoxy MWCNT Composites

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The flexure properties of nanostitched and nanoprepreg based three dimensional (3D) carbon/epoxy composites were studied. Stitching or nano or both stitching and nano slightly improved the bending strength and modulus of stitched and stitched/nano composites. The flexure failure of the base and base/nano structures was matrix and fiber breakages and large delaminated areas, whereas the stitched and stitched/nano composites had lateral matrix-multiple warp and stitched yarn breakages, and the delaminated areas were confined at the small area. The result showed that the introducing the stitching fiber and multiwall carbon nanotubes in the base structure improved its out-of-plane failure properties as a form of restricted delamination. Therefore, the stitched/nano composites could be considered as damage tolerance material.

Keywords: Carbon nanotubes, PAN carbon fiber, para-aramid fiber, nanoprepreg, nanostitching, mechanical properties.

ETT0036

"Investigation of Sound Insulation Parameters of Nonwoven Surfaces Obtained From Chicken Feather Fibers Using Low Melt Fibers"

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Sound absorbing materials are widely used to provide acoustic comfort in indoor places. Nowadays, many types of sound absorbing materials have been developed and mineral and polymer based natural, artificial and synthetic materials are used for the development of these materials. An important group of sound absorbing materials are the materials which have a porous structure. The most important part of these materials is the fibrous and cellular materials. This study is about the production of nonwovens from chicken feathers which have a cellular interior. In this way, it is possible to combine the properties of both cellular and fibrous materials.

In this study, thermal bonding method was used to produce a nonwoven surface from chicken feathers for sound insulation. Polyester based bicomponent fiber was used to connect the fibers together. The bicomponent fibers were mixed with the chicken feathers at specific ratios to produce nonwoven surfaces with hot pressing method. The samples were rested under normal atmospheric conditions for 48 hours and samples were prepared to measure the sound insulation parameters in the impedance tube. The measurements were performed according to the standard and each sample was measured in single, double and triple layers to see how the sound insulation parameters changed depending on the material thickness. Examination of sound absorption parameters revealed that the developed material has the ability to absorb sound at high frequencies like all porous materials. Two and three layer samples showed the good results in terms of sound absorbing properties at medium and low frequencies. Developed materials are cheap and easy applicable materials and also light. Production of these materials from waste raw materials show that these materials are so attractive.

This study is financially supported by the research project which's number is 115M725 by TÜBİTAK.

Keywords: chicken feather fibers, sound absorption materials, nonwoven, sound insulation, microporous materials, microcellular materials

ETT0037

Investigation on Unevenness, Hairiness and Frictional Properties of Some Regenarated Cellulosic Yarns

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Textile Engineering Department, Erciyes University

One of the important issues in fabric production is yarn friction. Yarn is subjected to friction in most of the process stages both for knitted and woven fabric production and sometimes yarn breakages may occur. Yarn friction may be related with fibre characteristics, yarn linear density, twist factor and also with other conventional yarn properties such as unevenness and hairiness. In order to investigate the unevenness, hairiness and frictional properties of regenerated cellulosic yarns; cotton, viscose, modal and bamboo fibres were spun in five different twist coefficients (αe:3.5, 3.7, 4.0, 4.2, 4.5) and in four different linear densities (Ne 16/1, 20/1 24/1, 28/1) in ring spinning system. The related yarn properties were investigated by using statistical analyses techniques. In conclusion, the fibre type is observed as a significant factor on yarn properties. Yarn linear density also affects the yarn properties. In contrast to the expectations, twist coefficient had minor effect on yarn characteristics, especially for friction coefficient.

Keywords: Cotton/viscose/modal/bamboo, unevenness, hairiness, friction coefficient

MARMARA ÜNİVERSİTESİ

ETT0038

PAN/AgNO3 Electrospun Nanofibers with Improved Conductivity for Sensor Applications

Sebnem Duzyer

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Electrically conductive nanofibers have gained much attention due to their superior properties like high ratio of surface area to volume, flexibility, light weight, good mechanical strength and adequate electrical conductivity. Therefore, these structures have potential application areas such as sensors, energy harvesting devices, field-effect transistors and photovoltaic devices.

Since nanofibers have very small diameters, electrical conductivity is expected to increase because of the confinement. Therefore researchers focus on the fabrication of conductive nanofibers and their potential applications.

In this study, conductive PAN nanofibers were produced by electrospinning with the addition of silver nitrate (AgNO3) into the spinning solution with different ratios. The effect of AgNO3 amount on the electrical conductivity of the nanofibers were investigated. The surface characteristics and electrical properties of the electrospun mats were evaluated. Smooth nanofibers with diameters under 1 µm were obtained. With the increasing AgNO3 amount, the conductivity values were increased. It was seen that the conductivity results were comparable with literature and conductive PAN/AgNO3 nanofibers are promising for sensor applications.

Keywords: conductive nanofibers, electrospinning, sensors

ETT0039

Improved Biobased Fibres for Clothing Applications

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1. Introduction : Polylactic acid (PLA), the first melt-processable synthetic fibre produced from annually renewable resources, combines ecological advantages with excellent performance in textile. PLA successfully bridges the gap between synthetic and natural fibres and finds a wide range of uses, but despite their large market share, commercial PLA grades still do not fulfil all the mechanical and thermal requirements for some applications.

To solve these limitations FIBFAB project is working on the development of a new biocompound that fulfil the desired properties for textile clothing applications as well as the suitability to be used in industrial fibre production.

2. About FIBFAB project: FIBFAB project aims to industrialize and successfully launch the production of biodegradable and sustainable polylactic acid (PLA) based fabrics (wool/PLA and cotton/PLA) for the applications in casual, protective and workwear clothing, and to overcome the current limitations of PLA fibres as a real alternative to current fabrics (wool and cotton combined with polyester fibres). The advantages of the project are based on:

• To obtain a final clothing product 100% bio-based and biodegradable that meets the mechanical performance requirements of the textile sector.

• To improve the thermal resistance of PLA fibres (target > 100°C).

• To improve extrusion process for PLA fibres (fine fibres less than 3 dtex, friction control in ring spinning process) to be able to spin PLA blend fibres at high speeds.

• To reduce the market dependence of Asian countries and improve the competitiveness of the textile sector by creating a new concept of clothing that fits the expectations of customers with high ecological awareness.

It is a two-year project founded by the EU's Horizon 2020 research and innovation programme under grant agreement Nº 737882.

First formulations have been obtained and processed by extruded staple fibres during the first year of the project (2017) with promising results.

Keywords: poly(lactic acid), fibre, crystallinity, thermal resistance

ETT0041

An Automatic Mechatronic System Design for Powder Dyestuff Systems in Textile Industry

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[2]*ENMOS Endüstriyel Otomasyon Elektronik ve İmalat San.Tic.Ltd.Şti*

In textile industry, the quality of the fabric is directly related to the machinery used in production, as well as the materials used. At this point the dye intended for use must be weighed automatically with a high degree of precision. After a homogenous and complete dissolution has been achieved, it have to be transmitted quickly and lossless to the relevant dyeing machine pot. This process, which seems simple but has a direct effect on the quality of the product, must be fully interactive with the active ERP program with a totally automated and high reliable structure such that all the created work orders should be optimally aligned and the dye preparation time will be minimized. The performance of the machine directly affects the quality of the fabric. In this study, in order to realize high precision and optimum production time, the general working structure of the powder dyestuff systems is modeled by discrete event system approach and an optimal supervisory control structure has been introduced by using Petri Nets.

And also the challenges for the powder dyestuff systems will be explained.

Keywords: Industry 4.0, Powder Dyestuff Systems, Petri Nets, Automation, Textile Industry

MARMARA ÜNİVERSİTESİ

ETT0044

Methods of Line Balancing in Garment Industry: Review Paper

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The Ready made garment market in Egyptian industry changed from large homogenous to fragmented heterogeneous market, which requires quick style change in orders and quick solution to line balancing problems.

Line balancing is a common problem in garment industry. Different kinds of algorithms have been applied in the garment industry. Many variables and constraints must be taken into account when designing a manufacturing facility such as an assembly line. For this purpose lots of data are collected from the real and alternative systems in order to find best line balancing solution.

The aim of this research work is to study the factors affecting Line Balancing to identify the bottlenecks and enhance production system performance. Review the previous simulation technique in garment to get a suitable lay out. And finally, to Compare between different kind of models to apply the best one for a small order line to balance it. In the clothing industry, the standard minute time derived from the work study methods is generally assumed as a constant for line balancing. However a lot of factors cause variations on operational time of the same task such as the fabrics, performance of the machinery, working environment, changing styles, consumer demands and quality level of the product. For this reason, time function for every operation was studied, such as; sewing times, machine breakdowns, correcting defective products, and operator breakings as changing bobbins and personal needs.

Finally, it was found that each operation standard time should be presented as a distribution function and then introduced to the simulation model used to design a general layout for garment line which minimize the time as possible. In this way, a simulation model is an easier way to build up models to represent real life scenarios with rapid style changes in industry.

Keywords: simulation, layout design, bottleneck, Assembly line balancing

ETT0045

Improving Liquid Transfer Performance of Cotton Woven Fabrics Woven with Different Constructional Parameters

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The liquid transfer performances of cotton fabrics are an important parameter in terms of clothing comfort. In order to improve the liquid transfer properties, various fabric constructions have been carried out and different methods have been developed to improve the liquid transfer properties.

Wicking Windows™ technology is a moisture management application developed to eliminate the sense of wetness in fabric. This method was developed based on the natural moisture transport feature of the cotton. This technology is applied through print application of repellent areas onto the skin side of a cotton fabric. Some parts of the fabric with wicking windows are water-repellent. This process is not applied to other regions. Special chemical paste is prepared for the fabric. This print paste is transparent and applied to the back of the fabric. Wicking Windows™ technology has reduced the intake of moisture capacity of cotton and it provides a feeling of being drier and more comfortable, especially in exercise and sport activities (1, 2).

In this study, moisture transfer performances of 100% cotton woven fabrics with different structural parameters were investigated. Wicking Windows™ technology, developed by Cotton Incorporated, has been applied to cotton fabrics with different yarn counts and weaves structures to assess the moisture transfer performance of the fabrics. Moisture transfer performance tests were evaluated in Drop Absorbency (AATCC 79) and Vertical Wicking test methods. The effects of fabric constructional parameters and weave structure were investigated on the moisture transfer performance characteristics of the cotton fabrics.

Keywords: Cotton Fabric, Moisture Transfer, Wicking Windows™ Technology

ETT0048

Carbon Fibre Precursor Production with NaSCN(aq.) as a Sustainable Solvent

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Department of Carbon Fiber Reaserach

In 2007 a chemical regulation order was adopted in Europe and China, to protect the environment and human beings from hazardous substances in consumer goods and their working environment. It is a topic of interest for the rest of the world, as well. Some substances are banned by law from industrial application. The organic solvents Dimethylformamide (DMF) and Dimethylacetamide (DMAc) are candidates for prohibition. To be prepared, the producers of carbon fiber precursors, hollow fibers and wet spun textile products are looking for alternative solvents for their production processes and try to gain according process Know-How. Aqueous solutions of inorganic salts are the most promising alternative.

The relevance of chemical regulations for the fiber industry and in particular for the carbon fibre precursor production process will be discussed and the major changes due to the use of inorganic solvents are shown. Some of the main characteristics and advantages of these solvents are considered. Appropriate spinning conditions and the waste water handling are the focus of this work. The Institute of Textile Technology at RWTH-Aachen University (ITA) is one of the leading textile research institutes in Europe. The experience we gained during the trials on our wet spinning lines and from the collaboration with industry partners will be part of the work.

Keywords: inorganic solvents, carbon fibre precursor production, political regulations, advantages & challenges

ETT0049

Combining Laser- and Textile-Technology for Just-in-Time production of Composites

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The demand for composite components is rapidly increasing due to the growing importance of energy and resource efficiency and by a simultaneous demand for increasing component performance. Compared to established construction materials, such as metals or plastics, production technologies in the composite field often have currently a lower technological maturity. In addition, the part of manual work is often high in small to large companies. The growing use of composites, especially in the automotive industry, is driving automation forward.

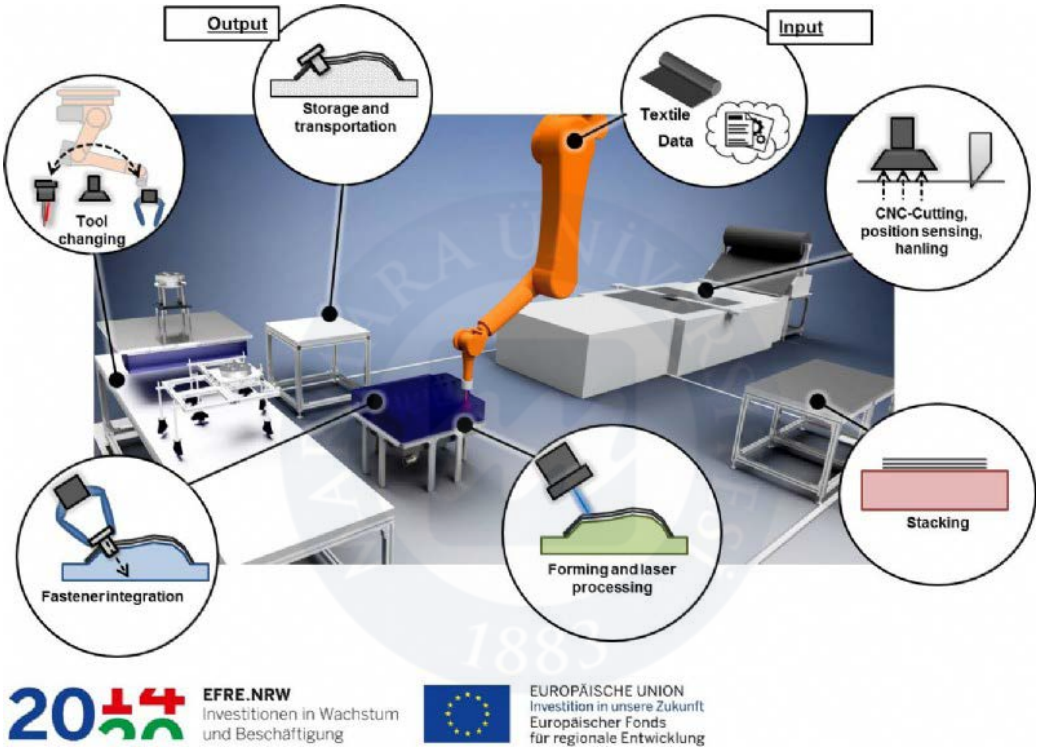
Current production technologies for fiber reinforced plastics (FRP) are using 3D multi-layer textile preforms. The preform production is often characterized by a high manual workload. One reason is the complex handling process of the flexible textile semi-finished products. The other reasons are high quality standards, which require a visual inspection by specialists, due to the high cost of the reinforcement textiles (up to 50% of the component costs). In the moment a high level of automation, including automated quality assurance, is often only cost-effective at high volumes.

In the highly innovative OP EFRE and EU funded “CarboLase”-project ITA RWTH Aachen University is developing in corporation with research and industry partners the future fully automated preforming process chain, independent of batch sizes. Sensors as well as flexible software and hardware interfaces are integrated in the process chain, enabling the transfer of product and process data along the process chain.

One core innovation is the combination of productive 2D CNC cutting, high-precision laser material processing of the textile preforms by ultra-short pulsed laser radiation and a fully automatic placement of individual preforms and metallic fasteners. The technologies are integrated in a single robot cell, which includes interfaces and sensors in the production process, creating a highly flexible, and hybrid production system. This approach allows a just-in-time production for FVK components.

Keywords: Laser, Composites, Preform

Visualization of the process chain



The target process chain is presented, including the required intermediate steps and technologies. The core component is the laser material processing of the preforms made of carbon fibers.

ETT0050

Greenhouse Trials of Agrotextile Nonwoven Structures Possessing Controlled Water and Fertilizer Release Properties

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A nonwoven material was coated with polymer/fertilizer mixtures and used as a source of water and fertilizer for Yedikule lettuce in greenhouse trials. To this end, the following materials were used: Poly(ethylene terephthalate)/viscon (PET/CV) needle-punched nonwoven fabric as base material, poly(viniyl alcohol) (PVOH)/ammonium sulfate (AS) mixture as the first coating layer, carboxymethyl cellulose (CMC)/potassium nitrate (PN) as the second coating layer, and citric acid (CA) as crosslinker for CMC. The reason why PVOH and CMC were chosen as the coating polymers is that they are both biodegradable polymers. Besides, CMC is thought to serve as an efficient water management thanks to its hydrogel property, which is provided by the expedient processing.

After establishing the optimum processing conditions for the generation of the coated structures and revealing water release and fertilizer release profile of the coated nonwoven structures under laboratory conditions, greenhouse trials with Yedikule lettuce were carried out for determining the effectiveness of the coated nonwovens under real conditions. In this context, we determined the water and fertilizer (ammonium nitrogen and nitrate nitrogen) release profile of the coated structures, moisture management and fertilizer amounts in the soil, total nitrogen amount in the Yedikule lettuce. In addition, plant physiological analyses were done. It was shown that utilization of the concerned coated nonwoven structures in agriculture/horticulture has the potential to reduce the irrigation water and fertilizer consumption and thus help practicing sustainable agriculture.

Acknowledgment: This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK), Project Number: 115M718

Keywords: Nonwoven fabric, polyvinyl alcohol, carboxymethyl cellulose, ammonium sulfate, potassium nitrate, fertilizer release

ETT0051

Effect of Different Coating Conditions on Sound Insulation Property of Magnetite Containing Nonwoven Materials

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With the increase of car ownership, the car has become one of the major sources of urban environmental noise pollution. The vehicle interior noise not only affects the vehicle ride comfort but also imposes danger on the health of drivers and passengers. In the framework of this study, we tried to reduce vehicle interior noise by coating a nonwoven fabric with different polymeric materials (styrene butadiene latex and ethylene vinyl acetate) by using magnetite, which is an inorganic material and used for sound dampening purpose.

We provided nonwoven material from HP Pelzer Pimsa Otomotiv A.Ş. (Turkey) and magnetite (MagniF 50) from LKAB Minerals GmbH. Carboxylated styrene butadiene copolymer latex (LITEX T 77A4, solids content: 51%, pH value:7.5, viscosity: < 400 mPa·s, Synthomer GmbH, Germany) was supplied by Hassan Tekstil A.Ş. Ethylene vinyl acetate (EVA ALCUDIA® PA-440, MFI190 ̊C/2.16 kg: 7 g/10 min, vinyl acetate content: 28%, Repsol, Spain) was kindly provided from Ravago Istanbul. Raw and ground magnetite were used. Grinding was done in a Fritsch Pulverisette 5 planetary ball-mill at 400 rpm using balls with 5 mm diameter. We decided to use an effective grinding time of 80 min according to the preliminary grinding tests. Magnetite loading amounts were chosen as 100, 400, and 800 g/m2. Latex coating was done with the help of a Mathis laboratory SV coating device. A laboratory press was used for EVA coating by using previously prepared EVA/magnetite compounds in a twin screw extruder. Morphology and sound transmission loss analyses were performed. In addition, the results derived from the tests were statistically evaluated in Design Expert® 6.06 software. It was shown that grinding did not change the sound insulation property of the coated nonwoven fabrics, while the magnetite loading amount and especially the coating polymer used contributed to the sound insulation considerably.

Keywords: nonwoven fabric, magnetite, coating, sound insulation

ETT0056

An Investigation of the Activation of Multi Colour Changing Photochromic Textiles

Dilusha Chathura De Zoysa Rajapakse

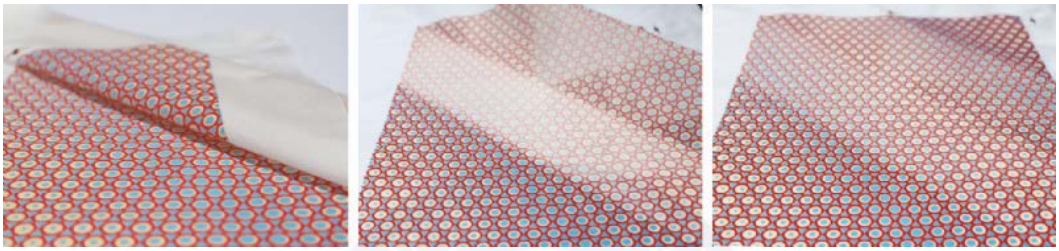
School of Arts and Design, Nottingham Trent University, UK

Recent development in chemistry, fibres and electronic technology provides new material directions for designers to develop dynamic textiles that can change colour and pattern as a response to external environmental stimuli. Such dynamic textiles create many opportunities including novel surface decorations, development of flexible displays that can express emotions or signals and textiles for safety and camouflage. The photochromic material can be used to design textiles embedded with reversible multi colour changing effects that can be experienced in daylight conditions. The activation of the colour changing effect of photochromic textiles is mainly influenced by the ultraviolet radiation that has a wavelength below 400 nm.

One of the limitations of using photochromic colourants for the development of multi colour changing textiles is the inability to control the activation of individual colours that have been applied to the textile surface. As such, the resulting visual experience has the tendency to become predictable for observers, thus, restrict the creative product design possibilities. The research conducted in this paper aimed to address this by exploring the possibility of handling different activation methods to control the kinetic behaviour of photochromic textiles. Three different activation methods including; sunlight, artificial UV lights and SMD UV LEDs were examined, and the ability to use each of these activation methods for the excitation of controllable multi colour changing photochromic effects was highlighted. The paper concludes with a discussion on the creative design possibilities that can be exploited with such controllable multi colour changing photochromic textiles, and appropriate visuals have been referred to justify the findings.

Keywords: Dynamic aesthetics, Multi colour changing textiles, Non-emissive colours, Printed textile design

Figure 1: Sunlight as an activation method. The images demonstrate the potential of manipulating the photochromic textiles in order to obtain a temporal multi colour changing photochromic effect.



The interaction of sunlight can be disrupted by manipulating the printed photochromic textile surface with different methods such as folding, pleating or layering. For example, as can be seen in this figure, the printed photochromic area, which was directly exposed to sunlight, remains with activated multiple photochromic colours as long as it was exposed to sunlight. However, the activation of the fabric beneath the pleat was reduced due to obscuration by the top fabric layer. When the pleat was unfolded, and was exposed to direct sunlight, the inactive photochromic colours started to rapidly change colour to match with the surrounding activated effect of the photochromic design.

Figure 2: SMD UV LEDs as an activation method.

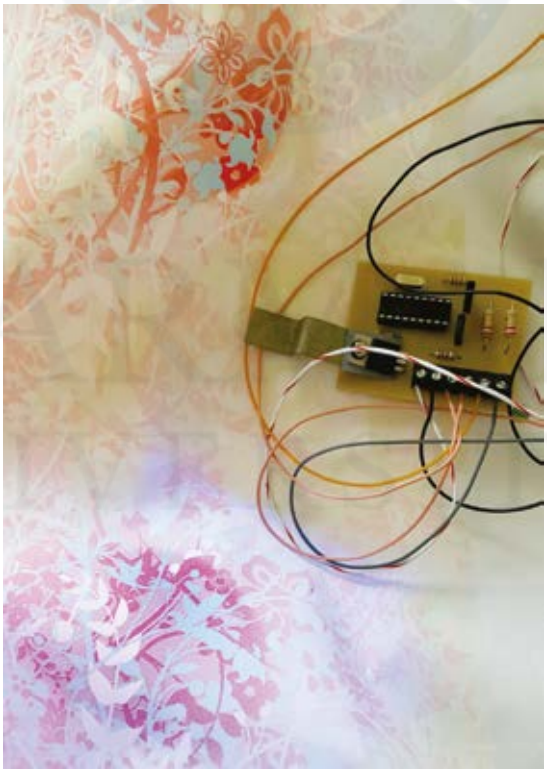


Image shows the potential of placing SMD UV LEDs to activate strong photochromic colours in different areas of the printed textile surface.

ETT0057

Schizophonic Machine: Wearable *Schizo*-interface, An Exercise of Possible Listenings

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Schizophonic Machine is a conceptual and experimental proposal. As a concept, inspired by Canadian composer Murray Schafer, "schizophonia" is suggested to be a condition of our existence right before the body becomes a body, and this one a "schizophonic machine", in whose interior affects float, a continent where the sonorous rest. Among the sounds from the outside and the ones produced within the (human) body there is a zone of indiscernibility that speaks (sometimes yells) in silence, but keeps histories in its cellular memories that could be told from the points of view of sound and listening. As an experimental proposal, the Schizophonic Machine emerges from the desire to tell this body's history (its affective memories) from a sonorous-visual experimentation with "affective technologies" and sensory devices (such as biosensors and e-textiles) aiming to explore new possibilities of listening, having the body as an object, the skin as an interface and the sight as a listening (a "listening of sight"). More than the exploratory use of those technologies, what is intended is an exercise of creation in which the production of sensations – the effective potency of Art – is experienced by means of a reverse process: a self-affection when the spectator becomes the work of art and vice-versa. As a starting point, the creation of a wearable interface is proposed, in order to investigate the shades of perception and sensitive communication, the body's affections in contact with Art. What would the body in its relation with Art "sound" like? Is it possible to capture the sensations (that which precedes emotions) produced in its encounter with Art? This proposal, which is a result of 20 years of research, intend to pursuit these questions not necessarily to answer them, but to experiment other possible listenings beginning with sensors and textiles technology available.

Keywords: schizophonia, body, listening, sensations, wearable interface, smart textiles

ETT0058

Analyzing the Effect of Air Gap Created by Insertion of Shape Memory Alloy Springs Between Fabric Layers of Protective Clothing Against Convective and Radiant Heat

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The main aim of the protective clothing is to protect the wearer's life from dangerous materials such as toxic chemicals and gases, and adverse environmental conditions such as radiation, extreme heat or cold. To ensure this, protective clothing must be act as an insulator between the environment and the wearer's skin. Textile fabric is one of the key factors which determines the performance of the protective clothing. One or multi-layered fabric structure can be used in protective clothing. The air gap existing between fabric layers is also a critical factor that has an important role on insulation. Static air behaves like an insulating material and effects both thermal comfort and protection performance of the clothing. In this study, three layered fabric structure which are conventionally used in fire fighter's suits and consisted of outer layer, moisture barrier and thermal liner was used. In order to analyze the effect of air gap created between fabric layers against convective and radiant heat, two-way shape memory alloy springs were inserted in a specific layout between moisture barrier and thermal liner by hand sewn. To compare the effect of air gap created by shape memory alloy springs, two reference samples were prepared. One of the samples was produced without using springs between fabric layers and the other one was prepared by using ordinary springs which was produced specially for the study to simulate the closed condition of two-way shape memory alloy springs. After production of samples, convective and radiant heat tests were carried out. Time until second degree burn was measured for each test and evaluated. According to the results of the study, it is determined that inserting shape memory alloy springs between fabric layers have a positive effect on protection performance of fire fighter's suits by increasing the time until second degree burn.

Keywords: Protective clothing, multilayered fabric structure, shape memory alloy spring, air gap, convective heat, radiant heat.

ETT0062

Electrospinning of Composite Fibers with Limunescence Properties

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3 mol% Dy3+ doped nickel niobate (NiNb2O6) compound has been synthesized by molten salt method using Li2SO4/Na2SO4 salt mixture as a flux at a relatively low temperature as compared to solid state reaction. X-ray diffraction patterns of 3 mol% Dy3+ doped NiNb2O6 compound indicated orthorhombic columbite single phase. SEM analysis revealed that Dy3+ doped NiNb2O6 has a submicron particle size. The photoluminescence of CoNb2O6:Dy3+ phosphor has exhibited in a dominant yellow emission at 577 nm with an excitation wavelength of 395 nm. Electrospun Polyurethane based nanofibrous membranes were fabricated by using the blend solvent system of N,N-dimethylformamide (DMF) and Tetrahydrofuran (THF). Then, various amount of NiNb2O6 nanoparticles added into the electrospinnig solution in order to obtain composite fibers with limunescence properties. Characteristics of the blended solutions were analyzed in terms of viscosity and conductivity. Morphology of the electrospun nanofibrous membranes were observed by SEM analysis. Experimental results revealed that the morphologies of electrospun nanofibrous membranes have been altered remarkably with process parameters, solution properties and the added amount of NiNb2O6 nanoparticles into the system. Tensile strength and elongation measurements confirmed that mechanical characteristics of the nanofibrous membranes were strongly influenced by the fiber morphology and NiNb2O6 nanoparticles incorporation.

Keywords: electrospinning, limunescence, nanofiber

ETT0064

The Globalization of the Egyptian Cotton Industry Quality via the Engineering Units, Part2: The Impact of the Latest Egyptian Cottons Generation on the Yarn Quality Factor

***Ibrahim Abdou Elhawary*, Sherwet Hussein Elgholmy, Wael Ahmed Hashima**

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abstract In this work 5 (five) combed cotton spun yarns with texs 7.38, 5.95 & 4.22 with twist factor, ∝_t=4300 (tex system) were manufacture via alternative spinning systems (ring & compact). These yarns were manuals activated from Egyptian extra-long staple cotton: G45, G93, G88, G92 & Pc (a) – promising crossed type, the other two yarns of tex, 7.38 [compact was produced from long staple cottons G86& Pc (b) – promising crossed type. The other two yarns – from 5 with texs: 15 & 20, ∝_t=3600, were spun combed & carded ring only via using Egy. Cotton (medium long staple), G80, G90, & Pc (c)- promising crossed type.

For each yarn tex, was processed from any type of the latest Egy. cotton generation, a different calculations were deduced as: yarn diameter using pierce formula, yarn circular cross-section area [CSA] was determined & consequently the yarn breaking strength in mega Pascal [Mpa] i.e. mega newton per SQ. m., was counted. Also, the toughness of each yarn was estimated, where, it evaluates the potential energy that can be withstanded or absorbed by the yarn during post spinning process.

All these calculated values, for the different yarns, made from Egy. upgraded generation cotton are tabulated, exhibited, graphed & analyzed. For more clarifying: for yarn tex 4.22 –ring spun-, it was found that its diameter dc = 7.76 *(E-5) ….m. while its cross-sectional area Ac= 4.61*(E-9)….SQ.m. For the same yarn tex, its Mpa ranges from 244 (G45) to 231 Pc[a], its breaking extension changes from 5.41% (G45) to 4.68% [Pc(a)] & consequently its toughness is varying from 6.6 Mpa [G45] to 5.41 Mpa [Pc(a)].

Keywords: globalization, Egyptian cotton industry,SI Units, YQF

ETT0065

Improving the Water Resistance of Filament Woven Fabrics with Microfilament Yarns

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Microfilament woven fabrics are used in many textiles such as; sportswear, casual wear, rain clothes, tents, wind-proof clothes, sleeping bags and surgical drapes and generally water repellency is required for a better service life of the product. In this study, it is aimed to determine the effects of filament fineness on the water resistance property of water repellency finished filament woven fabrics. For this aim, 1/1 Plain weave, polyester filament woven fabrics were produced with different weft yarns of 5 different filament finenesses (0.33 dtex, 0.57 dtex, 0.76 dtex, 1.14 dtex, 3.05 dtex). Fluorocarbon based water repellent finish was applied and water repellency and water resistance properties of the finished samples were tested. The water repellency was determined according to standard of TS 259 EN 24920, spray method. The contact angle was determined according to TS EN 828, with distilled water. The water resistance of the samples was determined according to TS 257 EN 20811 by using a hydrostatic pressure test device. As a result of this study it is observed that the filament fineness has no considerable effect on water repellency and contact angle, but also an obvious increasing trend of water resistance was available. In this study, the effect of water repellency treatment was investigated for breaking strength, breaking elongation, static tear strength, dynamic tear strength, air permeability and water vapour permeability. For this aim, related tests were performed for water repellency treated and untreated samples. A minor increase was observed for air permeability whereas there was a minor decrease in water vapour permeability after water repellency treatment. Also, there was no consistent trend for breaking strength but an increase was detected for breaking elongation after treatment. With respect to tear strength, higher results were obtained for both static and dynamic tear strength after water repellency treatment.

Keywords: microfilament, woven fabric, water resistance, water repellency

ETT0066

Comparison of the Workplace through the String Diagram Method and Simulation Program in the Manufacturing of Apparel

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Since the production of apparel has a labor-intensive system, it is necessary for the employees to be actively and continuously involved in this production. Production activities cause employees to make necessary or unnecessary relocations. Such shifts are likely to create a mess and confusion with the loss of time and efficiency in the workplace. For this reason, the working environment must be constantly organized in order to eliminate unnecessary movements.

The distance between the factory material entry point and taking its output as a product is extremely important for the duration time of this transition. Many techniques have been used to determine this distance. One of these methods, called the "String Diagram", comes into view as a scaled plan used to track and measure the movement pathways during the product transformation (Figure 1). On the other hand, simulation programs that allow a movement to be simulated in a computer environment, which has increased in popularity over the last years with the development of technology, provide a model for a real system (Figure 2). In this study "Simul8" was used as a simulation program.

In this study, the paths taken and the distances covered between the entrance to the sewing plant of the materials of a product selected for apparel manufacturing and the exit of the product were determined by the string diagram method and the simulation program.

According to the findings, sewing plant of the factory was rearranged and the distances were recalculated. Through both of the two methods used in the study, the products were produced with shorter time and also higher efficiency. The results are obtained from these determinations and calculations by both methods and, the advantages and disadvantages of each method are compared accordingly.

Keywords: Apparel production, Sewing plant, The String Diagram, Simulation

Figure 1. Example of the string diagram

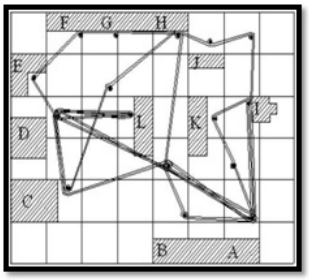
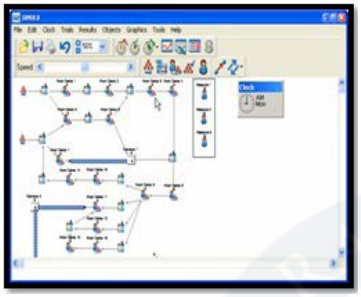


Figure 2. Screen display of the simulation



MARMARA ÜNİVERSİTESİ

ETT0067

The Effects of Different Types of MWCNTs on the Mechanical Properties of Textile-Based Composites

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In today's world, the ever-evolving technology and the endless desires of people are increasing the demand for innovative materials. In this perspective, composite materials seem to be one of the most preferred choices as novel materials when their outstanding properties are compared to conventional materials such as metal and wood. Carbon nanotubes are up and coming nano-particles used in composite industry for enhancing their properties. They are a class of materials that possess combination of excellent mechanical, electronic and thermal properties that no other material has been displayed until now.

In this study, the effects of different types of MWCNTs (MWCNT, MWCNT-OH, MWCNT-COOH) on mechanical properties (tensile strength and impact strength) of fabric reinforced composites were examined. Jute, E-glass and carbon fabrics were used as the reinforcement materials, whereas unsaturated orthophthalic polyester resin was used as the matrix material. Vacuum assisted resin transfer molding technique was utilized for the preparation of four-plied composite specimens. Results indicated that, E-glass fabric reinforced samples had the highest impact strength while the highest tensile strength was obtained with carbon fabric reinforced composite sample. In addition, when the influence of different MWCNT types were analyzed, it was seen that the best results were obtained with pristine MWCNT treated samples in both tensile and impact analysis.

Keywords: Composite materials, mechanical properties, multi-walled carbon nanotubes

ETT0068

Cultural Sustainability in Textile: Checked Fabric Of Malatya

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With industry gaining momentum, consumption of sources and waste production are rapidly increasing. Consequently, a lot of countries and governments are putting emphasis on the concept of "sustainability" in order to take necessary precautions and not to come face to face with a catastrophe in the future. The substances released to the environment by textile manufacturers, like all modern industries, are not totally harmless. Therefore, adaptation of recycling, usage of environment-friendly fibers and materials, decreasing the pollution level and developing methods to dispose the pollutants once they are formed are gradually gaining importance in terms of reducing environmental hazards and consumption of resources.

Efforts for using natural raw material, natural coloring and natural manufacture are made for the sake of sustainability in textile sector as in all other sectors. The idea of manufacturing organic textile products has led us to hand-weaving which is a part of our culture, our history when the production is carried out artifactually.

This study aims to present the efforts to revive the Checked fabric, which was used by women until recently only for veil and sinking into oblivion, woven in hand looms in Malatya region in confection and home textile.

The photos below show the accessories, ready-made clothing and home textile products manufactured with Checked fabric that has only been used as veil in the past.

Keywords: Sustainability, culture, Checked fabric, accessories, ready-made clothing and home textile.

ETT0069

Potential Use of 3D Printing Technology for Conductive Thread Assembly on Textiles

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Istanbul Technical University

E-textiles are defined as fabrics with intrinsic electronics and interconnections with physical flexibility. Conductive wires and threads are manually attached on fabric surface via sewing. CAD embroidery, knitting or weaving of conductive threads are used to realize e-textiles in addition to digital printing, screen-printing and coating of conductive inks.

3D printing is a method of rapid manufacturing in which materials are deposited onto a platform in thin layers to produce a 3D object. Recent developments in flexible 3D printing filaments enabled directly printing on textiles. One potential application of such direct 3D printing on textiles is creation of e-textile structures that are flexible and bendable. However, there is no research that explores electrical characterization of e-textile structures created via direct 3D printing on textiles. This research presents a preliminary exploration of the potential of 3D printing technology for fabrication of e-textile structures by encapsulating conductive thread on textiles via dispersing thermoplastic polyurethane (TPU) filaments in thin layers.

4 different conductive threads are used to fabricate 10 cm long 3D printed and conventionally sewn conductive tracks on a textile surface. 3D printed specimens were realized by depositing melted filament onto conductive thread and textile surface through the nozzle of the 3D printer. Conventionally stitched specimens were realized by feeding conductive thread as the bobbin thread in an industrial sewing machine.

Electrical resistance and the ratio of a signal power to noise power (SNRdB) for each specimen were measured. During the 3D printing process TPU filament at 235°C covered the conductive threads. Exposure to heat decreased resistance for silver conductive threads and increased resistance for steel threads. On the other hand, SNR(dB) values for all 3D printed specimens decreased compared to conventional specimens.

Keywords: 3D Printing, Conductive Thread, Electrical Characterization

ETT0070

Plasma Grafting of Reactive B-Cyclodextrin onto the Cotton Fabric

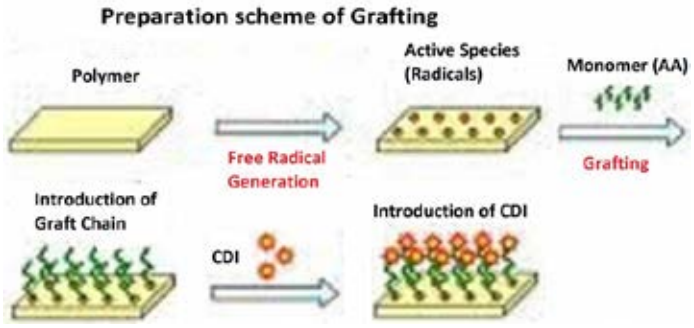
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β-Cyclodextrin (β-CD) is capable of forming inclusion complexes, but it cannot form a direct covalent bond with textile materials, hence some cyclodextrin derivatives have been synthesized with reactive groups to allow them to chemically bind to various substrates. In this research, the modified β-CD with itaconic acid (CDI) was grafted on to the cotton fabric by applying plasma technologies. Two methods of plasma techniques, atmospheric pressure plasma reactor (APPR) and atmospheric pressure glow discharge (APGD) were applied for the graft treatments. The grafting copolymerization of the reactive cyclodextrin (CDI or CDI/Acrylic Acid) on the surface of cotton fabric was studied and the performance (accessibility of cyclodextrin cavities for molecular encapsulation) of β-cyclodextrin fixed onto the surface cotton was evaluated. The effect of each plasma treatment method on the characteristics of the cellulosic fabric was investigated. The results showed that plasma activation was occurred on the surface of cellulose and free radicals can easily react to CDI/AA without any degradation on the polymeric chains of cellulose. The presence of anchored CD nanoparticles on the surface of the fibers was demonstrated by using SEM as well as the ability of the attached CDs to form inclusion complexes. According to the results, although the grafting rate indicated the amount of anchored cyclodextrin or copolymer of CDI/AA onto the cotton fabric, the correlation between the grafting rate and the accessible content of cyclodextrin confirmed the performance of the modified fabric.

Keywords: Cyclodextrin Itaconate, Cotton Fabrics, Plasma Technology, Grafting

Process of surface treatment of cotton with reactive CD



ETT0072

Smart Water Vapour Permeability of Cellulose Nanowhisker Reinforced Thermo-moisture Responsive Polyurethane Nanocomposite Films

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In this study, smart water vapour permeable nanocomposite films possessing both thermal and moisture responsiveness simultaneously were produced by reinforcement of commercially available shape memory-polyurethane (SMPU) with cellulose nanocrystallite (nanowhisker) (CNW). Recently, textiles with smart (self-adaptive) water vapour permeability having the capability of temperature and moisture management of wearers in extreme environmental conditions have gained much popularity. This study covers modification of SMPU which has a transition temperature suitable for body applications by introducing CNWs to possess moisture-sensitive water vapour permeability effect besides its thermal stimulation by an easier process than synthesis of the polymer. For the modification process, nanocomposite films with varying CNW concentrations (5, 10 and 20 wt%) were produced by solution blending and casting method in turn. Fourier Transform Infrared (FT-IR) Analysis was performed to characterize structure of nanocomposite films. Water vapour permeability and absorption capacity of the films were carried out under different thermal conditions (20°C, 40 °C and 65 °C). According to FT-IR analysis results, peaks belonging to cellulose became visible in films with the increase of the CNW content. Smart water vapour permeability was observed for the produced films that permeability improved as the CNW concentration and temperature was increased. Absorption capacity also had a similar trend. These results can be attributed to higher molecular mobility and free volume change by temperature and percolation network of the CNW whose hydrogen bonding can be regulated by moisture. Pores for passage of water vapour and volume for liquid absorption increase as a result of the mentioned mechanism. As a result, produced SMPU nanocomposite films having both thermal and moisture induced water vapour permeability can be used in various forms for smart clothing (sports, protective, etc.) that adapts dynamic environmental (temperature and humidity) and body physiological (sweat, body temperature) changes.

Keywords: Shape memory polyurethane, cellulose nanowhiskers, nanocomposite film, thermal responsive, moisture responsive, smart water vapour permeability.

ETT0075

Analysis of the Stabilization Process During Carbon Fiber Manufacturing

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Carbon fibers (CF) combine excellent mechanical properties with low density and high tensile strength. Therefore, they are often used in lightweight applications. The raw material for the CF production is usually wet-spun polyacrylonitrile (PAN). The PAN-precursor has to be thermally converted, in the stabilization process, to become incombustible and infusible. Only this way it can withstand the high temperatures during the carbonization process of up to 1500 °C. The PAN precursor has a carbon amount of approx. 67 %, this value has to rise above 90 % to become a carbon fiber. [1]

The stabilization process makes about 16 % of the global carbon fiber price and takes up to 2 hours. Even though it has not the biggest share in the cost, it has a huge potential for optimization. Therefore, the stabilization process is analyzed experimentally and by simulation.

In the stabilization process, three main reactions (dehydration, oxidation, and cyclization) take place simultaneously [2]. A simulation model for predicting the heat rate and the conversion rate has been developed and validated with measurements [3]. The aim of this research is to show the current results and compare them with simulations done on an oxidation oven.

Keywords: simulation, modelling, carbon fiber, stabilization

ETT0078

The Readiness of the Textiles and Apparel industry of Bangladesh-Vision 2021

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Over the last three decades, Readymade Garments Industry (RMG) has established itself as a global player. Its contribution to the economy of Bangladesh, and in providing employment, is indeed remarkable. As may be expected, the industry has faced numerous challenges in the growth process, which averaged about 15 per cent+ per year. It has overcome hurdles such as the elimination of child labour in the industry, open competition in the post-MFA (Multi-Fibre Arrangement) era, and progress in social compliance, safety reforms, etc.

Bangladesh already has a strong foothold in the world's apparel market, and we hope this will enable us to grow in the coming years. Our vision is to increase Bangladesh's RMG industry's global market share from the current 5.0 per cent to 8.0 per cent by 2021, which requires increasing our exports to about US$ 50 billion. Many may consider this to be over-optimistic but it is our contention that for Bangladesh's RMG industry, this is an achievable goal.

Keywords: Readymade Garments Industry, contribution,compliance,vision

ETT0082

Reproduction of the Ottoman Palace Fabrics Using Natural Dyes

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The vast majority of Ottoman silk brocade fabrics, which known for Turkish kemha, are fabrics that are now woven in looms known as jacquards and are very woven fabrics for sultan's family and members of the palace. These fabrics are invaluable fabrics consist of rich materials and patterns. Ottoman silk brocades were mostly woven for the sultan's caftan and were generally they were produced for wearing in ceremonies [1]. The 16th century, the most brilliant period of the Ottoman Empire, has reached its highest point in terms of both technical and used materials that have shown themselves in clothes as well as in everything. The production of these fabrics are the most special fabrics that require mastery including today.

The aim of this work is to serve the cultural heritage of the Ottoman silk brocade fabrics of the 16th and 17th centuries and reproduce them in accordance with their originality in order to transfer from generation to generation and to use natural dyes in new productions [2-4]. Technical analysis, colour measurements, elementel analysis in the metal thread and dyestuff analysis consist of on the basis of this studying. It is observed that red colour is dominant in the Ottoman silk brocades and it is determined by analysis that insect origin dyes are used to obtain this colour. It was observed that yellow, green and blue colours other than red were widely used in the Ottoman silk brocades and it was found that the colours of Anatolia's rich vegetal origin were used. All of the natural dye sources used in these fabrics are the same as those used in the newly produced silk brocades and have the same characteristics as the technical, pattern and woven quality.

Keywords: Palace fabrics, reproduction, silk brocade, natural dyes

ETT0083

Multidirectional Investigation of Organic Cotton Fabrics Dyed with Gall Oak

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In former times, wool, cotton and silk fibres were always dyed with natural dyes extracted from plants animals and shellfish. Gall oak (Quercus infectoria Olivier) plant has a very important place in the history of natural dyes and have long been used in Turkey [1-2].

In this study, four organic cotton fabrics were dyed with gall oak plant. Iron-2-sulphate [Fe-SO4.7H2O] was used as postmordant. Firstly, four cotton fabrics were washed with 10 % nonionic soap in hot water (about 50 oC) for 20 minutes, rinsed and so they were dried. Then, they were dyed with gall oak (Quercus infectoria Olivier) at 100 oC for 60 and 120 minutes. In these four dyeings, gall oak percentages were 200% and 300%. Dyed fabrics were mordanted with FeSO4.7H2O at room temperature.

L*, a* and b* values were measured by CIELAB spectrophotometer for the dyed these four fabrics. pH values of the dyed fabrics were determined by surface pH meter and they were between 5 and 6. HPLC-PDA was used for identification of the dyestuffs in the dyed fabrics. According to the HPLC results, vanilic acid, gallic acid, ellagic acid and tannic acid derivatives were detected in the dyed cotton fabrics. SEM-EDX was used for surface image of the dyed and undyed organic cotton fabrics and SE (seconder electron detector) for imaging was preffered. Washing, light, rubbing and perspiration fastnesses of dyed organic cotton fabrics were performed according to ISO 105 C06:A2S; ISO 105 B02:1995/G:6; ISO 105x12 and ISO 105 E04 standarts respectively. Antimicrobial tests were performed against gram-positive and gram-negative bacteria by the AATCC 100 quantitative test method.

Financial support by the Scientific and Technological Research Council of Turkey (TUBITAK) 1507 project (Project No: 7150407) is gratefully acknowledged.

Keywords: Cotton fabric, gall oak, antimicrobial activity, fastness tests, HPLC-DAD, SEM-EDX

ETT0084

Lotus Effect Inspired Materials: Contact Angle Validation on Modified Ramie Yarn for Self-Cleaning Textile

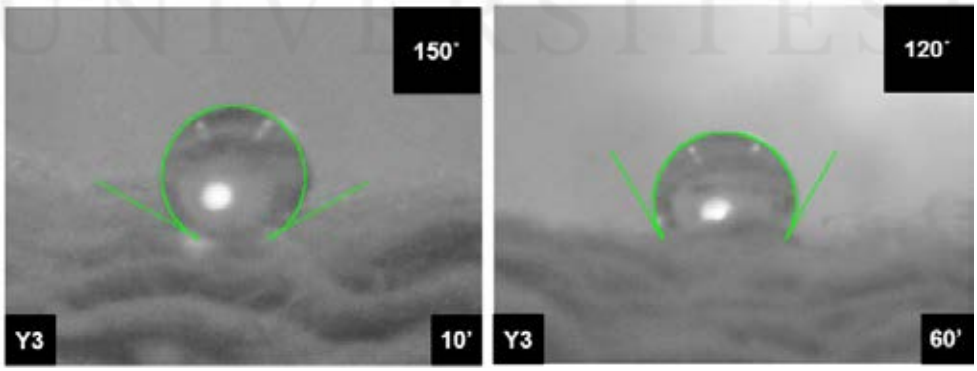
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Development of liquid prevention has become a major concern in textile manufacture which is inspired by lotus leaf. The lotus leaf is well known by its properties the lotus effect which prevents the liquid to reach the leaf's surface. Those properties not only to prevent the liquid but also clean and collect the dirt or dust on the surface, afterward, those properties are well known as self-cleaning in textile manufacture. The properties of self-cleaning can be achieved on a flat surface if the droplet of the liquid has a contact angle around 150° based on the Cassie-Bexter model. This research tries to demonstrate the self-cleaning properties on a modified ramie yarn by using chitosan and silica, then produced into fabric by using a simple and traditional weaving technique. The difference on this research is to modify the main material not in fabric form as has been done in general textile manufacture for the finishing process. As the result, the properties of self-cleaning can be conducted well on the fabric and the contact angle around 120-150° can be achieved and the condition of the surface also help the function of the properties.

Keywords: Ramie, Yarn, Contact Angle, Chitosan, Silica

Contact Angle value for hand-woven of self-cleaning ramie fabrics.



ETT0085

Investigation of the Permeability Properties of Commercially Available Reusable and Disposable Surgical Gowns

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In this study, it is aimed to study the permeability performance of commercially available products. The samples in this study including disposable and reusable products are compared in terms of their water repellency, air permeability and water resistance performances. Air permeability and water resistance (hydrostatic head) tests are applied to compare the permeability performance and spray rating test was applied to determine the water repellency. For this aim, three commercially available disposable and one reusable surgical gown were compared. In addition, the effect of fabric mass on the permeability properties of disposable gown samples was studied. Besides, the effect of stitch type on air permeability property of disposable samples was also investigated. For this aim the one type of disposable sample was sewn by cover stitch, interlock stitch and ultrasonic stitch. Then the air permeability performance of stitched regions was compared with each other and non-stitch regions. As a result of this study it is seen that, air permeability of the disposable nonwoven samples; are higher than the reusable woven sample. The air permeability of the disposable nonwoven sample decreases as the fabric mass increases. Reusable woven sample has high absorption to water, so this sample had no water repellency and water resistance. Considering the disposable nonwoven samples, the fabric mass do not have an obvious effect on water resistance. With respect to the effect of stitch type, the highest air permeability value was obtained for interlock stitch. Furthermore, the air permeability is higher than the unstitched regions for interlock stitch. But ultrasonic stitch and cover stitch decreased the air permeability of samples in comparison to unstitched regions. Additionally, ultrasonic stitch provides less air permeability than cover stitch. So, interlock stitch have higher potential risk of liquid transmission during usage.

Keywords: surgical gown, disposable, reusable, air permeability, water resistance

ETT0086

Process Development For Controlling Of The Viscosity Increase Of The Ozonated Oils Used Medical Textiles

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The ozone gas (O3) is accepted as one of the bactericidal, antiviral, and antifungal agents on a large scale, and is also used as a clinical therapeutic agent for chronic wounds. Recently, it has been considered that the ozonated oil could be a way to gradually deliver ozone to the target tissue, namely skin (Valacchi et al. 2011).

According to our previous experiments, it is known that the viscosity of ozonated oils has been increased depending on the ozonation time in comparison with the viscosity of raw oils, in addition, in the same literature, the antibacterial activity of these ozonated oils has been proven (Beşen et al. 2017). Along with the viscosity increase of the ozonated oils, some disadvantages occur such as limitation of the ozonation time, productivity of ozonation and challenges of the next processes.

In this experimental study, the increase on the viscosity will be tried to be avoid by usage of different chemicals. The olive, walnut, pistachio and fish oils will be ozonated at different ozonation time with adding aliphatic hydrocarbons (n-heptane, n-hexane) and without. The aliphatic hydrocarbons will be used in order to control the viscosity of oils during ozonation. In this way, it will try to be observed whether adding of aliphatic hydrocarbon prevent the increase of the viscosity of oils during ozonation and the possibility of the increment of the ozonation time or not. Moreover, regardless of the oils type, all ozonated oils will be transferred onto %100 cotton textile surfaces by padding to be gained antibacterial activity. A set of tests such as determination of contents of the fatty acids via GC-MS analysis, FTIR, the viscosity and the antibacterial activity of the oils will be investigated on the raw, both ozonated and ozonated oils containing hydrocarbons, and the applied textile surfaces.

Keywords: vegetable oils, ozonated oils, aliphatic hydrocarbons, antibacterial textile surfaces, viscosity, fatty acid

ETT0088

Properties of Weft Knitted Fabrics Made from Dual Core-Spun Yarns

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Recently, the Dual Core-spun yarns have been widely used as weft yarns to enhance the denim fabric properties. Yet, they haven't been used in knitted fabrics. Thus, this study aims to use these yarns in the knitting and compare the properties of these fabrics with the properties of the fabrics knitted from Core-spun yarns. Core and Dual Core-spun yarns were used to produce weft knitted fabrics with different structures; Single Jersey, Rib 1x1, and Full Cardigan, and using different levels of stitch length. Results showed that yarn type has a significant effect especially on fabric recovery, elasticity, and shrinkage. While it has an insignificant effect on drapability, thermal resistivity, and air permeability

Keywords: permanent set, core yarn, Dual Core yarn, thermal resistivity

Figure 1The permanent set of the Single Jersey fabrics at loop length L1.

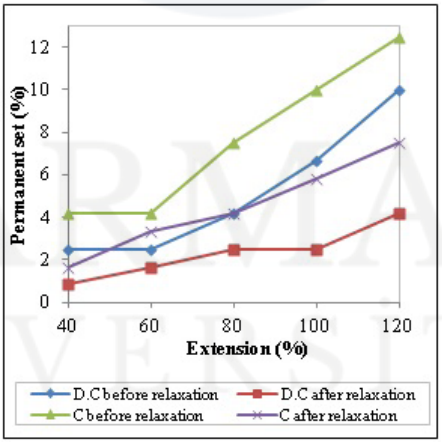


Figure 1 shows the permanent set of the Single Jersey fabrics made from Core and Dual Core yarns at different levels of extension before and after relaxation. Obviously, the permanent set decreases after relaxation by a ratio up to 6% for all samples either made from the Core or the Dual Core yarns. It is noticed from the figure that, as the extension increases from 40% to 120%, the permanent set after relaxation of the fabrics made from Dual Core yarns increases from 0.8% to 4.2%. This is attributed to the larger stresses the fabric is subjected to during the extension process. While the permanent set after relaxation of the fabrics made from Core yarns increases from 1.7% to 7.5%. This difference is ascribed to the differences in yarn structure where the Dual Core yarn contains a proportion of polyester fibers which in turn increases the yarn elongation as shown in Table 2. This superiority makes the Dual Core yarns suitable for the knitted fabrics which are subjected to a high extension such as the sportswear. Moreover, both the breakage rate of yarns during

knitting as well as the fabric defects was lower in case of using Dual Core yarns. Consequently, the permanent set of the fabrics made from Dual Core yarns only has been presented at different levels of extension, loop length, and fabric structure.

The experimental plan

Fabric Structure	Loop Length	Loop Length	Yarn Type	Yarn Type
	L	mm	Dual	Core
Single Jersey	L1	6.8	√	√
Single Jersey	L2	7.3	√	√
Single Jersey	L3	7.8	√	√
Rib 1x1	L1	6.7	√	√
Rib 1x1	L2	7.1	√	√
Rib 1x1	L3	7.5	√	√
Full Cardigan	L1	6.3	√	√
Full Cardigan	L2	6.7	√	√
Full Cardigan	L3	7.1	√	√

In order to investigate the effect of using the Core and Dual Core-spun yarns on the comfort properties of the knitted fabrics, three different fabric structures were used, with three levels of loop length while knitting the fabrics on STOLL CMS 433.6 flat knitting machine, 6 cam systems, and gauge 10, as shown in Table 1. 10 Ne count for the Core and Dual Core-spun yarns was used which is suitable for the machine gauge

MARMARA ÜNİVERSİTESİ

ETT0089

Effect of Lateral Fabric Resistance on The Axial Compressive Force of The Industrial Sewing Needle

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The needle of the industrial sewing machine is a vital part for the sewing process. The needle is subjected to various interactions with the sewn fabric. One of these interactive factors is the elastic lateral resistance-spring effect- of the sewn fabric on the needle during it's penetration in the fabric layers. In the present work, this effect has been investigated via a special formula where the spring constant is incorporated. It was found that: the equivalent length coefficient of the sewing needle γ was ranging from 2 (Lower end is the free end) to 0.7 (lower end of the needle is simply supported). The elastic stability factor η was changing from 2.46 – 20.12 that create a critical sewing needle axial compressive loadP_cr=20-160cN. That means the spring constant S (changes from S=0 toS=∞) has enhanced the critical load by 8 folds. The elastic stability factor η formula was deduced: tan[[λl]_]=[λl]_ (1-p_cr/Sl), where η=(λl)^2 for small values or η=tan(λl)^2

Keywords: critical force, lateral force, sewing needle design

ETT0090

Novel Techniques to Analyse the Comfort of Car Seats

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The comfort performance of car seat is important factor while producing car seats, each layer of the car seat is tested separately on classical testing machines, which lacks the real car seat performance when all layers are sandwiched. The complication of car seat design and the testing method bring a great demand of portable device which can measure the comfort performance of the real car seat. In this research a novel portable device is designed which work with special heat flux sensor and the device is connected to computer by USB port and values of heat flux temperature of the water and temperature of the surface is provided by the software. Heat flux sensors measure the heat transfer through a surface, and are expressed in kw/m2. The software controls the heating plate adjustment using PID controller. The device is tested with real car seat and shows repeatable and reproducible results.

Keywords: car seat, comfort, portable device, heat flux

ETT0091

Thermophysiological comfort properties of car seat materials

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the car seat's cover material are tested for moisture and air permeability and compared with the properties of individual layer of the car seat cover material. This analysis gives us a real idea of which factors negatively affects the breathability of the car seat. The focus of this part of research was to identify the issues within the car seat material and not factors like external cooling or clothing of driver. It was observed that the PU foam and lamination significantly reduces the permeability of the car seats. Whereas the 3D spacer fabric shows the best top layer properties as compared to classical woven, knitted or leather car seat covers.

Keywords: Car seats, comfort, 3D spacer

ETT0092

Dyeing of Silk Fabric with Natural Dye Extracted from Leaves and Stem Bark of Dalbergia sisso

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Natural dyes are preferably liked in textiles because of their biodegradability and environment friendliness. This paper is concerned with exhaust dyeing of 100% silk fabric by natural dye extracted from Dalbergia sisso in alkaline medium. Effect of mordants on dyeing was also checked by employing different techniques (meta-mordanting, post-mordanting and pre-mordanting) using potash alum, ferrous sulfate and zinc sulfate respectively. The dyeing was conducted with mordants as well as without mordants. A variety of pale to dark reddish shades were achieved on the fabric dyed with aforementioned mordants. However, ferrous sulfate mordant produced duller and darker shade. The color of dyed silk fabric was analyzed by CIELab values (L*, a*, b*, C* and h) and color strength (K/S) values. Colorfastness performance to light, crocking and washing of the dyed fabric samples were measured in accordance with, ISO 105-B02: 1994, AATCC Test Method 8-2007 and ISO 105 C06 respectively. Best results were attained by dyeing at 90oC for 60 min. Colorfastness to washing was fair to good, whereas colorfastness to light was good and colorfastness to crocking was good to excellent.

Keywords: Natural dyeing, Dalbergia sisso, mordanting, potash alum,

MARMARA ÜNİVERSİTESİ

ETT0094

Development of a Durable Anti-microbial Silica Based Nanoparticles Treatment for Textile for the Healthcare Industry

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Hospital-acquired infections (HAIs) are a key issue faced by hospitals, with a reported 4-10% of patients getting sicker during their stay in hospitals, and a reaching up to 30% in intensive care units. One of the main modes of transmission of these pathogenic microorganisms is via contaminated surfaces and textiles. This has been recognised for many years but preventing it is not trivial and as this is a problem with many complex variables. It has been documented that the use of durable antimicrobial textiles as apparel is the emerging frontier in epidemiologically important surfaces in healthcare. However, to date the antimicrobial textiles market has focused on consumer-wear (socks, sportswear, t-shirts, etc) although the biggest impact of anti-microbial textiles is in healthcare. Most commercially available coatings are based on silver and are widely perceived as being costly. Silver also show high toxicity and there are concerns over leaching of silver ions into the environment or of silver nanoparticles through the skin.

The AcTin project is a join UK-Mexican project aimed at developing low cost, high efficiency and durable copper and silica nanoparticles based anti-microbial treatment for textiles. The challenge for copper textile treatment is to restrain the copper nano-particles in a structure that provides antibacterial functionality, but prevents leaching of copper into the environment. The AcTin consortium believes that the nanoscale silica nanoparticles functionalised can be used as coupling agents to bind the copper to substrates such as textiles.

This talk will illustrate the approach taken by TWI to design the functionalised silica nanoparticles by using a material-by-design approach. The formulation and synthesise process will be presented together with the challenges addressed by those novel inorganic-organic hybrid nano-materials. The anti-microbial property of the material will also be described

Keywords: Hybrid nanomaterial, functional nanoparticles, silica, anti-microbial, textile

ETT0095

Effect of Shear Thickening Fluids on Mechanical Properties of Glass and Carbon Preforms for Textile Composites

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The aim of this study is to develop an enhancing mechanism by embedding of non-Newtonian fluids (shear thickening fluids) on the host of glass and carbon composite preforms for improved mechanical properties. Different silica particle ratios (10-30%) were dispersed in to polyethylene glycol (PEG) to create a shear thickening fluid (STF) after optimizing the processing parameters. Viscometer test results indicated that the viscosity of fluids increased with increasing shear torque, shear rate and silica contents. Fabrics were immersed in to STF after diluting it with ethanol through various periods to calculate their fluid absorption. It was revealed that carbon and glass fabrics absorbed different amount of fluids due to their inherent fabric characteristics. Tensile test results indicated that STF contents and fabric types affected strength and modulus of the structures. It was observed that dynamic and static frictions of fabrics highly increased by the addition of STF. These fabric tensile and friction tests results will serve as a base for the future studies, which are the tensile, flexural and impact damage tolerance properties of glass/epoxy and carbon/epoxy composites containing STF fluids.

Keywords: High performance fabrics, textile composites, tensile strength, fabric friction, shear thickening fluids.

ETT0099

Microencapsulation of the Thermochromic System Prepared with Phenolphthalein Color Developer

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Thermochromic pigments are materials which change colour reversibly as a function of temperature. The leuco dye based thermochromic systems generally change from coloured to colourless with an increase in temperature. A thermochromic system (TS) consists of a colour former, a developer and a solvent in a specific combination. In our previous works, we synthesized microcapsules containing TS with poly(methylmethacrylate) and poly(methylmethacrylate-co-methacrylic acid) shell in ratios of 4:1 shell/core [1,2].

This study also focused on microencapsulation of thermochromic systems (TS). According to the literature survey, Bisphenol A is generally used as color developer to form ternary thermochromic systems. In this study, phenolphthalein was used as colour developer component of thermochromic system to avoid the toxic effects of Bisphenol A. Crystal violet lactone (CVL) as a leuco dye and 1-tetradecanol (TD) as a solvent were used as other components of TS. In the ternary system, CVL, phenolphthalein, and TD ratios were selected as 1:4:70.

The thermochromic systems are microencapsulated because of their water insolubility and inadequate affinity to the textiles, and fluidity of the melt solvent. In this study, the prepared TS was microencapsulated in poly(methylmethacrylate-co-glycidylmethacrylate) shell using emulsion polymerization. The shell/core ratios of the microcapsules were selected as 0,5:1. The chemical structure, thermal properties and morphology of the synthesized microcapsules were analyzed by FT-IR spectroscopy, differential scanning calorimetry, scanning electron microscopy, respectively.

Acknowledgements
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Keywords: Thermochromism, leuco dye, phenolphthalein, microencapsulation, color change

ETT0100

Polymerization and Characterization of *N*-vinylcaprolactam Based Thermoresponsive Polymers for Textile Applications

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In this study, thermoresponsive polymers based on *N*-vinylcaprolactam were synthesized and characterised as smart textile additives. Thermoresponsive polymers can respond to environmental conditions. They generally have a hydrophilic and a hydrophobic group in the molecular structure and due to this amphiphilic character, they show reversible transitions at the lowest critical solution temperatures (LCSTs).

A novel type thermoresponsive polymer were originated onto modification of the caprolactam monomer unlike literature, *N*-vinylcaprolactam was hydrolyzed by methanol (in 1/1 molar mixture) in toluene before the polymer synthesis. The hydrolysis process provided opening the ring structure to produce a new monomer. Polymers based on the poly(*N*-vinylcaprolactam) were synthesized using free radical polymerization method. Polymerization was performed in an oil bath at 80°C for 8 hours 2,2'-Azobis (2-methylpropionitrile) was used as an initiator as toluene was used as solvent.

The chemical structure of the synthesized polymer was examined by using a Nuclear Magnetic Resonance (NMR) spectroscopy and a Fourier Transform Infrared (FTIR) spectrometer. FTIR spectroscopy results showed that the peaks belonging to the vinylic carbon carbon double bond of the caprolactam monomer spectrum disappeared in the spectrum of the synthesized polymer. To investigate thermoresponsive behavior of the synthesized polymer, turbidity test was performed along the 20°C-40°C temperature interval by 1°C increase in temperature. The starting point for turbidity called as LCST for the polymer solution was measured as approximately 36-37°C at which hydrophobic groups become dominant. The transformation from transparent to turbid demonstrated the success of the thermoresponsive polymer.

Acknowledgements

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Keywords: Smart polymer, thermoresponsive polymer, N-vinylcaprolactam, free radical polymerization

ETT0101

Historical Development of Swimsuit as a Textile Product and Its Effects on Swimming Performance

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Swimsuit is a kind of clothing that is worn during swimming and designed specifically for this purpose. Swimsuits wrap the body firmly or have bigger models. In selecting a swimsuit, the comfort which it provides during swimming as well as such concerns as nakedness become decisive. Generally, fabrics that do not become transparent after getting wet are preferred. Swimsuit is generally designed in a way that will fit different body structures of men, women and children.

On the other hand, performance swimsuit is a kind of swimsuit designed specifically for increasing the swimming performances of professional sportsmen. This study deals with historical development of swimsuit and it examines the performance effect of swimsuit in swimming sport.

Keywords: Swimsuit, Sport textiles, Technical textiles

MARMARA ÜNİVERSİTESİ

ETT0102

Electrospun Polyvinylidene Fluoride (PVDF) Nanofibers

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Electrospinning has become a prominent fiber production technology in last decade although it has been known since last century. There have been a number of research works on electrospinning of different polymers. In this study, we used polyvinylidene fluoride (PVDF) with a concentration of 20% in the polymer solution. Different solvent types and different concentrations were used to dissolve PVDF. Prepared polymer solutions were fed to electrospining unit to produce PVDF nanofibers. The parameters such as feeding rate, high voltage and the distance between the needle and the collector were studied and the optimum parameters were used to produce PVDF nanofibers. Electrospun fibers were collected on aluminium foils located onto the collector. Surface morphology and diameters of the produced fibers were analysed by using scaning electron microscope (SEM). The effects of the solvent type and concentration on the fiber morphology and the diameter were investigated.

Keywords: Electrospinning, PVDF, nanofiber, morphology, diameter

MARMARA ÜNİVERSİTESİ

ETT0104

Development of Recycled Acrylic Fibers - A Technical and Economic Approach

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Nationally and internationally, sustainability is increasingly coming to the forefront of current discussions, both at the societal and political levels. Above all, the pollution of our environment by plastic waste is increasingly being discussed. The recycling of plastics plays a key role in the sustainable use of these consumer goods. Recycling processes and take-back systems are already established for a few plastics, e.g. for PET bottles. However, due to their cotton-like feel, polyacrylonitrile (PAN) fibers play an important role in the textile industry, especially in the house and home sector as well as apparel textiles. This means that around 1.9 million tons of PAN fibers (2014) are produced worldwide [TFY15]. Currently, textile waste containing PAN is mainly used for thermal combustion, which may result in the production of energy, but release CO2 and other toxic gases during combustion.

For the production of PAN (polymer) energy of about 69.3 GJ per ton is needed and released 2,590 kg CO2 per ton of PAN [Pat99]. This represents the general savings potential for the recycling of PAN-containing textile waste. Here, the required energy and CO2 emissions for the recycling of the polymer must be considered and the specified values (mentioned before) for an ecologically meaningful process must not be exceeded.

In this presentation, technical and economic opportunities and risks for the recycling of PAN will be presented and discussed. Through process engineering and economic feasibility studies, a qualitative and quantitative assessment of the recycling of PAN-containing textile waste will be presented.

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[TFY15] – The Fiber Year Consulting: The Fiber Year 2015 World Survey on Textiles & Nonwovens, Issue 15, April 2015

Keywords: Acrylic Fibers, Recycling, Sustainability, Recycled PAN Fibers,

ETT0105

Investigation Barrier Properties of Linear Low Density Polyethylene (LLDPE) Spunbond Fabrics

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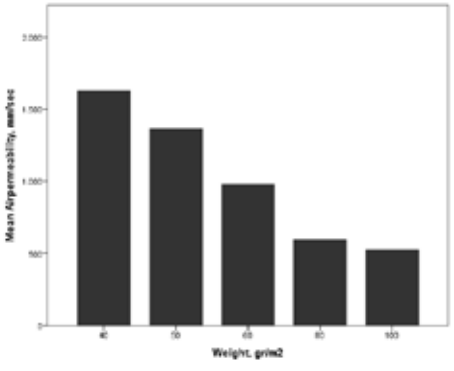
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Spunbond nonwovens are widely used all over the world. Today, it has the largest share in various nonwoven fabric manufacturing techniques and finds use in diverse fields such as baby diapers and incontinence products, automotive, geotextiles, civil engineering, medical and packaging. There are various polymers, polypropylene, polyester, polyethylene, polyamide, polyurethane, etc., used for the manufacture of spunbond nonwovens. Among of these, because of the inexpensive and providing highest yield, polypropylene is the most widely used polymer. Meanwhile, polyethylene has excellent chemical resistance; good fatigue behaviour, wear resistance and higher impact strength. Lower working temperature is needed than polypropylene polymer and LLDPE polymer has low moisture absorption rates. But, it has been put forward to be difficult to produce spunbond nonwovens of LLDPE which have more than about 50% of tensile properties manufactured from polypropylene polymers. This advantage makes LLDPE desirable in diaper coverstock, medical and hygiene products.

This study provides important contribution to the spunbond nonwovens field such as medical and hygiene by using LLDPE spunbond nonwovens. So, it was focused on barrier properties of LLDPE spunbond nonwovens with different weights. LLDPE spunbond nonwovens with 40 g/m2, 50 g/m2, 60 g/m2, 80 g/m2 and 100 g/m2 were manufactured. Barrier properties of samples were achieved via air permeability and hydrostatic head tester.

Keywords: low linear density polyethylene, spunbond, barrier properties, medical textiles

Air Permability of LLPE Spunbond Fabric



ETT0114

A Study About the Effect of Dual-Core and Core Materials on Yarn and Some Fabric Properties

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With the changes in consumer demand, the need of new products was appeared in textile industry. This requirement caused the development of different types of yarns produced with new techniques by use of different kinds of fibres. Developed new raw materials and technologies have opened up new horizons in textile industry. Core-spun yarns are one of the attractive developments in this area and hence its market share is growing up day by day. Core yarn is the yarn type consisting of core/sheath structure which combines the advantages of both components in one structure. The sheath part improves physical and aesthetic properties, while the core part affects the mechanical properties of yarn. Due to its multi-functional performance, core-spun yarns are also named as composite or hybrid yarns. The technique used in production of core-spun yarn is very simple and there is a choice for the selection of core and sheath materials depending on any predetermined end use. With increased demand to high extensibility and comfortability of fabrics, soft (elastic) core yarns have been widely used in core-spun yarns according to desired properties. Elastane fibres are covered with any type of staple fibres to produce elastic fabrics. However, it has been encountered some problems resulted from recovery features of elastane. To solve this problem, dual-core spun yarns have been developed. Although core-spun yarns are widely studied in the textile industry, there are limited findings about dual-core spun yarns. The aim of this study is to research some of yarn and fabric properties of core and dual-core spun yarns. Additionally, in the study, two types of core materials were used and the effect of X55+Elastane and PBT+Elastane core yarns on yarn properties and also mechanical properties and flexural rigidity of fabrics were analysed.

Keywords: Dual-core yarn, core-spun yarn, Elastane, PBT, elastic fabric

ETT0115

Application of the Microcapsules with Reactive Shell to Modified Cotton Fabrics

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In the study, cotton fabric was chemically modified using tannic acid in order to increase the affinity to the microcapsules having cationic reactive group on their shell structure. Cationic molecules have low affinity to cellulosic fibers because of less carboxyl end groups of cellulose except anionic carboxylate groups generated due to excessive oxidation. According to the literature, cellulosic fabrics are usually modified with anionic natural or synthetic compounds, during cationic dyeing or any pretreatment before dyeing. Tannic acid is commercial anionic phenolic compounds and has hydroxyl end groups. According to the literature, the cotton fabrics pretreated with tannic acid has acidic functional groups with anionic character such as carboxylic, lactonic and phenolic groups in acidic baths [Bouatay vd, 2014; Ontiveros-Ortega, vd, 1998]. Based on this information, in this study, cotton cellulose was modified chemically by tannic acid before microcapsule application. Microcapsules have poly(methyl methacrylate-co- methacrylamide) shell and n-dodecanol core and offer latent heat storage/releasing property. Microcapsules with amino groups on their shell structure were applied to modified cotton fabrics using exhaustion and padding methods in sequence. Before application, microcapsules were dispersed in distilled water containing nonionic surface active material using ultrasonic homogenizer. Then, fabrics modified with tannic acid and untreated one were exhausted with this bath. After that, the fabrics were impregnated with this bath in which a cross-linker and a catalyst was added, and dried and cured to bind microcapsules on the fabric. In the study, it was also investigated the salt addition on application of microcapsules by exhaustion method. The fabrics were characterized by FT-IR spectroscopy, SEM microscopy, T-History and DSC analysis methods before and after repeated washings.

Keywords: Microcapsules, tannic acid, cotton fabric, latent heat storage

ETT0117

The Smart Fabric Inspection Machines

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Companies that are actively working in the apparel field have to produce high quality products in short time and with affordable prices to save their own competitiveness. In the process of the production in apparel field, the first important thing under the quality title is checking the fabrics when just receive them. The fabric inspection process is up to operator's observation, marking and report preparation. "The Smart Fabric Inspection Machine (SFIM)" that make the fabric inspection process (the first link of quality control process) less dependent to operators, presents innovative solutions.

In this study, the information about the differences between Classic fabric inspection machines and Smart Fabric Inspection Machines and the advantages of this innovative technology are presented. İn addition, the information about the transform classical machines to the SFIM is presented.

Keywords: Fabric control, Quality control, Fabric control machine

MARMARA ÜNİVERSİTESİ

ETT0118

Conductive Cotton Yarn for Wearable Electronics

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With the progress in textile industry, functional products which can use for different purposes, gain importance day by day. One of the functional smart textile products are electronic textiles or wearable electronics. Wearable electronic textiles can be defined as the integration of various electronic elements such as sensors, energy harvesting devices, transistors, antennas etc. into fabrics. Therefore, e-textiles offer the combined advantages of both electronics and fabrics, and hence attracted considerable interest with the development of personalized electronics due to their flexible and wearable features. Wearable electronics have innovative applications in the military, public safety, healthcare, sports and daily life activities. One of the main elements for e-textiles is the usage of electrically conductive fibres or yarns to provide the signal transmission between the garment and other segments such as sensors, actuators, or computer chips, which are embedded into fabric. Electrically conductive fibres or yarns can be produced using conductive materials such as metals, carbon etc., or even conductive polymers such as polyaniline, PPy etc. and nanoparticules like silver (Steele, 2005; Lee vd., 2015). However, these materials do not provide flexibility, durability, comfort and stability as expected. In this study, it was worked on the conformal coating of the cotton fibres to get electrically conductive as well as flexible material. Cotton fibre is one of the most commonly used textile fibre in textile industry and has the advantages of being natural fibre and highly hydrophilic. In the study, carbon black powder was selected as conductive material due to low cost and easy procurable and cotton fibres were coated with carbon black powder. Conductivity and tensile properties of the produced yarns were measured. Two-probe measurement method was used for the yarn conductivity and the changes in yarn tenacity and breaking elongation of the yarns were also evaluated.

Keywords: Wearable electronics, electronic textiles, conductive yarns, smart textiles, carbon black

ETT0120

A Review on Bio-Nanofiber Membranes with Herbal Exract Blends

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Functionalization and characterization of bio-nanofibers for industrial applications have gained much attention in the recent twenty years because of their properties such as biodegradable, good mechanical and anti-inflammatory properties, biocompatibility, antibacterial, antioxidant, eco- and body- friendly. Bio-nanofiber membranes, including as herbal extract blend use in medical and pharmaceutical domains such as tissue engineering, wound treatment, bioactive packing and drug delivery. Herbal bio-nanofibers with suitable polymers, especially can be fabricated easily by electrospinning. Electrospinning method can be applied with different biomaterials for produce different morphological structures. Several studies have seen that the crude plant based extracts antimicrobial and/or antioxidants produce from rosemary, grape seed, pine bark extract, ginger, green tea, pepper, oregano, sage, turmeric, thyme, olive leaf and hypericum. These natural extracts provide sufficient support without changing thermal stability, physical properties and amorphous phase.

The purpose of this review is to reveal varieties and applications of bio-nanofiber membranes. Additionally, combinations of natural and synthetic polymers and herbal extracts used in various applications, properties, influences, methods of analysis, antimicrobial properties and usage areas are reported.

Keywords: Herbal extract, electrospinning, bio-nanofiber, polymers

ETT0121

Examination of a plant extract for smart wound dressings

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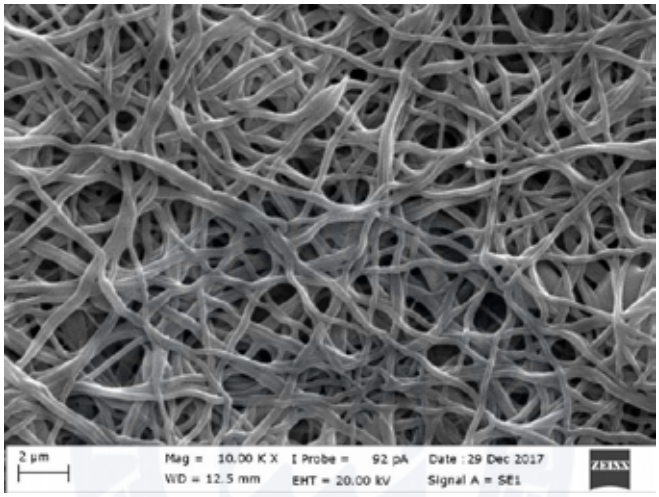
Color changing textiles are intelligent textile materials which change color upon an external stimulus. They are produced by adding color changing dyes into the structure of textile materials. There are many mechanisms of color change depending on the external stimulus. The most used two chromic applications in textiles are the ones of color change by light (photochromism) and color change by heat (thermochromism). The studies about the materials which change color upon the change in acidity (halochromic) are in the beginning stage. The degree of acidity or pH value is a vital parameter and halochromism is the reversible color change as a result of pH change. The usage of halochromic textiles in the determination of acidity of sweat, urine, coryza are possible. The pH degree of a wound gives information about its healing property. The pH of the wound leakage changes according to the healing or worsening of the wound. For this reason, the pursuit of the change of wound pH is of vital importance in wound healing.

In this study, natural pH-indicator anthocyanins which are compatible with human health and environment were extracted from the plants of black carrot (BC). Nanofiber wound dressings were produced by electrospining method by adding this extract in sodium alginate (NaAlg) and polyvinyl alcohol (PVA) mixture solution. Morphological characteristic of electrospun PVA/NaAlg/BC nanofibers mats were investigated in terms of extract concentrations. To stabilize the PVA/NaAlg/BC nanofibers, electrospun mats were cross-linked by glutaraldehyde. Further, PVA/NaAlg/BC nanofibers mats tested against simulated conditions having different pHs for the purpose of wound healing monitoring. The morphological appearances of electrospun PVA/NaAlg/BC mats were observed under scanning electron microscope. Eventually, it could be concluded that natural pH-indicator dye (BC) was successfully incorporated into nanofibrous textiles and later the obtained structures could be used as pH-biosensors.

The authors thank TUBITAK (The Scientific and Technical Research Council of Turkey) for its financial support in the research project of (No. 116M540).

Keywords: Nanofiber, Wound dressing, Smart textile, Sodium alginate, Polyvinyl alcohol, Natural extract

SEM image of the cross-linked electrospun 2/1 12 %PVA /1%NaAlg with 1% BC



SEM photographs (Figure 1) have showed that nanofibres were successfully produced from PVA/NaAlg/BC polymer solutions.

Properties of electrospun solutions

Solutions	pH	Conductivity(mS/cm)	Surface tension(m-N/m)	Viscosity (cp)
12% PVA	5,1	760	45,60	2500
1% NaAlg	7,1	3625	58,21	454,4
2/1 12% PVA/1% NaAlg	5,56	1524	47,65	932,3
2/1 12% PVA /1% NaAlg with 1% BC	5,42	2072	47,77	521,6
2/1 12% PVA /1% NaAlg with 2% BC	5,32	1609	48,22	348,8

The pH, conductivity, surface tension and viscosity properties of electrospun solutions results were shown in Table1.

ETT0122

Pressure Sensing Behavoir of PEDOT: PSS Coated Polyester Fabrics

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Electronics have an important place in facilitating our lives and meeting the needs of the modern world. Electronic textiles are preferred for reasons such as being flexible, light and cheap to meet these needs. Sensors are systems or components that perform sensing process in electronic applications. They serve as a bridge connecting physical environment and electronic devices. Variables in this physical environment can be heat, light, pressure, humidity, and chemicals. If the sensor in the system is sensitive to which change, it perceives the change and passes the resulting values to the system's decision-making unit. Pressure sensors are elements that sense any change in physical pressure and force, and convert this change into electrical signals. Pressure sensors have applications such as automobiles, production, aviation, biomedical measurements, weather conditions, hydraulic measurements. In this study, electrically conductive PEDOT:PSS [poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate)] coated polyester (PES) fabrics were prepared by drop casting method and their pressure sensing behavior was examined.

Keywords: PEDOT:PSS, polyester fabric, pressure sensor

ETT0123

Smart Costume Design with Wearable Electronics

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The rapid progressing of technology has resulted in the development of the field of materials and the increase in diversity. The use of technical and intelligent textiles, apart from the technical applications, has started to be used in today's clothing, so globally known fashion designers and companies hasprovided orientation to technical and smart textiles. The use of smart textiles has begun to be seen in social domain such as stage performances, premieres, invitations and parties. The smart clothes, known as the clothes of the future, has been designed by world-renowned fashion designers, fashion houses and big companies, especially started to be preferred on stage performances.

The aim of this study is design a smart costume with using wearable electronics for an ice skating show. A smart costume was designed which was as a result of interdisciplinary work, for a stage performance. As a result of interviews with dancer and choreographer, "Karlar Ülkesi (Frozen)" was chosen as the theme of the show. Wearable LEDs, which their trademark are 'Lilypad', and an electroluminescent wire were used and the light emitted by these LEDs according to movement of the ice skater. A accelerometer with 3 axis sensor was used into the costumes. Principally, inclination angle changes perceived by the sensor is transmitted to the microchip; the signals encoded by the microchip lights LEDs according to the choreography of performance.

Keywords: Smart Clothes, Costume Design, Smart Costumes, Wearable Electronics, Costumes

ETT0124

Design of an Alternative Heat Insulation Wall Fabric With Hot Melt Adhesives in Different Forms

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The sources of raw materials are decreasing day by day and the necessity of using the resources more efficiently is increasing. In order to leave a clean world and adequate resources for future generations saving, recycling, sustainability and environmentally friendly production methods are becoming increasingly important. Parallel to these, it is obligatory for the residents to apply TS 825 Standard of Thermal Insulation Rules since 2000. By providing thermal insulation in the buildings, it will be possible to make very serious energy savings.

Hot melt adhesives are high performance adhesives that do not contain solvents and are produced in 100% solid form. They are applied to the material surface by heating to a temperature above their melting temperatures. Hot melt technology is cheaper and more environmentally friendly compared to other lamination technologies.

In this study, 1000 gr / m2 needled nonwoven surface from recycled textile wastes was laminated with a chenille fabric by using hot melt adhesives in different forms and raw materials (powder, film and web). In order to obtain an aesthetic image, a chenille upholstery fabric with a weft density of 15 and a warp density of 66 was used as the upper fabric. The 7 different hot melt adhesives used are 2 in film, 2 in web and 3 in powder form. The adhesives in powder form were applied in 1, 2 and 3 grams. The raw materials of adhesives used are EVA (Ethyl Vinyl Acetate), PA (Polyamide), PES (Polyester). Web adhesives are expressed in terms of their weight, film adhesives thickness and powder adhesives in particle sizes. The heat transfer coefficients of 13 different laminated fabrics were measured with a Kyoto Quick Thermal Conductivity Meter and the relations between the measured values and adhesive forms, raw materials and the amounts used are investigated.

Keywords: Hot melt adhesive, lamination, heat insulation, recycling

ETT0125

An Investigation on Thermal Conductivity Properties of Epoxy Based Twill Fabrics Carbon Composites

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Carbon fiber reinforced polymer (CFRP) composites are very attractive because of their superior mechanical properties. So that, they have been widely used in aeronautical, automotive, petroleum, maritime, defence and sport industries among others. In this study, Carbon fabrics were coated by coupling agent silans with different concentrations (0.25, 0.5 and 1 wt %) to improve bonding force between the resins and reinforced material. After coating process, the carbon fabrics have been dried at 60 minutes and 100°C temperature. After that, composite structures were manufactured by vacuum infusion process with epoxy matrix reinforced with carbon fiber twill fabrics. The thermal conductivity test of carbon composite materials was performed using P.A. HILTON LTD. H940 device. The specimens were cut into a circle 25 mm in diameter and placed in to the device and tested. The obtained thermal conductivity test results have been analysed under three main parameter groups as type of amount of silane.

Keywords: Carbon Fiber, Woven Fabrics, Polymer-Matrix Composites, Thermal Conductivity Properties, Coupling Agents.

MARMARA ÜNİVERSİTESİ

ETT0128

Utilizing Recycled High Density Polyethylene Caps of Polyethylene Terephthalate Bottles in Composite Plates

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In the last 5 years, 3 million tons of plastic materials are used in Turkey just for packaging sector and 37% of it belongs to polyethylene (both high density polyethylene and low desity polyethylene) packaging. High density polyethylene (HDPE) is one of the most common polyethylene type especially used in polyethylene terephthalate (PET) bottle caps which can be reuseable after melting and re-shaping processes owing to its thermoplastic characteristics. When its huge percentage in solid wastes and ease of accessibility are taken into consideration, recycling of HDPE package wastes becomes a very important issue in environmental aspects.

In this study, composite plates that are consisted of recycled HDPE polymer matrix and reinforced with woven fabrics (cellulosic fiber content; flax and jute) are manufactured in order to contribute polymer waste management. Used HDPE bottle caps are collected and then hot press method is used to produce HDPE matrix plates. Plates are than reinforced with 100% jute and 100% flax woven fabrics with different sequence combinations by hot press machine. Temperature, production time, pressure and cooling rate are the crucial parameters that are optimized for forming composite materials. These bi-layered and three-layered composite plates are dimensionally, physically, mechanically and morphologically tested for appropriate end use areas.

Keywords: recycling, composites, textiles, packaging wastes

ETT0129

Antibacterial Properties Of Poliurethane / Benzalkonium Chloride Nanofibers

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The textile sector brings us different functional features besides our need for dressing. One of them is to give antibacterial properties to textile structures. Antibacterial property is aimed to increase the quality of life by protecting people against bacterial attacks. It is possible to achieve antibacterial characterization, at different stages of textile production processes. One of these process is the electrospinning method in which antibacterial substances are added to the polymer that fiber is drawn.

In this study, it is aimed to obtain antibacterial textile surface using benzalkonium chloride which has antibacterial property and polyurethane polymer family by using electrospinning method. For this purpose, nanofiber surfaces were obtained by electrospinning from polyurethane / benzalkonium chloride solutions at different concentrations. After the viscosity and electrical conductivity of the solutions were determined, the surfaces, obtained by electrospinning method were analyzed by Scanning Electron Microscopy (SEM), antibacterial and strength tests.

The voltage, applied to the electrospinning process parameters was 25 kV, the distance between nozzle and the cylindrical collector was 27,5 cm, feeding rate of the polymer solution was 2 mL / h, and speed of the cylindrical rotating collector was 100 rpm.

According to the results, antibacterial property tested positively and nano-structured surface was obtained.

Keywords: electrospinning, antibacterial textile, antibacterial, nanofibers

ETT0131

Artistic Design with Technical Textiles

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As technological developments are in every field, the textile sector is experiencing its unforeseen influences on its own world in every passing day. Every issue that is difficult to imagine for yesterday is indispensable today and it becomes products that can take part in habits. 10 years ago, we were trying to imagine the innovations of a digital clock we tied to our wrist would bring. But today, these watches are a multifunctional instrument that can be described as a performance tracker, a music / radio / television / internet connection item, or even a medical assistant connected directly to our doctor. The evolution of a clock in such a short time has enabled the movement of every sector to which it may relate. As in any industry, the textile sector has not lost a legitimate share of this movement as much as a garment that can be associated with this watch and another that can be influenced by this watch.

Today, hybrid disciplines open new horizons. The access of science and knowledge to people through art also leads to a more effective and beautiful way through the unification of two disciplines. The scientist, who can constantly change the material with the magical instruments of technology and science, can also shape the image of the new thing he has achieved. The artistic direction can be combined with technical knowledge and skill and turn into other ergonomic and aesthetic forms. This requires two separate competencies.

Many artists used textile materials in the art of fiber and land art. The designers of the fashion world are aware that there will be no areas where textiles will not be used in the future. For this reason, most of the designers, design products containing aesthetic items using different materials and methods in every area from fiber to fabric, from yarn to finishing processes and present them to consumers in different concepts. The sculptural clothes of which Issey Miyake produced in terms of art and the wearable art works created by Alexander McQueen and Hüseyin Çağlayan can be seen as an example of concept.

Through this work, the relationship between science and art has been exposed to the historical process, the pace of change and the dizzying fascination of science on the art of textiles. For this reason, the relationship between science and art has been exposed through the historical process, the pace of change and the dizzying frenzy of science on the textile arts. The work is expected to inspire the textile and design sectors.

Keywords: Technical Textiles, Art, Design, Wearable Art, Land Art, Innovation

ETT0132

Investigation of Antibacterial Properties of PVA/ Gelatin/ Benzalkonium Chloride Composite Nanofibers Obtained By Electrospinning Method

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Electrospinning is a widely used technique for the electrostatic production of nanofibers, during which electric power is used to make polymer fibers with diameters ranging from 2 nm to several micrometres from polymer solutions or melts. This process is a major focus of attention because of its versatility and ability to continuously produce fibers on a scale of nanometres, which is difficult to achieve using other standard technologies. Electrospinning is a relatively simple way of creating nanofiber materials, but there are several parameters that can significantly influence the formation and structure of produced nanofibers. These parameters are generally divided into three main groups: Solution (viscosity,solution concentration, molecular weight of the polymer, solvent properties, surface tension, conductivity) Processing parameters (voltage applied, distance of the electrode from the collector,f low rate, capillary geometry) and Atmosphere (Temperature, Relative humidity)

This study investigates the antibacterial action of polyvinyl alcohol based nanofibers obtained by the electrospinning process. For this purpose, nanolifiable surfaces were obtained by using PVA, Gelatin, Benzalkonium chloride mixture solutions in different concentrations with antibacterial properties. First the viscosity and electrical conductivity of the mixture solutions were determined. The concentration of polymer solution was 10 wt%. The velocity of cylindrical rotating collector was adjusted at 100 rpm. The set parameters of electrospinning process such as applied voltage, distance between cylindrical rotating collector and the nozzle, feeding rate of the polymer solution were 30-36-39 kV, 19,5 cm and 1 ml/h, in order of solution. the surfaces obtained by electrodeposition method were analyzed by scanning electron microscopy (SEM), antibacterial tests and strength tests.

According to the results, antibacterial property tests are possible under these conditions. Resistant surfaces were formed in the nano structure.

Keywords: Electrospinnig, antibacterial textile, antibacterial, nanofiber

ETT0133

Investigation of Antibacterial Properties of Polyurethane-Chlorhex Nanofibers Obtained by Electrospinning Method

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The application of nanotechnology in textiles aims to increase performance of textile products and provide new functions for textile products. The most permanent and effective applications for obtaining desired properties of the product are fiber based applications. Electrospinning is a simple, cheap, easy and fast process for producing fibers in micro-nano-size, also it's suitable for the production of various types of polymers and suitable for commercial production.

Antimicrobial textile products are obtained by incorporation of the antimicrobial material during fiber drawing and impregnation into the fiber polymer structure or by transferring the antimicrobial material to the textile product by finishing operations [3]. It is known that polyurethanes are susceptible to microbial attack. They are subject to deterioration by many fungi or bacteria [4]. In this study, nanofibers were prepared by adding chlorhex material in different concentrations (0.5, 1, 2, 5, 7%) in polyurethane polymer and the antibacterial properties of the produced nanofibers were compared with scanning electron microscope images and the results of strength.

Keywords: Nanofiber, Elektrospinning, Antibacterial

ETT0134

Polyethylene Based Carbon Fibers: Future Prospects and Challenges

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The global demand for carbon fibers for the year 2016 was approximately 70 kt and is anticipated to exceed 100 kt by 2020 [Pic17]. Currently, the aviation and aerospace sector represents the most significant segment in terms of demand [WSK17]. Then again, automotive and wind applications are becoming increasingly important. Although the trend for growth of carbon fiber market is expected to remain strong with a growth in the range of +8 to +14 % per annum [Pic17], the manufacturing costs are still the limiting factor for carbon fiber use in mass market applications.

Since potential cost savings of optimizing the conventional polyacrylonitrile-(PAN-)based process chain are too low, new processing concepts have to be developed. Approximately 50 % of the PAN-based carbon fibers' production costs are caused by the precursor production process. Therefore, alternative precursors for carbon fiber production are currently being researched. Among the new precursors, polyethylene (PE) is the most promising alternative.

Intensified research efforts are, however, necessary for production on an industrial scale and for reaching the PE-based carbon fibers' full potential. Major challenges lie, on the one hand, in developing industrial scale production equipment as well as a sulphuric acid recovery system, and on the other, in optimizing and harmonizing the individual production steps along the process chain. At the level of fibre development there are currently two approaches. Since PE-based carbon fibers offer a great reduction of production costs they could substitute the more expensive PAN-based carbon fibers in appropriate applications. To become competitive this requires further improvement of the fibres' tensile strength and Young's modulus. Then again, the fibres' structure suggests that PE-based carbon fibers offer better compressive strength. If this hypothesis can be confirmed PE-based carbon fibers would be ideally suited for turbine blades or automotive applications.

Keywords: Carbon fibers, Polyethylene, Sulphonation, alternative precursors

ETT0136

Temperature Sensing Behavior of PEDOT: PSS Coated Smart Textiles

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The temperature of the human body is an important sign of physical condition in terms of comfort, performance, heat or cold stress. Temperature is one of the important parameters followed in many areas such as production processes, structural health monitoring, in home and health care applications. Property of the temperature sensor is referred as the ability to change resistance depending on the increase or decrease in temperature of the material. Textile based temperature sensors show great advantages for applications in smart structures compared to electronic sensors. For example, in health care applications, temperature sensors used in smart textile technology can provide an assessment of temperature changes on the skin surface. This data can be used in physiological evaluation, control and patient comfort development as well as wound healing. In this study, we define a different approach to manifacturing conductive textiles with temperature sensing capacity. For this approach, we obtained to textile based temperature sensors using PEDOT: PSS as conductive polymer via Drop Casting-Drying method.

Keywords: Temperature sensor, Conductive textiles, PEDOT:PSS, Smart textiles

MARMARA ÜNİVERSİTESİ

ETT0140

Sensory Carbon Rovings Used for Leakage Detection in Water Pipes Made of Textile Reinforced Concrete

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The outstanding mechanical and chemical properties of carbon rovings enable their use as a textile reinforcement in concrete structures. Concrete structures reinforced with technical textiles made of alkali resistant (AR) glass or carbon rovings are high-strength, non-corrosive and lightweight construction materials compared to steel reinforced concrete.

Due to their electrical conductivity carbon fibers allow the detection of leakages in concrete structures and therefore they are able to be used as humidity sensors in the construction sector. This increases the material functionality, since carbon rovings are used as a textile reinforcement and at the same time as a monitoring system in the construction.

Different roving properties like the linear mass density and sizing type as well as different producers (production lines) have different effects on the electrical resistance of carbon rovings. In this paper the sensory behavior of various carbon rovings will be presented. For this purpose the change of electrical conductivity between roving pairs will be measured and the influence of the humidity will be estimated.

Keywords: TRC, sensory carbon rovings, leakage detection

ETT0143

Investigation of thermal degradation of Wool/PA blends by TGA and MCC

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Wool and its blends have a variety of end-uses in aircraft cabins, e.g.; upholstery, floor coverings etc [1]. Intrinsic flame retardancy of wool products is not sufficient to comply with the requirements established by aviation organizations. A limited number of flame retardant chemistries have been developed up to date and are currently in use. Among the other factors; the thermal degradation and pyrolysis mechanism of the fiber alone and in blends should be evaluated to study the effects of flame retardants. Thermogravimetric analysis (TGA) and microcombustion calorimetry (MCC) are two useful techniques to study the thermal degradation and flammability of milligram size samples.

This work aims at investigating the thermo-oxidative degradation and combustibility of wool(WO)-polyamide(PA) blends. Yarns of 100%WO, 90% WO-10% PA and 80% WO-20%PA were scoured using a non-ionic detergent and the composition of yarns was determined according to TS1700. Simultaneous thermal analysis of yarns were carried out at various heating rates (β=5ºC/min, 10ºC/min, β=15ºC/min,20ºC/min) under air flow (50ml/min) up to 700ºC. The kinetic parameters of oxidative decomposition of wool and its blends were computed from thermogravimetric data according to invariant kinetic parameters (IKP) method. Coats&Redfern [2] method and the iterative technique by Órfão [3] were used for the solution of temperature integral. The probability distribution of 21 conversion functions was computed for each sample using a MATLAB code generated in our laboratory and a representative model for degradation was determined. Important flammability parameters such as heat release rate and total heat release were determined by MCC.

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2. A. W. Coats JPR. Kinetic Parameters from Thermogravimetric Data. Nature. 1964;201:68-9.
3. Órfão JJM. Review and evaluation of the approximations to the temperature integral. AIChE Journal. 2007;53(11):2905-15.

Keywords: wool blends, thermal analysis, micro-combustion calorimetry, IKP method

ETT0146

Electronic Textiles (E-Textile) in Fashion Design

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In parallel with technological developments in the century we are living, a new field of research is to produce fibers, fabrics and clothing suitable for the ages by integrating different disciplines such as information technologies and micro systems into traditional textile applications. This aims to develop flexible, harmonious and voluntary new areas for both civilian and military areas. For this reason, it is necessary to develop technology and manufacturing techniques that provide a wide textile-based information system in order to economically produce new projects in the fashion and textile sector.

Nowadays, traditional textiles such as communication, transformation and energy management are involved; have received textiles, intelligent textiles with the ability to detect and react to any change in effect or effect.

E-Textiles (Electronic Textiles) are textiles that contain digital and electronic components. In general, these textiles are defined as "Smart" because they have functions that will directly react to environmental stimuli such as mechanical, thermal, chemical, electrical and magnetic. Electronic textile refers to a textile material that includes sensing, communication (usually wireless), power transmission, and interconnection technologies to allow sensors or items such as data processing devices to be networked together in a fabric.

Textiles are an integral part of human life and in the direction of significant developments in the field of information, the use of e-textile will enable people to integrate easily into their lifestyle. The fact that the world population will use the high value-added technologies in the coming years reveals the importance of using e-textile. Many smart apparel, wearable technology and wearable computing projects involve the use of e-textiles.

Today's developments in information technology, as well as the traditional industrial processes, change our consumption habits, and the production and design of textile and fashion products are being reformed in line with these changes.

The production of garments enriched with digital technologies is very important in your day. Fashion designers are turning to innovative and futuristic designs that support technology in their creativity. Interdisciplinary studies are being conducted; scientists, engineers and designers come together to design, develop and produce some items. Wearable electronic textiles have recently come into conflict in many fashion designs as result of collaborations in fashion, design, technology and science fields.

In this study, it was tried to synthesize the resultant information of E-Textiles (Electronic Textiles) in detail by examining the sources obtained by the researches.

Keywords: Smart Textiles, Electronic Textiles, Wearable Electronic Textiles, E-Textile, Fashion Design.

ETT0147

3D Revolution in the Fashion Industry

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3D printing (3DP) is an innovative technology that allows you to create a physical object from a digital model. In 1980s, this technology began to be used to make prototypes faster and cheaper. 3D printing, also known as Additive Manufacturing (AM), creates layers of solid 3D objects into solid objects.

Special designs are made through 3D printer to create special products tailored according to size and shape and to make rapid prototypes; in particular engineers, designers and firms, to get repetitive feedback on their designs in short period of time and to create difficult models in interesting and useful way with complex geometry.

With materials and technology used, 3D printing reduces cost of end products and prototypes. Since it is possible to print models more than once using appropriate materials, the production time and material waste are also reduced. 3D printing is possible with thermoplastics, thermoplastic composites, pure metals, metal alloys, ceramics and various foodstuffs.

Over time, textile and fashion industry, which switches from haute couture producers to fashion apparel collections firms, is under the influence of fast fashion trends. But nowadays, fast fashion and sustainability have gained importance due to environmental effects. Use of 3D printing in many industries, including fashion industry, is becoming widespread. This technology offers advantages over traditional manufacturing processes such as accelerated design processes, shorter production time, fewer documents, storage, packaging, lower costs associated with logistics and waste.

3D printing technology provides design and manufacturing freedom to create designs that are difficult to produce with traditional methods. In fashion and textile sector, 3D printers have potential to influence the way design, produce and market products.

In this study, use of 3D printing technology by designers in fashion and textile sector and comparison of designs in terms of commercial / economic / fashion / art are given.

Keywords: 3D Printing, 3D Printing Technology, Fashion, Design

ETT0148

The Effect of Interlining on Properties Used in Fabric Modelling for 3d Virtual Garment Simulation and Compare Different Measurement Systems

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With the developing technology in recent years, 3D virtual garment simulation programs have attracted attention in textile and clothing sector at production and sale stages and has begun to be demanded. Fabric mechanical and physical properties which are used for fabric modelling in other words fabric simulation are important to reflect real garment in these programs. Interlining is an important material that affects appearance of clothing in the production of textile and clothing and are usually used for building clothing shape in the production of suiting. In this study is aimed to put forward the effect of interlining on bending, extension and shear properties on fabrics that are usually used for manufacturing suiting. These properties are used for fabric modelling in the 3D virtual garment simulation programs. In the direction of this aim; five different suiting fabric fused with five different adhesive interlining and are prepared totally thirty sample fabrics. Bending and extension properties are measured using Lloyd Tensile Tester and Wira Bending Tester, respectively and shear properties are calculated. In the scope of study also these properties are measured with Browzwear Test Kit and are put forward compatibility of these different measurement systems. The results of this study are evaluated statistically using SPSS programme.

Keywords: Fabric modelling, suiting fabric, adhesive interlining, extension, bending and shear properties

ETT0152

Preparation and Cotton Fabric Applications of Chitosan-Silver Nanocomposite

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Nanotechnology can be seen as a new industrial revolution in the last decades. Textile industry has discovered the possibilities of nanotechnology. Application of nanotechnology and nanoparticles in textile industry has risen owing to the possibility of incorporating desirable properties including antibacterial properties, UV protection abilities, etc [1-2].

Nanotechnology can provide high durability by presenting better affinity for fabrics and leading to an increased durability, especially for antibacterial textiles. Therefore, special attention has been focused on functionalization of natural fibers to avoid the negative impacts of growing microorganisms by using antibacterial agents [2]. The treatments of the textiles for the functionalization with antibacterial agents are applied to obtain technical materials especially for fabrics made from natural fibres which are more susceptible to microbial attacks [3].

Researchers are currently focusing on developing more eco-friendly processes or materials for the application of nanoparticles. In this concept, biopolymers have been extensively used as bionanocomposites. Biopolymers like chitosan can be used to replace various chemical auxiliaries in textile finishing [4]. To take the advantage of macro-sized chitosan more effectively chitosan nanoparticles were used and better results could be obtained by using less amount of chitosan. Different nanoparticles such as silver, zinc can be used in the functionalization of fabrics achieving significantly improved products with chitosan nanoparticles[5].

The aim of this paper is to make the applications of nanochitosan and chitosan-Ag nanocomposites onto the cotton fabrics by environmental friendly plasma and sol gel methods. Synthesized nanoparticles characterized by DLS, UV-Vis, FTIR analysis. Also, treated fabrics will be examined in detail from the point of their antibacterial activities. As a conclusion, application of biopolymer with environmental friendly methods, multifunctional cotton fabric has obtained with the potential to obtain products used in medical textiles.

Acknowledgements:This study was supported by the TUBITAK through the project number 216 M 055.

Keywords: silver nanocomposites,chitosan, bionanocomposite, cotton, antibacterial

ETT0154

Perspective of Printing Industry to the Technical Textiles: Wallpaper

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Today, the textile sector not only serves as clothing or fabric, but also serves a diverse and diverse range of fields in many areas of our life, depending on technological developments. The definition of textile technologies covering these developments, rather than aesthetics and appearance characteristics, is understood primarily textile materials and products produced for their functional properties and technical performances. Technical textiles are expensive, products with added value, that is quite high. Chemical products are products with superior physical and performance properties such as resistance to adverse weather conditions, microorganisms, high strength and incombustibility and nowadays coatings in home textiles covering the agricultural, construction, geological, industrial, medical and ecological fields as well as printing industry and packaging textiles as well.

In this study, the production and printing stages of Textile Based Wall Paper were mentioned from the floor coverings used in home textiles.

In the production of wallpapers which are used in the decoration materials of home textiles for decoration and protection purposes, natural materials such as silk, jacquard, silver yarn, cotton and cotton are used as protective textile wallpapers. In these productions, the harmful chemicals do not exist in the foreground with environmentalist features.

The Tifdruk Printing System, which is the printing system used as the printing material of the Textile Based Wallpapers, is also used in the packaging printing and unlike other printing systems, the quality of the printing point is at the forefront and adds value to these products.

This study is a compilation, showing how the technolo- gies have successfully combined different disciplines, explaining the effects of the print industry, one of the areas where technical textiles are effective, with an example.

Keywords: printing industry, technical textiles, screen printing

ETT0155

The Investigation of Antimicrobial Properties of Ag–Alginate Coated Polyester/Viskose Nonwoven Fabric

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Alginate is a biomaterials that is used in food, textile and medical industry. Alginate is used in textile industry as a sizing agent, thickener and finishing materials.In addition to this It is used in medical industry due to its biodegradable and biocompatible properties. The aim of this study is to investigate the antimicrobial properties of Ag–alginate coated polyester/viskose nonwoven fabric. In this study, Ag–alginate solutions were prepared at different concentrations. Polyester/viskose nonwoven fabric with different mixing ratio were coated with prepared solutions. Finally, The antimicrobial, ICP-MS, SEM analyses were performed.

Keywords: Ag–alginate, Antimicrobial Properties, Polyester/Viskose Nonwoven

MARMARA ÜNİVERSİTESİ

ETT0157

Textile-Based Wearable Pedometer

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This research work presents design and development of textile-based smart knee sleeve that can be used as a wearable pedometer. Textile-based capacitive soft sensor and its associated circuitry are integrated on a stretchable knit fabric in order to construct the proposed device. The proposed sensor is made of conductive knit fabric as electrode and silicone elastomer as dielectric. The sensing principle of the sensor mimics the simple parallel-plate capacitor with a dielectric layer that varies in thickness as the sensor is strained axially. Thus, as a result of the decrease in thickness due to an applied strain, the sensor's total capacitance increases. Here, movement of knee joint during the walking action stretches the soft sensor on knee sleeve, thereby changing its electrical output. Every step during the walking action causes a peak capacitance value in which we use this information to calculate number of the steps. Arduino nano board with ATmega 328P microcontroller is used to get electrical output and process the obtained data. Finally, we also embedded LED screen on the device that shows the number of the steps visually during the walking. Based on the experimental results, we verified the effectiveness of the proposed smart knee sleeve as a measurement device for identifying walking or running rate of the wearer.

Keywords: soft sensor, wearable electronic, pedometer,capacitive

ETT0158

Eco-friendly Cotton Fabric Finishes Using Natural Dyes

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In recent years, plant materials have attracted a great attention. In textile field, several investigations have been undertaken on the dyeing and functional finishing of textiles with these materials. In the current study, surface modification of cotton to enhance dyeability and functionality has been investigated. Chemical modification using dopamine as biopolymer was realized. Furthermore, attachment and antimicrobial effect of two natural dyes has been studied. Laundering tests were also performed to predict the durability of the finishing. The results demonstrated that cotton surfaces treated with dopamine exhibit a high level of dye uptake and a good washing fastness. It was also demonstrated that plants rich in bioactive compounds lead to functional dyed textiles.

Keywords: Cotton, natural dyes, Eco-friendly, surface modification, dyeability, functionality.

MARMARA ÜNİVERSİTESİ

ETT0159

Ultrasonic Assisted Surface Treatment of Okra Fibers

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Okra fibers, which are obtained from agricultural waste by use a specially designed machine, are a kind of bast fibers. This kind of fibers has similar properties about ready for industrial adoption to traditional bast fibers such as flax, hemp, kenaf etc. In this research, fibers, which were obtained from okra stem wastes from Amasya in Turkey by use a specially designed machine, were treated 10 % sodium hydroxide and 1 % laccase enzyme with and without ultrasonic energy. The results of the contact angle measurement, tensile strength and X-Ray analyse of ultrasonic assisted treated fibers were compared to the conventional process. Finally, the ultrasonic assisted pre-treatment process was improved the contact angle and mechanical properties of the okra fibers. Environmentally friendly laccase enzyme treatment were more effective than conventional alkali treatments with sodium hydroxide.

Keywords: agriculture waste, surface modification, ultrasonic energy, natural fibers, okra fibers

ETT0162

Level of Recognition of Technical Textile Terms by University Students

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This study is an exploratory study to investigate the levels of recognition of the most commonly used technical textiles terms for textiles branches by university students in the department of Textile Technology. For this purpose, a series of vocabulary lists related to each branch of the discipline were created by interviewing the specialist and educated people in different branches of textile. The levels of recognition are measured at five levels. Responses are rated on the scale from 1 to 5: I have never heard it, I've heard it before but cannot say anything about that, I can say a few words about it, I have enough information to explain it and I know it exactly.

Keywords: technical textile terms, university students, recognition level

MARMARA ÜNİVERSİTESİ

ETT0168

How Mathematical Models Can Improve Process Chain Designing

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The introduction of fiber-reinforced plastics (FRP) in serial and large series production is decisively influenced by the cost-effectiveness of the manufacturing processes. At present, preform production causes a significant amount of the resulting component costs and represents one of the biggest barriers to FRP serial production. As a result, the objective is to reduce the corresponding process costs. Systematic and efficient process chain design can make a significant contribution in combination with the development of new technologies and the continuous improvement of established processes. The existing methods for designing process chains are therefore striving to reduce intuitive decisions and to facilitate a systematic approach. Nevertheless, they are still dependent on manual procedures and the process planner's wealth of experience. This may impede a well-founded and objective decision-making process. Furthermore, a technological or economic evaluation is often carried out for a few selected alternatives. As a consequence, upstream decisions are made in isolation, technically feasible process chains are prematurely excluded and an intuitive procedure is facilitated.

Therefore, this paper is about a first extension of existing planning methods with simple mathematical decision models. Thus, alternatives are no longer prematurely excluded and subject to a technical and economic assessment without exception.

Keywords: Process Chain Design, Operations Research, Composites

ETT0169

Effect of PVP addition on PVA/Boron Carbide Nanofibers by Electrostatic Spinning for Interactive Wound Dressing Application

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Boron carbide (B4C) nanofibers have a wide range of application in automobile and aircraft components, ballistic applications and nuclear power plants due to their high chemical inertness, thermal stability, hardness, excellent high temperature thermoelectric properties and neutron capture capacity. Since electrospinning technique enables mass production of one-by-one continuous nanofibers from various polymers, the electrospining of B4C nanofibrous membranes in the polymer provide large surface area to volume ratio, flexibility in surface functionality and superior mechanical and impact performance. In this study, by addition of polyvinyl pyrrolidone (PVP) into poly vinyl alcohol (PVA) boron carbide composite nanofibrous membranes, the effect of the electrospinning parameters on the fiber structure, morphology and its characteristic behaviour, depending on solution flow rate, applied voltage and distance between the substrate and syringe, will be investigated by scanning electron microscopy (SEM) and x-ray diffraction (XRD) analysis.

Keywords: boron carbide, poly vinyl alcohol, polyvinylpyrrolidone, electrospinning

ETT0172

Investigation of the Opportunity to Use of Silicone-based Chemicals to be Developed Elasticity of the Woven Fabrics

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The expectation of the fabric elasticity is changed by comfort features what the consumers expect and the usage area of the fabrics. Nowadays, the elasticity performance of the fabrics that the consumers demand has increased to 25% especially for women/men outerwear. The expectation about all fabrics is that the residual extension (growth) value is about either “0%” or not exceed 7% in association with the elasticity. These properties are gained to the woven fabrics with usage of different kind of elastane fibre. However, depending of sensibility of this kind of fibre, the growth problem occurs at usage area for woven fabrics.

In this study, it is aimed to develop the elasticity, while keeping residual extension value of the fabrics at a certain level and prevent growth, by using special elastomeric agents which are based silicone raw material. With this aim, different elastomeric silicon based chemicals will be used at different concentrations for fabrics woven by different technological properties. In the scope of this study, the woven fabrics were weaved with the weft yarns involved elastane fibre having different linear density, different weft density and pattern constructions. It will be examined the effect of elastomeric silicone depending on the technological properties of the woven fabric on the elasticity and residual extension (growth) of the fabrics. The % elasticity, % residual extension, % growth will be tested to observe the effects of the elastomeric silicon based chemicals on the fabrics performance.

Keywords: Silicone, elasticity, residual extension, growth

ETT0173

PVP/Gelatin/Lavander Essential Oil Based Nanofiber Production With Green Electrospinning Approach

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In this study, it is aimed to achieve Polyvinylpyrrolidone (PVP)/gelatin/Lavender Essential Oil (LEO) nanofiber production by oil-in-water emulsion electrospinning with green electrospinning approach. Emulsion electrospinning is a new approach to produce nanofibers with green treatment. Especially for medical applications, green electrospinning approach has a vital importance why it is focused on this subject. Emulsion electrospinning is the most suitable method to combine nanofibers with essential oils (Agarwal, 2010; Hu, 2013; Briggs 2014). PVP and gelatin polymers are preferred for this research because of intrinsic properties of hydrophility, water-soluble, biodegradability, biocompatibility, good cell adhesion and mucoadhesion which are important for medical applications (Yu, 2009; Yu, 2013; Dhandayuthapani, 2010). Lavender (*Lavandula hybrida* L.) Essential Oil which is used as an additive substance has antiseptic, antibacterial, sedative, tranquillizer, antioxidant and relaxing properties and therefore, it can be used perfumery, pharmacology, medicine and especially aromatherapy applications areas (Guenther, 1952; Cavanagh and Wilkinson, 2002; Lis-Balchin and Hart, 1999; Hui, 2010).

Firstly; polymer solution preparation, nanofiber production optimization and nanofibrous web characterization in terms of solution properties (concentration, viscosity, conductivity) with various concentrations of LEO and various rates of PVP/gelatin (100/0, 75/25, 50/50, 25/75, 0/100) were achieved. All solutions were prepared under the same conditions (temperature, stirring time etc.). Distilled water was used as a solvent and PVP concentration is 12 wt % which was determined from previous experiments. Secondly; optimization studies about process parameters of electrospinning (voltage, feed rate, distance between the electrodes) and characterization nanofibers using SEM for fiber morphology such as; fiber diameter, fiber uniformity and FT-IR for chemical structure were achieved.

As a result, it is thought that this nanofibrous material has a potential of cosmetic and biomedical applications such as wound dressing.

Keywords: Polyvinylpyrrolidone, Gelatin, Lavender Essential Oil, Emulsion Electrospinning, Green Electrospinning, Nanofiber

ETT0174

Selection Method for Grippers for Handling of Reinforcing Textiles in Automated Composite Process Chains

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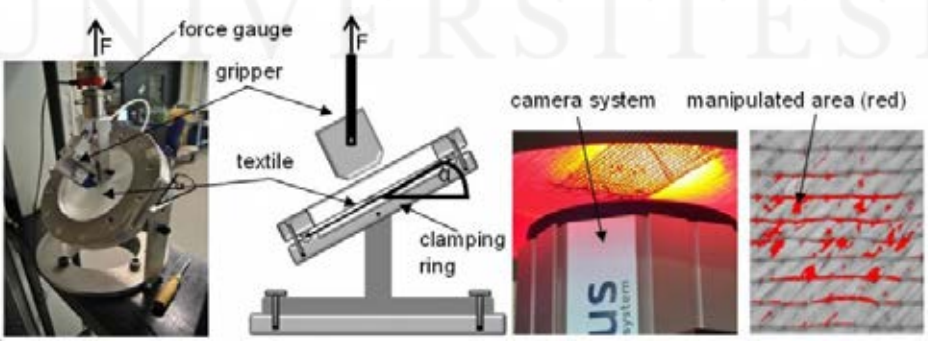
In almost all industrial sectors handling processes are automated using robotic systems. However, in the manufacture of fiber-reinforced structures with complex geometries, the handling of dry semi-finished textiles is still performed mainly manually. This leads to long processing times, low reproducibility and high manufacturing costs. The reason not to use robot handling systems is the lack of knowledge about the behaviour of flexible semi-finished textile products avoiding gaps and defects.

In many projects several handling systems with several handling principles were developed. When selecting a suitable gripper for textile semi-finished products, different criteria must be considered e.g. the geometry of the gripping and placing position, the dimensions of the workpiece as well as its material properties. An important criterion is the reliability of the gripping process. According to the reliability depends on a variety of factors, such as the material flexibility, operating speed, gripping technology and the environment. A methodology to select gripper technologies for an optimized handling process with minimized damages to the textile and reduced energy consumption is missing.

Based on these challenges a methodology is developed at the Institut für Textiltechnik (ITA) of RWTH Aachen University to select the right gripper technology for the automated handling of reinforcement textiles. The methodology includes pull-out-experimentations and a extensive model based analysis of handling processes with which a “handling-value” can be evaluated. With this method a comparison between different gripping technologies and the selection of a suitable gripping technology are possible.

Keywords: handling, Composites, gripper, textile, automation

Experimental pull out test



this figure shows the test stand for the pull out tests which is used to determine the handling values for different gripper Technologies and reinforcing textile

ETT0175

Microclimate Regulation with Spacer Fabrics

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To regulate the microclimate in outdoor tents and caravans is particularly important in terms of health. Especially adjusting the humidity to a certain level is crucial. Harmful mold grows often appears if the environment is too humid. On the other hand, a too low air humidity often leads to dry skin or respiratory complaints.

Until now the humidity in housings and tents can only be regulated with relatively high energy consumption or environmental costs. Air humidifiers require electricity to evaporate water. Whereas, chemical desiccants are usually used as dehumidifiers. A textile fabric for regulating the indoor climate can be a flexible solution to this problem: by maintaining a balance between condensate and humidity. The textile can function as a humidifier and also as a dehumidifier. This can be achieved passively without the usage of any chemicals.

As a basis for such a climate regulating textile a spacer fabric is used, which is functionalized with bionic inspired fibers. The fibers use the bionic template of the horned lizard. A complex network of micro-channels run on the skin of horned lizards, which allow them to transport water in a directed way to its mouth. Copying this principle, it is possible to develop a special fiber which transports fluids only in one direction. A spacer fabric functionalized with these fibers is able to regulate the room climate without the need for electricity or chemical agents.

Keywords: bionic textiles, microclimate regulation, spacer fabrics, fluid transport

ETT0177

Sound Absorbing Properties of Nonwoven Fabrics Produced from Biofibres for Automotive Applications

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Nowadays, the polyester nonwoven fabrics are generally used as car interior material in automotive industry. Due to environment and sustainability issues, there is growing interest to use nonwoven fabrics made from natural fibres in automotive industry. Natural fibres are noise absorbing materials that are renewable and biodegradable. The nonwoven fabrics made from the biofibres such as flax, hemp, kenaf, jute, sisal and abaca can be good alternative to polyester nonwoven fabrics for noise reduction in automotive industry.

In this study, the carded and needle punched sound absorbing nonwoven fabrics were developed from flax, kenaf and hemp fibres for automotive applications. The nonwoven fabric production was carried out from the bio fibres without physical or chemical modification. The bi-component staple PLA fibres were used as matrix material. These bio fibres were mixed with staple PLA bi-component fibre at 50:50 blend ratios.

In the experimental study, the bio fibres and PLA fibres were fed to laboratory type carding machine in order to produce web. The webs were formed and wound on the rotating drum at carding machine. And then, the webs were bonded at needle punching machine working at low velocity. The needle punching operation was done the industrial type needle punching machines. The needle punched nonwoven fabrics were bonded with hot air in oven. The mechanical and sound absorbing properties of produced green and biodegradable nonwoven fabrics were compared to polyester nonwoven fabrics.

After nonwoven fabric production, tensile strength, thickness and sound absorbing properties of the produced needle punched nonwoven fabrics were tested. The sound absorbing properties of needle punched nonwoven fabrics were measured in the frequency ranges of 500 to 6400Hz and 50 to 1600Hz using impedance tube method.

Keywords: sound absorbing, nonwoven, biofibres, automotive

ETT0178

Effect of Selected Fire Retardant Additives on the Flammability of Epoxy Resin for Aircraft Composites

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Composite materials have taken the place of steel and aluminium alloys in a wide range of applications over the last decade because they offer excellent physical, chemical and mechanical properties with low density, high specific stiffness and strength, good fatigue resistance, corrosion resistance and good thermal insulation. However, due to the polymer matrix and the organic structure of the fibers, the composite materials have poor fire resistance. Especially, airplane manufacturers must certify compatibility to the airworthiness standards of EASA and FAA for composite materials used in all areas such as aircraft frame, power units and cabin interiors in terms of fire safety. So the aerospace and defence industry have concentrated on the epoxy resin-glass fibre composites providing excellent mechanical and thermal resistance.

In this study, selected environmental friendly alternative flame retardant materials for fiber-reinforced polymer composites was investigated. Within the scope of the study, five different types of flame retardant additives were added to the epoxy resin system and evaluated by the thermal analysis and flammability tests. The first group of the additives is phosphorus based flame retardants consisting of RP (Sigma) and APP (Exolit AP 760, Clariant). The second group is metal-based flame-retardants consisting of ATH (Sigma), SbO_3 (Sigma) and ZnB (Chemtura), which can be used as smoke suppressant and synergist for other types of flame retardants. Thermogravimetric analyses were carried out for all samples firstly. In the second part of the work flammability of the samples were tested by limit oxygen index (LOI) test device (Concept) and smoke density chamber (FTT). Thermogravimetric analyses showed that the char formation could be increased to 10% from 3% with even low loading ratio (2%). With loading 20% ATH to epoxy resin, char formation was increased to 17.6% by lowering 50% of heat flow in parallel with the flammability test result.

Keywords: aircraft composites, epoxy resin, flammability, flame retardants, thermogravimetric analyses

ETT0187

Characterization of Nylon Based Nanofiber Membranes

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Nanofiber based membranes have received great attention due to their characteristics including high specific surface area, small pore sizes and high porosity. These membranes have found applications in many different areas such as biomedical, energy, filtration and protective clothing. Considering the wide range of applications, it is important to determine the effect of solution properties on the final properties of these membranes. In this study, effect of different solvent systems on the physical properties of electrospun nylon based nanofiber membranes are studied. Significant difference in morphology and physical properties are observed owing to different properties of solvent systems.

Keywords: solvent system, electrospinning, nylon

ETT0193

Investigation of Water Permeability of Ultrasonic Seaming on PU Coated Fabrics

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Apparel industry enhancing the added value of products is one of the sectors which has major importance. Various seaming methods are used in conversion into final product of different fabric surfaces. Besides conventional seaming methods, there are alternative seaming methods for technical textiles which requires functional spefications. One of these alternative methods is ultrasonic seaming.

Ultrasonic seaming method can perform sewing process without the need for the materials such as needle, thread that have been used in conventional seaming. This feature makes it possible to obtain seams with high waterproofing properties.

Our study aims to compare the water permeability of ultrasonic seaming and conventional seaming by using woven fabrics coated with polyurethane membrane. The properties of fabrics and the seam parameters are characterized in Table 1.

Ultrasonic seam process was realized by using Pfaff 8310 ultrasonic sewing machine with two different speeds. A roller was used that across 8 mm. Conventional seam process was performed to fabrics by using Brother S-7200C-403 electronic lock stitch sewing machine.

The sewn fabrics were washed at 30°C with synthetic washing programme for five times. Water permeability tests were performed to fabrics with Prowhite Hydrostatic Head Tester according to TS 257 EN 20811. Test results evaluated considering fabric type, seam type, velocity and washing process.

Consequently, our study demonstrated that waterproof values of the fabrics sewn with ultrasonic seam are higher than the fabrics sewn with conventional seam. In ultrasonic seam, these values decreased with the increase of velocity. The lowest waterproof values were observed in the fabric with the lowest weight in grams before washing process. In addition, these values are higher in plain structure than in twill structure at equivalent weight in grams before washing process in ultrasonic seam. Besides, waterproof values decreased after washing process for both ultrasonic seam and conventional seam.

Keywords: ultrasonic seam, conventional seam, water permeability, waterproof fabric, coated fabric

Table 1. Properties of the fabrics and seam parameters.

Fabric code	Weaving structure	Weight in grams (g/m²)	Thickness (mm)	Raw material	Sewn fabric code	Seam type	Velocity code
F1	Plain	105	0.366	Polyester	F1v1	Ultrasonic seam	v1
F1	Plain	105	0.366	Polyester	F1v2	Ultrasonic seam	v2
F2	Plain	170	0.432	Polyester	F2v1	Ultrasonic seam	v1
F2	Plain	170	0.432	Polyester	F2v2	Ultrasonic seam	v2
F3	Twill	170	0.540	Polyester	F3v1	Ultrasonic seam	v1
F3	Twill	170	0.540	Polyester	F3v2	Ultrasonic seam	v2
F1	Plain	105	0.366	Polyester	F1L	Conventional seam	Lock stitch
F2	Plain	170	0.432	Polyester	F2L	Conventional seam	Lock stitch
F3	Twill	170	0.540	Polyester	F3L	Conventional seam	Lock stitch

MARMARA ÜNİVERSİTESİ

ETT0195

Characterization of Electrospun Nanofibers Coated Spunbond Nonwoven Media

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Dry air filtration is an important process that helps the purification of air from any particulates to provide clean and healthy atmospheres in various areas needed. Nonwoven media are widely employed as filter materials since they have efficient structures in terms of holding any particulate in the fluid media. Polypropylene (PP) spunbond nonwovens are commonly preferred in filtration applications due to their good mechanical and physical properties such as high tensile strength, lightness, and low pore sizes.

In recent years, researchers focus on integrating traditional materials with innovative ones and enhancing their properties. The other significant area in the focus of academic interest is nanofibers. They are potential candidates for filtration applications due to their unique properties such as low fiber diameters, high porosities, low pore sizes, and so on. These properties make them advantageous in developing the efficiencies of traditional filters. Therefore we have studied espun nanofibers coated spunbond nonwoven media.

In this study we used PP spunbond nonwoven media having two different basis weights: 15 and 50 g/m2. Polyamide 6 polymer that is an easily electrospinnable one and is preferable in filtration applications was chosen as polymer for fabrication of nanofibers by electrospinning method. Optimum electrospinning parameters were determined for PA6 polymer. Scanning electron microscope images were taken for morphological analysis. Average fiber diameters and diameter distributions were identified. Then, PP nonwovens were coated by PA6 nanofibers. We have changed the duration of electrospinning since it determines the thickness of the nanofiber mat collected on nonwovens. 15 and 30 minutes of durations were chosen for thin and thick nanofiber coatings, respectively. Last of all thickness and air permeability values of nanofibers integrated PP spunbond nonwovens were measured for comparison with the uncoated ones in order to get rough idea about the efficiency of the samples developed.

Keywords: nanofibers, electrospinning, air permeability

ETT0198

Potential of Using Sandwich Panels of Flax Fibers Waste in Thermal Insulation and Other Applications

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This study aims at utilizing a local flax wastes in the manufacture of sandwich panels used in thermal insulation. This utilization provides high value added to massive undesired wastes, which impact the local market by producing new sustainable competitive materials. Consequently, local investments will be increased and the internal economy will be refreshed. That will open the field for creating more job opportunities. In this structure a core was made of flax mats in different densities then was attached to a woven wool fabric skin from the both sides. The core mats were molded in a flax frame with the presence of Urea formaldehyde resin. Hot pressing was applied so as to cure the thermoset resin under elevated temperature and to compress the molded mats to a predetermined thickness. Then the woven wool fabric skin was hand laid-up on the flax cores using a polyester resin which was left to be cured under the room temperature and dead weights for a week. Mechanical and physical tests were applied on the specimens of different densities.

Keywords: sandwich panels, thermal insulation, thermal conductivity

Fig.1 A hot pressed flax mat composite without skin



ETT0202

Syethesis of PVC/ Zn2(NO2)3 Nanofibers for the Production of PVC/ZnO Hybrid Nanofibers

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Zinc oxide is a photoactive material and has been used for variety of applicaitons including UV protection, photoinduced antimicrobial applicaitons, energy production and biocatalisis. Embedding ZnO in nanofibers is hard because dissolving ZnO in a solvent is challenge. Even though ZnO particals are suspended in an electrospinning polymer solution, it is challenge to electrospun into nonwoven nanofibrous mat structure. So, a soluable zinc precursor (zinc nitrate, Zn2(NO2)3) has been dissolvend in dimethylformamide/tetrahydrofuran (DMF/THF) mix with a appropriate concentration of polyvinyl chloride (PVC) and electrospun into PVC/Zn2(NO2)3 hybrit nanofiber structure. The aim of the study is to convert Zn2(NO2)3 to ZnO nanoparticles in PVC nanofibers after a proper chemical and following heat treatment treatment process.

Keywords: Polyvinyl chloride, nanofibers, zinc nitrate, zinc oxide

MARMARA ÜNİVERSİTESİ

ETT0207

Investigation on SO_2 Adsorption Capacity of Graphene Oxide Fibers with Activated Carbon Particles and Metal Salt

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Sulfur dioxide (SO_2) is an important atmospheric pollutant and has been proven to be hazardous to human health. In recent years, SO_2 has been extensively studied and several researches have been carried out dealing with the removal of SO_2 by carbon based materials. Although among carbon based materials, graphene oxide (GO) has attracted a great deal of interest, only very few studies have investigated the SO_2 adsorption of GO. The objective of this study is to investigate the effect of addition of activated carbon particles and metal salt on SO_2 adsorption capacity of graphene oxide (GO) fibers produced by wet spinning method. GO samples were also characterized by scanning electron microscopy (SEM) and atomic force microscopy (AFM). It has been seen that SO_2 adsorption capacity of GO fiber increased from 320,90 to 561,27 mg SO_2/g sample with the addition of activated carbon, while the addition of metal salt resulted in decreased SO_2 adsorption as compared to reference sample due to the reduction in functional groups.

Keywords: SO_2 adsorption, graphene oxide fiber, activated carbon, metal salt

ETT0221

Investigation on the Doping Possibilities of Microcapsules in Solution Spinning

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Microencapsulation is an effective method to protect the “precious” agents against the environmental effects, such as light, oxygen, heat, water etc, and to give controlled release property. Microcapsules are applied to the textile materials using a few techniques, such as padding, spraying, coating and addition into spinning solution of fibers. However, a few studies were done on application of microcapsules into spinning solution. Suzuki and Ichimaru (1974), claimed an improved method of preventing aggregation of the microcapsules and eliminating various troubles in the spinning step by performing the microencapsulation process in the spinning solution. PCMs (phase change materials) microcapsules were added to the acrylic and viscose fibers during the spinning by Outlast Technologies LLC. These fibers widely used in different applications.

In this study, St. John’s Wort (Hypericum perforatum L.) oil was encapsulated by in-situ polymerization using melamine, urea and formaldehyde monomers in different mole ratios. Than produced microcapsules were introduced wet spinning solution of NMMO (N-Methylmorpholine N-oxide) and α-cellulose. Wet spinning was performed according to NMMO process in different microcapsule amounts. Morphology of the microcapsules was examined by optical microscope and SEM (Scanning Electron Microscopy) analysis. Thermal properties of microcapsules was performed by DSC (differential scanning calorimetry). In order to characterize of regenerated cellulose fibers, XRD (X-Ray Diffractometer), moisture and water retention studies, DSC (differential scanning calorimetry) analysis were done.

Optimum conditions for microencapslation process were achieved 1:5:1 melamine:formaldehyde urea mole ratio using 0.5 % (w/w) Arabic gum as colloid agent and 0.5 % (w/w) sodium dodecyl sulphate as surface active agent under 8000 rpm strring rate. Regenerated cellulose fibers were produced by different amount of microcapsules respectively 0.3-0.5-0.7 % (w/w).

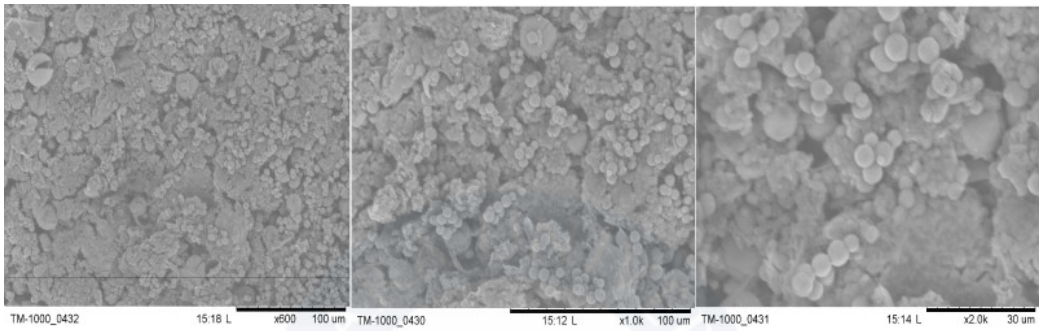
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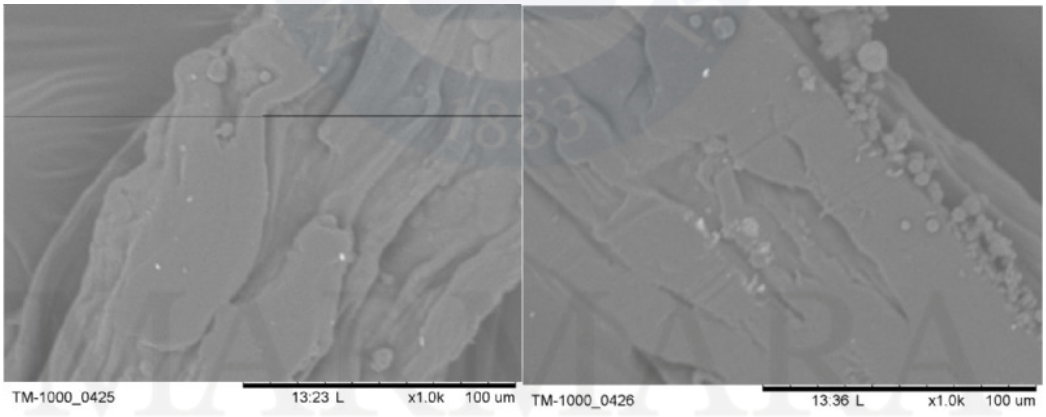
Keywords: Microencapsulation, Regenerated fibre, N-Methylmorpholine N-oxide (NMMO), Hypericum perforatum L.

SEM Micrograph of Microcapsules



SEM (Scanning Electron Microscope) images of microcapsules taken by various zoom, respectively 600x, 1000x and 2000x

SEM Micrograph of Regenerated Fibers



SEM (Scanning Electron Microscope) images of regenerated and microcapsule doped fibers taken by 1.0k zooming

Particle Size Distribution of Microcapsules

Microcapsules	Mean Size (µm)	Median Size (µm)
KD-5	6.59691 µm	5.27264 µm
KD-6	73.83588 µm	70.99660 µm
KD-7	21.91738 µm	17.37421 µm

Particle size analysis was carried out with Laser Scattering Particle Size Distribution Analyzer LA-950. Mean size of microcapsules was calculated as seen on the table.

ETT0225

A Review of Stab and Slash Resistance in Personal Protective Equipment Garments

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Personal protection includes all kinds of protective clothing in the areas of Personal Protective Equipment and the sports area. In general, stab-resistant clothing is manufactured, to protect humans against accidental stab wounds and cut. This applies to the whole body, as well as high-risk areas such as hands and arms, which means that the wearer is protected during his working sufficiently against cut and stab injuries. Workers in the field of cutting in the textile and clothing industry also use sharp knives, to cut multi-layer fabrics. Especially in the food industry accidents with hand knives are not uncommon. About 30-40% of all accidents occur with hand knives.

However stab resistant textiles are not only used to prevent accidental stab injuries, but also to protect against unintentional injuries by other people. Another risk group are the employees of the Security Forces, such as police, Special Forces and security services.

The demand for protective garments are ever increasing and is more focused on ballistic protection and anti-stab protection. Ballistic protection provides protection against projectile penetration including the new kind of bullets and anti-stab offers protection from sharp pointed objects with or without sharp cutting edges such as knives and needles.

The fibres that are used extensively for the armour products are Kevlar®, Spectra®, Dyneema® and Zylon®. A product has been recently introduced by Dupont called Kevlar Correctional® that is 4 times thinner than Kevlar®. Various fabric structures are currently used to provide resistance against stabs and slashes. They include tightly woven structures, woven and nonwoven composites, as well as warp and weft knitted fabrics. The ultimate objective of this study is to design novel cutresistant and slashproof materials for the police, armed forces, children, and the public that would be lightweight, comfortable, efficient, and can be utilized for long periods of time.

Keywords: Slash, Stab, Personal Protective Equipment, PPE Garments, Test Methods, Standards

ETT0229

Production and Characterization of Cartilage Tissue Scaffolds by 3D Printing

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As one of the most popular research subject of the tissue engineering studies, regenerative medicines are alternative and developing topic that improve, restore or replace tissues or organs which are lost or damaged due to disease, injury or trauma. There are several requirements for tissue engineering studies to achieve success such as creating appropriate cell to material interactions, and promoting growth factors. In this study, polycaprolactone (PCL), gelatine, different concentrations of levan hydrogel were used to create 3D bioprinted tissue scaffolds using a modified bio printer. Materials were dissolved in the mixture of dichloromethane and dimethyl sulfoxide. Blend solutions were fed into the bioprinting system using a digital syringe pump. Bioprinting were optimized for each sample with different ingredients, according to the evaporation rate of the dissolving solution as well as the print speed and other environmental conditions. Additionally, for the PCL/gelatine/levan composite solution, three different concentrations of Levan hydrogel were examined in order to observe which concentration results more successfully in the terms of biocompatibility. After the bioprinting, characterizations tests were performed on the scaffolds for comprehensive analysis of their chemical and morphological structure. Additionally, physical properties of the solutions such as viscosity, electrical conductivity and density were tested using calibrated equipment to exhibit optimised parameters of bioprinting. Scanning electron microscope were used to reveal morphological structure of the scaffolds. Fourier-transform infrared spectroscopy was used to obtain chemical composition of the scaffolds. Furthermore, in-vito cell culture test was performed using chondrocyte cells. Results indicated that the cell viability and proliferation were observed on the scaffolds indicating positive signals of biocompatibility.

Keywords: PCL, Gelatine, Levan Hydrogel, 3d Printing, Tissue Engineering and Scaffold Materials

ETT0231

Leather: Could it be an Alternative Liner for the Prosthetic Leg Users?

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Liners have a crucial role in terms of comfort and health for the prosthetic leg users. They are protective covers made of different flexible materials that worn over the residual limb and help to prevent the discomfort occurred during the movement. They are generally composed of silicone, polyurethane and copolymer based materials and designed with specific features for different suspension systems. To select a correct liner depends on the activity level and needs of the user in addition to the suspension system of the prosthetic leg. Although a liner ensures wearing comfort to the users, most of the users feel uncomfortable due to the excessive sweating. Leather has advantages in terms of wear hygiene and physiology due to its triple helix collagen fibres and seems to be a perfect alternative natural material to syntehic liners. For this purpose, the production of a leather liner as an alternative to synthetic liners was aimed for the prosthetic leg users. Chromium free leathers were produced based on the properties of the synthetic liners found in the market and the performance properties were compared. The results of the study demonstrated that leather could be utilized as a liner in the use of prosthetic legs.

Keywords: leather, prothesis, prosthetic leg, liner

MARMARA ÜNİVERSİTESİ

ETT0242

Nonwoven Based Innovative Self Sufficient Tent

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Due to recent natural disasters (earthquake, flood etc.), wars and refugee situations in the world, the need for the relief tents are increasing tremendously. These tents are the living quarters for the people who are in need. The conditions in tents are becoming very important in terms of keeping tents warm, cool, anti-bacterial, breathable, inflammable and sound insulated. All the tents produced in recent times are made from woven fabrics of cotton and cotton blends.

The aim of the project was to produce all fabric parts of the tent from nonwoven fabrics of recycled fibre with superior properties to that of woven fabrics which already been used in tents. Different parts of the tent made from fabrics are included; roofing fabric, side fabric, winterization kit and floor fabric. Properties of the fabrics improved were breathability, flammability, water repellency, anti-bacterial, insulation (heat and sound) from cold and hot climate conditions. On top of that to avoid the tent fires due to using coal burning stoves, the tent has developed self-heating nonwoven fabric which requires a very low energy (24 Volts). Energy consumption of this system is too low, that's why it is very convenient to work with natural energy sources like solar and wind systems.

All developed innovative nonwoven products are made into relief tents by Turkish Red Crescent (KIZILAY) and tested by International Federation of Red Cross and Red Crescent IFRC in real life situations in Ankara, Luxembourg, and Mongolia.

After this project and advantages of the products attitude and perspective towards nonwoven fabrics for relief tents are change favorably.

Keywords: Nonwoven Based Innovative, Self Sufficient, Tent

MARMARA ÜNİVERSİTESİ YAYINEVİ

POSTERS

MARMARA ÜNİVERSİTESİ

P-0010

Comparison of Virtual Try-On in Different 3D Virtual Garment Simulations

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In the fashion industry, major brands and producers are evolving in a high competitive environment where speed, quality and price are the main criteria. Fashion companies need to be flexible, productive and to give quick feedbacks. By the usage of virtual technologies, obstacles like time and distance are being minimized for collaborations among fashion companies when they are creating a collection. The actual representation of a virtual garment is dependent on two factors, precise computational models and exact input of fabric parameters. Already there are many advanced systems having capability of actual representation on the market including Optitex's 3D virtual clothing, Browzwear's V-stitcher and Lectra's Modaris 3D fit solution. These systems are able to not only predict the garment shapes properly on a 3D avatar, but also simulate the fabric behaviours. This study aims to compare the 3D virtual try-on results in these three different systems. Five stretch knitted fabrics made of polyamide, polyester and cotton including different amounts of elastane fibers were selected from sports garment producers. In previous study, We had carried out tensile tests and bending resistance test under standard laboratory condition and also used the V-stitcher's testing kit to compare the extension, shear (bias extensibility) and bending measurements between objective fabric measurements and the derived parameters for the virtual garment simulation. According to the comparison of results, it was expected that virtual garment systems properly simulate the fabric behaviours for fabric A and C according to the results of tensile and bending rigidity in both testing system. Then we simulated these fabrics A and C in each simulation systems and compared the results of pressure and extension maps on the same avatar's dimensions.

Keywords: Virtual garment, 3D Virtual Try-on, 3D simulation systems, textile parameters

Physical and structural parameters of fabric specimens

Fabric Code	Fibre Composition	Fabric Structure	Fabric Mass (g/m²)	Fabric Thickness (mm)
A	82% PES 18% Elastane	weft knitted	155	0.41
B	80% PA 20% Elastane	warp knitted	210	0.64
C	83% PES 17% Elastane	warp knitted	280	1.23
D	75% Cot 25% Elastane	weft knitted	200	0.49
E	80% PES 20% Elastane	weft knitted	300	0.59

Five stretch knitted fabric made of polyamide, polyester and cotton including different amounts of elastane fibers were selected from sports garment producers.

P-0026

A comparison Between the Manual Method and the 3D Programs in the Preparation of Models Draping on the Dress Form

Shadia Hassan Salem[1], Abir Abdelhamid Ibrahim[2]

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[2]Department of Clothes and Textile, Faculty of Home Economics, Helwan University - Cairo, Egypt

The research aimed to: Utilization of the OptiTex program in the preparation of models draping on the dress form in measurements and the evaluation of the effectiveness of using OptiTex program in the preparation of totally perfect and matching models draping on the dress form compared to the manual method. The program is also used in the elimination of the time taken in the preparation of models draping on the dress form compared to the manual method.

The two researchers adopted the experimental methodology. The research aimed at conducting a comparative study between the manual method and the 3D programs, namely the OptiTex program, in the preparation of the models draping on the dress form. The research sample included three models prepared by the two methods, draping on the dress form and the OptiTex program to measure size 40 body.

The results of the research showed the following: There were no statistically significant differences between the average control and matching ratios in the preparation of the first model by the two methods, Meanwhile, there were statistically significant differences between the average control and matching ratios by the two methods, in favor of the method of modulation on the mannequin. There were no significant differences between the average control and matching ratios in the preparation of the third model, " draping on the dress form and OptiTex program". There are also statistically significant differences between the average time taken in the preparation of the three models by both methods, in favor of the OptiTex program.

In light of the research results, several recommendations were proposed, including the following: Developing and updating the curricula taught to the students at specialized colleges in the field of clothing and textile to cope with the development in the field of software technology

Keywords: 3D, Programs, OptiTex, program

P-0030

Utilizing the Aesthetics of Al Musannaf Using 3D Techniques in Design on the Mannequin

Abir Abdelhamid Ibrahim

Associate Professor at the Department of Clothes and Textile, Faculty of Home Economics, Helwan University - Cairo, Egypt

The Al Musannaf is a type of men's clothing in the south of Saudi Arabia.It is dressed as a jacket and is usually decorated with embroidered yarns from the edges and is striped in colors (green, red, orange, black and silver) and is usually worn on social occasions. It is considered a national and cultural heritage that distinguishes the south Saudi tribes and tribes of Tehama from other tribes.

This research aimed to identify the aesthetic and artistic properties of Al Musannaf and to identify the effect of the aesthetic and functional role of the 3D Techniques in the creations of international fashion designers, and to use the aesthetic and artistic properties of the fabric of Al Musannaf Using 3D Techniques in Design on the Mannequin.

The research followed the analytical descriptive approach due to its relevance in the achievement of the research objectives and verification of its hypotheses.

The results of the research showed the following: There were statistically significant differences among the implemented designs to utilize the fabric of Al Musannaf Using 3D Techniques in Design on the Mannequin according to the opinions of the specialists in the availability of elements and the foundations of the design and achieving the aesthetic and functional dimensions in the designs. The results stressed that there are statistically significant differences among the implemented designs according to the views of women aged (25: 40) in achieving the aesthetic and functional dimensions.

Recommendations were made, including: Interest in the study of heritage due to its great importance as a source of modernity as it is an inexhaustible source of the artist in the modern era and all ages, and conducting further studies linking the art of fashion design and different folk legacies

Keywords: Al Musanna, 3D Techniques, Design in the Mannequin

Al Musannaf Picture



It is a rectangular fabric its width is twenty meters and length 270 cm of cotton yarn that is characterized by the existence of long lines in multiple colors where some begin with lines usually in red, the width of 5 by 7 cm followed by thin lines in red and yellow and orange and then wear a white line width of 3 cm and then repeat the former thin lines and repeat colors.It ends with trimmings and wearing by men of the tribes Rejal Al_ma'a,Ghamed, Zanad,Banu Shahar,Tihama,Qahtan,Bareq, Almnad Znad Banu Shahr and Tihama Qahtan and Bareq and other tribes that inhabited the mountains of Tihama in Saudi Arabia

P-0031

Utilizing the Aesthetics of Al Musannaf Using 3D Techniques in Design on the Modeling

Abir Abdelhamid Ibrahim

Associate Professor at the Department of Clothes and Textile, Faculty of Home Economics, Helwan University - Cairo, Egypt.

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Keywords: Al Musanna, 3D, Techniques, Design, Modeling

P-0043

Polyethylene Based Carbon Fiber Costing

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The global demand for carbon fibers for the year 2016 was approximately 70 kt and is anticipated to exceed 100 kt by 2020. Currently, the aviation and aerospace sector represents the most significant segment in terms of demand. Then again, automotive and wind applications are becoming increasingly important. Although the trend for growth of carbon fiber market is expected to remain strong with a growth in the range of +8 to +14 % per annum, the manufacturing costs are still the limiting factor for carbon fiber use in mass market applications.

On the one hand, carbon fibers are far too expensive for cost-sensitive industrialization and on the other hand they outperform many mass market application requirements. However, in addition to high tensile strength and rigidity, automotive and wind energy applications also require reinforcement fibers with increased compressive strength..

Today's carbon fiber market is dominated by carbon fibers based on polyacrylonitrile (PAN), which account for more than 96 % of the market due to the quality if the fiber produced. PAN-based carbon fibers are characterized by impressive tensile strength and high production costs (15 – 20 €/kg). Though, latest findings show that polyethylene (PE) based carbon fibers are the most promising alternative to achieve cost and properties targets of mass market applications.

The poster presents the results of a detailed cost analysis of the production of PE based carbon fibers. The analysis focuses on determining the production costs and identifying the main cost drivers. Hence, the cost breakdown of both process routes (PE and PAN) is compared. The poster also gives an insight into the PE-based carbon fibers' future.

Keywords: Carbon fibers, alternative precursor, polyethylene, cost model

P-0046

Melt spinning of Carbonnanoparticle-modified Polyamide for Technical Applications

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Institut für Textiltechnik der RWTH Aachen University

Nano composites have become more and more important as the implementation of nanoparticles in polymer allows additional functions in common industrial parts. Especially in the fabrication of filaments or fibres nanomodification is important, as only very small fillers can be added to the very fine fibers (common fiber diameter is 20 µm, fine filaments are 1 µm).

On the poster the latest results of bicomponent fiber production and several electrically conductive matrixes are published and it displays several methods to manufacture semi-conductive polymer-based fibers. The core-sheath constructed fibers are made from an insolation core that is surrounded by a conductive outer shell. The production of such fibers in the lab and industrial scale is shown.

Keywords: fibers, conductive, functional

P-0053

Modular Machine Set-up for the Production of Split Tows and Hybrid Rovings

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The development and production of tailored reinforcement fiber rovings gets more important for fiber reinforced plastics. On the one hand there is the rising market of thermoplastic composites as they are suitable for mass production. Moreover, these composites offer a good shapeability, high impact resistance and they can be back-molded. Tailored hybrid rovings consisting of reinforcing fibers and thermoplastic filament yarns are one approach to produce such composites and to handle the high viscosity of the molten thermoplastic matrix. On the other hand the price of carbon fiber rovings is highly depending on the number of filaments. The price for fine tows is significantly higher and there is a demand for textiles and composites made from these textiles especially for visible surfaces.

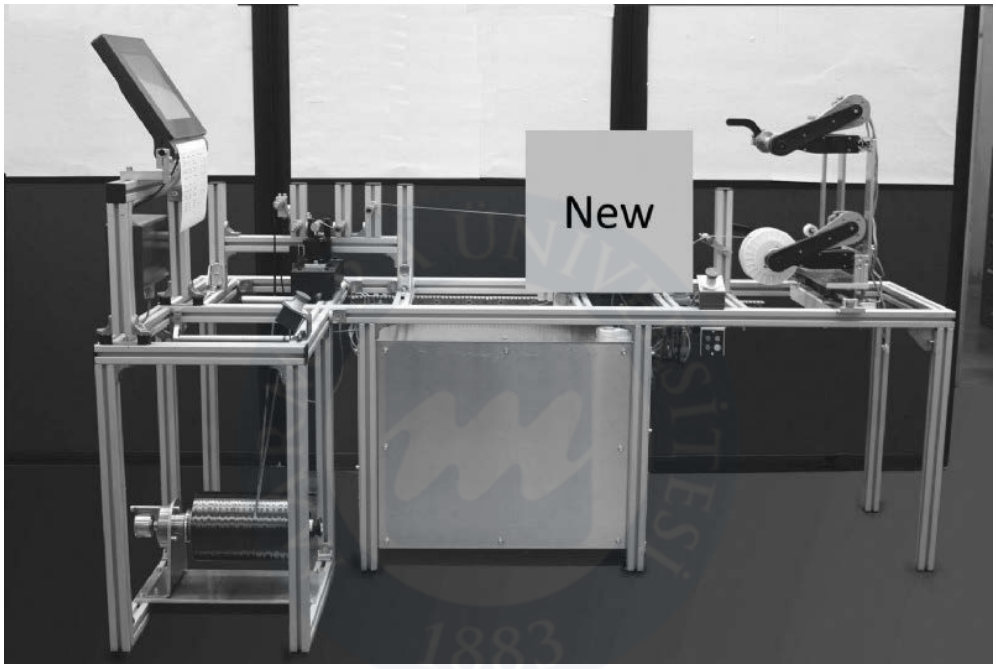
The new machine features a modular design and it is suitable for spreading, splitting and winding of carbon fibers. This procedure reduces the costs significantly for fine tows. Additionally, a tailor-made number of single filaments can be produced. The spread and split carbon fibers can be processed e. g. by twisting or hybridization with glass fibers or thermoplastic filament yarns. The machine setup comprises the following elements that can be integrated depending upon the customer's requirements:

- Spreading unit: Bars are used to spread the carbon fiber roving and to enhance the orientation of the filaments
- Splitting unit: The splitting unit splits the roving into different sub rovings with an adjustable number of filaments between 3 K and 12 K
- Winding unit: The winding module creates parallel wound bobbins
- Machine setup: Carbon fiber rovings can be processed and other fibers are possible.

In this poster presentation the machine approach will be presented.

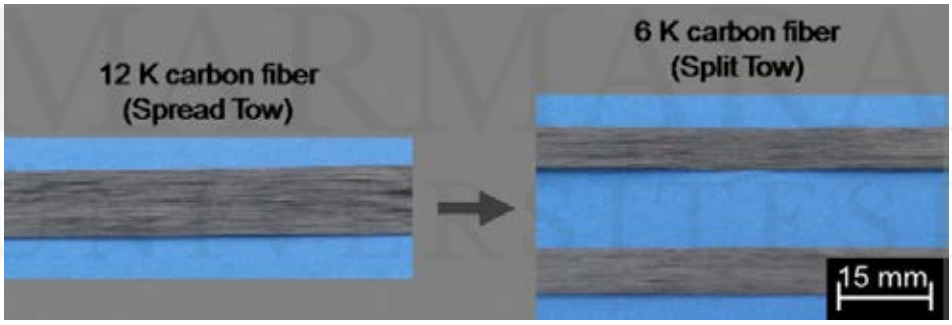
Keywords: Hybrid roving, carbon fibers, spreading, splitting, mixing

Machine set-up



Machine set-up for the production of spread and split tows based on carbon fiber rovings

Spread and split carbon fiber



Spread and split carbon fibers based on carbon fiber roving

P-0054

Improve Mechanical Dynamical Properties and Impact Resistance of Polyvinyl Alcohol by Halloysite Nanotubes and Additives

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In this study, the mechanical properties of the film of polyvinyl alcohol / holloysite nanocomposite films and also with boric acid additive were measured at different temperatures. The surface under the curve of the dynamic modulus and loss factor (delta tangent) is related to theoretical and experimental impact resistance in terms of temperature. Because of the impact resistance is specified. The glass transition temperature of films has also been reported from dynamic experiments. The results showed that the existence of halloysite nanoparticles and the formation of polyvinyl alcohol / halloysite nanocomposite, a mixture of polyvinyl alcohol / boric acid, a mixture of polyvinyl alcohol / boric acid / halloysite have better mechanical properties than pure polyvinyl alcohol., improving mechanical properties and impact resistance of Polyvinyl alcohol as biocompatible polymer with materials that are healthy and have no side effects, it makes it possible to use this polymer as an artificial tissue such as cartilage in the body.

Keywords: Polyvinyl alcohol, Mechanical Dynamical Properties, Impact Resistance, Halloysite Nanotubes. DMA

P-0055

Polyethylene Terephthalate (PET) Based Nanofibrous Vascular Access

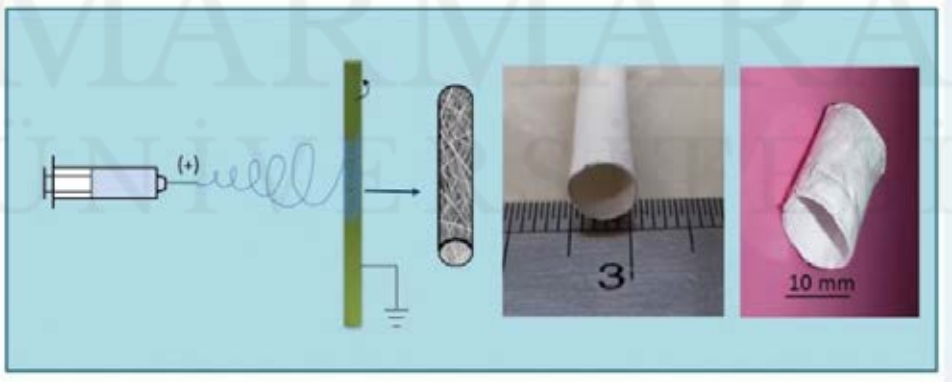
***Maryam Yousefzadeh*[1], *Sahar Jafari*[2], *Maryam Rahmatinezhad*[1], *Atefeh Solouk*[2]**

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Various types of vascular access have been conventionally used including fistula, catheter and vascular grafts for dialysis treatment. However, those accesses have some disadvantages such as infection, narrowing and clotting that restrict their extensive clinical applications. Therefore, there is still need for fabricating novel accesses. In this study the anti-clotting and self-sealing vascular access was developed by using electrospinning technique. Polyethylene terephthalate (PET) was electrospun as a small diameter tube to fabricate the novel nanofibrous synthetic graft for vascular access application. PET is chosen because it is stable, cost-effective and biocompatible, with tunable properties and because several PET-based vascular implants have already received FDA approval. Anti-thrombotic additives (ATA) were incorporated into grafts to increase their blood compatibility during electrospinning. Fabricated tube grafts were characterized by scanning electron microscopy (SEM), tensile strength, porosity, and platelet adhesion test. Herein, the optimum condition for preparing tubular electrospun PET is discussed.

Keywords: Vascular access, Small diameter tube, PET nanofiber, Electrospinning

Electrospun PET nanofibrous tubes



P-0061

The Effectiveness of using Camera in entering of Clothing Pattern on Graphics Programs

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The research aimed to access the possibility of using the method of inserting the pattern (by camera) on the graphics programs, including its most famous CorelDraw program, and measuring the final pattern after its print, compared to the original pattern and access to the use of graphics programs instead of the use of specialized programs, which will have a good return on the industry and specialized educational institutions economically and financially.

The research followed the semi-experimental approach due to its relevance to achieving the research objectives and hypotheses. The research sample consisted of (3) arbitrators from Department of Clothing and Textiles at the Faculty of Home Economics - King Abdul Aziz University and Helwan University. The estimation scale for the produced pattern was used as a measurement tool to control these patterns.

The study concluded that there were statistically significant differences among the opinions of the arbitrators in the resulting patterns. The study also concluded the effectiveness of using the method of input (camera) in the entering patterns to the CorelDraw program.

The study recommended directing the results of the research to benefit from the design programs available at universities as well as directing the results to factories and Small Projects manufacturing ready-made garments to use these simple programs and proposed methods of input and benefit from the results of the study in the development of the garment industry, and encourage small enterprises to use these programs so as to achieve the goal of Arab Republic of Egypt in encouraging small industries with the aim to promote the Egyptian society.

Keywords: patterns,Graphic,Programs,Camera

P-0071

Composite Nanostructures in Energy Applications

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Nanocomposites can be defined as materials that gather nanosize particles or nanosize materials with standard materials. They can be classified in a wide range as organic-inorganic, inorganic-inorganic, polymeric nanocomposites etc., and are promising and atracting increasing investments in various sectors of research and application.

Nanocomposites containing polymer matrix and conducting polymer are novel materials that benefit from the synergy between conducting parts and polymer chains. Among the conjugated polymers, polythiophenes are preferred for their good thermal and chemical stability, thus offering potential for many applications. In the polythiophene family, poly(3,4-ethylenedioxthiophene) (PEDOT) has drawn interest due to its lower oxidation potential, low band gap, good electrical conductivity and high stability of doped state.

Polymer nanocomposites have been proposed or are being used for numerous applications, ranging from car bumpers to advanced optoelectronic devices such as organic photovoltaic applications. Incorporation of CNTs into polymer based materials improved mechanical, electrical and thermal conductivity properties. Nanofibers containing silver nanoparticles exhibit electrical conductivity and antimicrobial properties for energy and medical applications. Nanocomposites fabricated by using carbon-based materials, silver or PEDOT: PSS polymer combinations can be used as electrode for solar cell applications.

Keywords: nanocomposite, polymer, conductive polymer, photovoltaic, energy

P-0073

The Effect of Cross-linking Agent on the Efficiency of Immobilized B-Cyclodextrins on Cotton

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β-cyclodextrins (β-CDs) are cyclic oligosaccharides containing seven units of D-glucose with glucopyranose. They are produced during the destruction of starch by the CGTase enzyme. In recent years, cyclodextrins have become important for textile finishing as by attaching of CD molecules on textile substrate, the hosting cavities could be provided onto the surface of cellulose. So a large variety of guest molecules can be included for specific functionality. However, β-CDs cannot form a direct covalent bond with textile materials. Thus, permanent fixation of cyclodextrins onto fibers is one of the attractive possibilities of chemical modification of textile materials. In this study in order to create immobilized β-cyclodextrins on cellulose using steric bonds, polycarboxcylic acids (acrylic acid, citric acid and 1,2,3,4-butane tetra carboxylic acid) were applied as the crosslinking agents and optimal conditions was demonstrated using response surface method (RSM). The presence of CDs onto the surface was investigated by decreasing of absorbance of phenolphthalein. Accessibility to the cavity was determined by uploading the guest molecules (BZCl and cyclohexane) and releasing of these molecules. The results showed that the highest fixation rate of β-cyclodextrins on cotton has been achieved using citric acid and the best performance (loading efficiency) provides by use combination of all three crosslink agents.

Keywords: β-cyclodextrins, Cotton, Molecular Encapsulation, Guest molecules, Uploading and releasing

P-0074

Investigation of the Oil Absorption of Keratin-polypropylene Composite

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Nowadays, the recycling of waste feather has gain a lot of attention due to its abundance. In this research, keratin was extracted from feather by enzymatic hydrolysis under optimal conditions to prepare porous film. to improve the film structure, optimal amount of polyvinyl alcohol(PVA) was added and finally the porous film of keratin was prepared by freezedrying method. Since, keratin is insoluble in water and contains a large amount of hydrophobic residues, it gives the resultant film oil absorption properties. On the other hand, nonwoven layer of polypropylene is also a common oil absorbent in industry because of its low cost, resistance against diverse chemicals, oil absorption, washability and reusability. Considering the above mentioned points, the composite of keratin-PVA and nonwoven layer of polypropylene was prepared with three different grammage of nonwoven layer and its oil absorption was investigated. Results showed the absorption of composite of keratin-PVA film and nonwoven layer of polypropylene under optimal conditions was more than 35 g/g.

Keywords: Feather, polypropylene, composite, oil Sorbent, Recycled Keratin

Evaluation of oil absorption



steps to prepare the composite



keratin film, nonwoven layer and composite is showed

amounts of keratin-polypropylene nonwoven layer composite oil absorption

Grammage (g/m2)	Nonwoven layer weight (g)	Keratin weight (g)	Weight of composite (g)	weight after oil absorption (g)	Amount of absorbed oil (g/g)
17	0.215	0.08	0.295	10.89	36.91
17	0.250	0.09	0.340	11.76	34.58
20	0.215	0.06	0.275	9.08	33.01
20	0.490	0.10	0.590	15.59	26.46
24	0.390	0.08	0.470	9.72	20.68
24	0.366	0.07	0.436	10.86	24.09

amounts of polypropylene nonwoven layer oil absorption

Grammage (g/m2)	Nonwoven layer weight (g)	Weight after oil absorption (g)	Amount of absorbed oil (g/g)
17	0.3	2.98	9.80
17	0.23	2.22	9.65
20	0.23	2.21	9.61
20	0.32	3.05	9.53
24	0.32	2.24	7.00
24	0.20	1.42	7.10

P-0076

High Efficient Reactive Filtration Technology for Exhaust Air in Waste Water Treatment Plants

***Lukasz Debicki*[1], *Thomas Gries*[1], *Andreas Obermayer*[2], *Frank Magdeburg*[2]**

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[2]*Unitechnics KG, Schwerin, Germany*

For reasons of health, hydrogen sulfide (H_2S) which is released during waste water treatment must be filtered from exhaust air. The disadvantage of the currently used bio-filter system is its huge volume (10 m^3). As a result, difficult handling is required for maintenance leading to enormous costs for the operator.

Nonwovens have so far not been used for exhaust air filtration in waste water treatment plants. Especially for reactive filtration, nonwovens are very suitable because of their high volume specific surface. Within the project “Reaktivfilter” the Institut für Textiltechnik in cooperation with UNITECHNICS KG is developing a controllable, compact (1 m^3) filter system which will be used to remove H_2S from exhaust air.

The approach is to attach a reactive substance to a carrier material. While in contact with exhaust air toxins will get neutralised. For this purpose, different filter media are developed and the most effective one will be chosen. Therefore, a test stand is prepared to measure the filters’ efficiency and resistance.

As first approach a nonwoven filter medium is developed from fibres made of polylactide acid (PLA). The filter effect results from decomposition of the used carrier material. When PLA meets with H_2S and water, it releases the reactive substance continuously. To implement this filter medium, a melt spinning process for filament yarn from PLA and compounded reactive particles is developed. In addition to the insertion of reactive particles into the polymer, activation by coating of the carrier material is examined as second approach. For this purpose, a nonwoven fabric made from polyester passes through an immersion bath from a dispersion of the reactive substance in a so called padding process.

The aim of the project is to develop a new filter system that is inexpensive and high effective.

Keywords: reactive filtration, hydrogen sulfide, air, nonwoven

P-0077

Tensile Properties of Paper-Waste Derived Lignin Film Reinforced Carbon/PP(Polypropylene) Flexible Laminates

***Gaye Yolacan Kaya*[1], Yıldırım Çiftçi[1], Nurcan Kurtoğlu[1], Mehmet Daşdemir[2], Yasemin Korkmaz[1]**

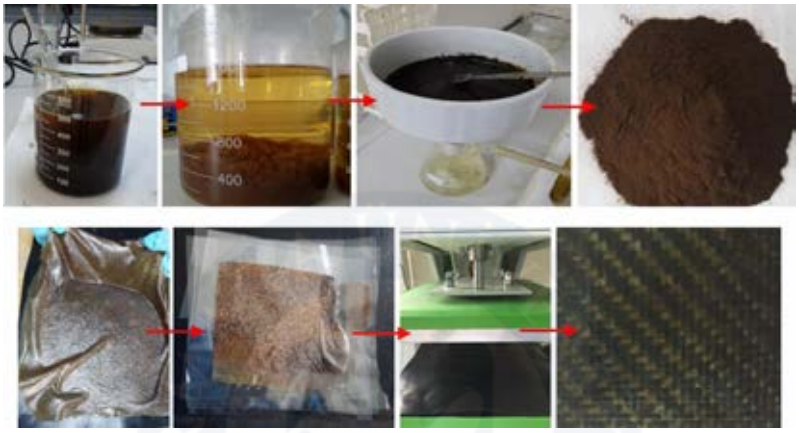
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Nowadays, there is a growing interest in using industrial wastes in different areas with increased environmental concerns. Different functionalities are gained by converting these wastes into new materials by considering the structural characteristics. Lignin is one of the most common and most important organic polymeric materials in the plant world after cellulose. Paper-waste is an important source of lignin. This study aims to obtain paper-waste derived lignin reinforced flexible films and develop a new flexible Carbon/PP/lignin laminated structures. Lignin was derived from black syrup by using sulphuric acid. Dried powder lignin was mixed with poly-acrylic based printing paste and binder. This mixing was coated on a Teflon surface to obtain a thin film and peel it easily. For producing Carbon/PP/lignin flexible laminates, lignin films were firstly placed between two layers PP films. After that, these films were placed between four layers twill Carbon fabrics and also on top and back surfaces. Hot press was used to produce laminates at 180°C for 10 min. Tensile results of Carbon/PP/lignin flexible laminated structures were compared with Carbon/PP laminates. These results showed that lignin film increased the flexibility and toughness of the laminates. The Carbon/PP/lignin flexible laminates have a potential to absorb more energy under impact load.

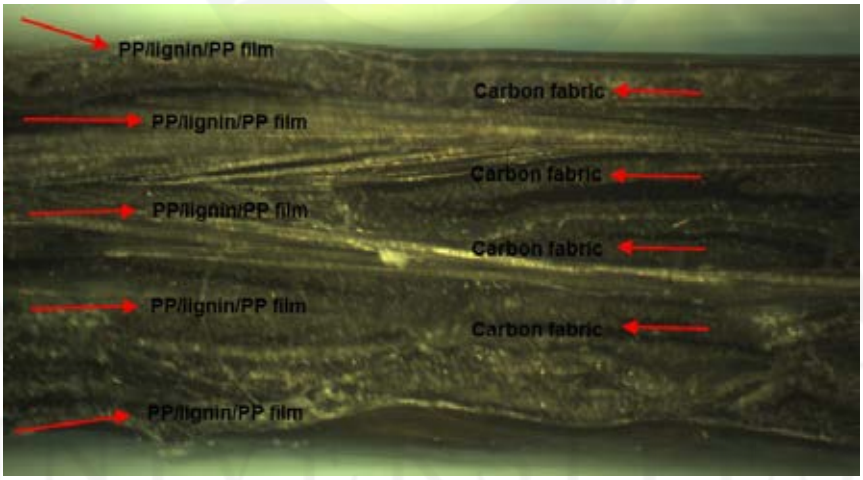
Keywords: Lignin film, paper-waste, flexible Carbon laminated structures, tensile strength, toughness.

Figure 1.



Deriving stages of lignin from paper-waste and steps of Carbon/PP/lignin flexible laminates production.

Figure 2.



Cross-sectional optical microscop view of Carbon/PP/lignin flexible laminate (3x magnification).

P-0079

Recycling and Reuse of Clothing and Textiles in Textiles Industry

Norah Nasser Bin Krad

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The consumption of clothing and textiles has increased around the world over the last few decades. It has become the recycling and reuse clothing and textiles in textiles industry of the most relevant solutions for the protecting the environment from pollution and make it more sustainable. The key focus of this study is to evaluate the impact of types using recycling and reuse from clothing and textiles waste in the textiles industry and preserving the environment success in terms of different recycling techniques from during efficiency, cost effectiveness and environmental friendliness. The second part presents a case study focusing on H&M because H&M has been cited as one of the best companies to develop strategies and apply recycling processes to protect the environment from the textiles waste industry in creating a sustainable environment.

Keywords: recycling, reuse, environment, clothing and textiles, waste. Industry. sustainable environment.

MARMARA ÜNİVERSİTESİ

P-0087

Effects of Drought Stress in the Presence of Agrotextile Material Possessing High Water Absorption Capacity And Controlled Fertilizer Release Property

***Ilhan Ozen*[1], *Gamze Okyay*[1], *Abdullah Ulas*[2]**

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[2]*Department of Soil Science and Plant Nutrition, Erciyes University, Kayseri, Turkey*

Drought is one of the major constraints limiting crop production worldwide and this issue seems to be more severe in the near future. Drought impairs normal growth, disturbs water relations, and reduces water use efficiency in plants.

Our goal was to generate an agrotextile material with controlled water and fertilizer release property and thus contributing to a sustainable agriculture/horticulture. To this end, we coated a nonwoven material with polymer/fertilizer mixtures and used as a source of water and fertilizer for Yedikule lettuce in greenhouse trials. Poly(ethylene terephthalate)/viscon (PET/CV) needle-punched nonwoven fabric was used as base material. Poly(vinyl alcohol) (PVOH)/ammonium sulfate (AS) and carboxymethyl cellulose (CMC)/potassium nitrate (PN) mixtures were used as the first and second coating layers, respectively. After generation of the agrotextile materials, greenhouse trials with Yedikule lettuce were carried out for determining the drought-stress response of the coated nonwovens in three different irrigation levels (100%, 75%, and 50%).

Here, we have studied the effects of drought stress on the growth, phenology, water and nutrient relations in Yedikule lettuce. It was shown that utilization of the concerned coated nonwoven structures in agriculture/horticulture has the potential to reduce the irrigation water and fertilizer consumption and thus help practicing sustainable agriculture.

Acknowledgment: This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK), Project Number: 115M718

Keywords: Nonwoven fabric, polyvinyl alcohol, carboxymethyl cellulose, fertilizer release, water absorption, drought stress

P-0093

In Situ Thermoplastic Coating of Melt Spun Glass Fibres

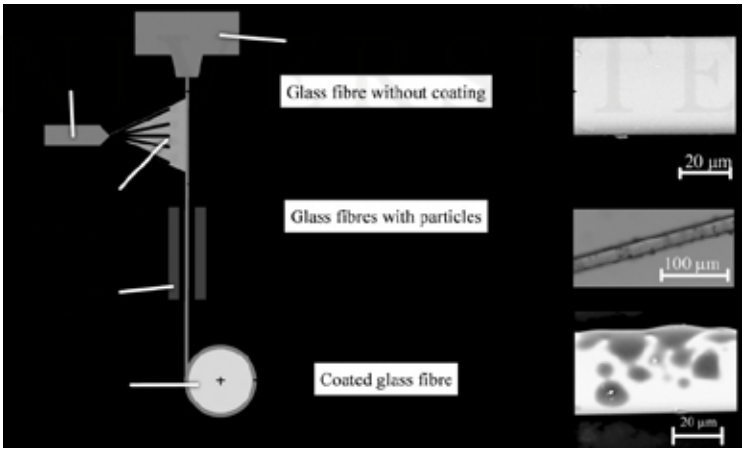
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The film stacking method is the industrial standard for the manufacturing of fibre reinforced thermoplastic composites (FRTCs). An alternative to this is commingling thermoplastic fibres with reinforcment fibres, e. g. glass fibres, into hybrid yarns. However, the composites produced by the use of film-stacking or hybrid yarns cannot achieve an optimal impregnation of reinforcement fibres with the matrix polymer. This stens from the high melt viscosity of thermoplastics, which prevents a uniform wetting of the reinforcement fibres. Leaving some fibres is unconnected to the matrix. This leads to composite lower strength than theoretically possible. The aim of the research is the coating of a single glass filament in the glass fibre nozzle drawing process to achive a homogenous distribution of glass fibres and matrix in the final composite. The approach uses particles with a diameter from 2 to 15 µm of Polyamid 12 (PA 12) which are electrostatically charged and blown at an E glass filament in the nozzle drawing process as seen in figure 1. The particles adhering to the filament are melted by infrared heating and winded afterwards. This development will allow the homogenous distribution of fibres and the matrix in a thermoplastic composite allowing a higher fibre volume content leading to improved mechanical properties. Even though the glass filaments could be coated with PA 12, a homogenous sheath could not be achieved in this investigation. Therefore, further research will focus on an improved homogeneity by reducing the agglomeration of PA 12, using dried PA 12 and enhancing the overall nozzle setup.

Keywords: Glass fibres, coating, in situ coating, Polyamid 12, Powder coating, glass fibres spinning

Figure 1



P-0097

Micro Capsules Towards a Better Recyclability of Multi-Material Textile Bonds

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Many industrial produced textiles consist of different types of materials that are directly bound together. Currently, only the fewest of these multi-material textile bonds are being recycled. The reason is that the bonds cannot be teased apart technically or a separation is not economical. Regarding only the mixed-waste consisting of polyester and cotton, there are 15 Mio. tons of waste per year worldwide.

To enforce the recycling of the enormous amounts of mixed-waste, special micro-capsules have been developed. These capsules in the linkage between the different materials can be activated by microwave-radiation at the end of the life-cycle. By absorbing heat or by releasing water as an environmental friendly solvent, the capsules decrease the bond strength significantly. While a textile bond is in use, the capsules do not influence the performance characteristics of the bond such as chemical and thermal persistence.

Fields of application for the new technology are both two-dimensional bonds and textiles which are connected by sewing yarn (one-dimensional bonds). Considering the two-dimensional bonds, it is conceivable to separate for example extensive textiles like truck canvas covers which regularly consist of PVC linen fabrics. In this possible application the interlayer between the two fabrics would contain the activatable micro capsules.

Keywords: Recycling, Melt Spinning, Mixed Waste, Waste Treatment, Micro-Capsules

P-0103

High Performance Textiles in Space Suit

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The desire to curiosity and discovery of human being concentrates mainly on space in nowadays, we can also see studies focusing on space life in addition to work done with the environment and surface of space. Although textile firstly functioned to meet the need of covering people for clothing purpose, later the formation of high performance textile products has begun by directing the technology for exploration and development. More recently, the human being is aiming to establish a colony on Mars in 2030 to realize his dreams. So, properties such as lightness, ergonomics, UV protection, high strength and corrosion, high abrasion resistance, flammability and high dynamic deformation are required in materials that is used to provide suitable living conditions in space wear. Hence, it is necessary to work with all branches of science such as physics, mathematics, material science, textiles, computer, electronics, biology, mechanics. Therefore, materials such as composite, coating, lamination and braiding are preferred mostly due to technical and economic reasons. In this study; PBI, PEEK, Vectran and Boron fibers which provide the desired high performance properties during the construction of these textile materials for the space suits are conferred.

Keywords: PBI, PEEK, Vectran, Boron, Space suit

P-0108

Textiles Emitting Far Infrared Rays

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Far infrared radiation (FIR) is often defined as electromagnetic rays with a wavelength longer than visible light and shorter than terahertz and microwave rays. These rays are emitted by sunrays, human body and some minerals. Several studies have shown that the far infrared radiation covering approximately the wavelength range of 5,6-1000 µm is beneficial for human health. These rays have been found to possess great rejuvenating power such as elevating the body's temperature and activating major bodily functions. FIR properties can be impregnated to yarns or fabrics through such bioceramic powders as magnesium oxide (MgO) and zirconium dioxide (ZrO2).

In this context, it is foreseen that textile products with FIR property will have much more significance within medical textiles. This review study examines the effects of these rays on human health, their application to textile products and their usage areas.

Keywords: Far infrared, Health, Medical Textiles, Bioceramics.

P-0111

Wound Dressing Materials Made of SF Nanofibers

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Silk is one of the exceptional natural fibers and has a long established history in textile production throughout the centuries. It is especially very well known for its mechanical properties and lustre. Conversely, electrospinning is one of the widely used technologies for more than two decades. With this technology, ultra-fine fibers can be produced continuously with the help of the electrical forces at nanometer scales. In this study, silk fiber and electrospinning are briefly introduced. Later, a revise is made on silk fibroin (SF) nanofibers and their applications on wound dressing materials. In relation to SF electrospinning, some information is also given on the solvent used for the production of silk containing nanofibers. As it is already known that, silk fibroin electrospun materials have good characteristics such as mechanical properties, biocompatibility, biodegradability and flexibility. Because of these good features, they can be used for wound dressing, mats and so on. With this review, it is aimed to achieve a notice on the production of silk fibroin (SF) nanofibers which are produced by the electrospinning process and to highlight their applications in wound dressing materials.

Keywords: SF, electrospinning, nanofiber, wound dressing, biomaterials

MARMARA ÜNİVERSİTESİ

P-0135

One Bath Dyeing of PBT/Nylon Blended Seamless Fabrics

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Polyesters (PES) fibers are one of the most important polymers for textile industry due to their large production amounts. Poly (butylene terephthalat) (PBT) fibers are important aromatic polyesters known as their good elasticity and easy dyeing properties. PBT is manufactured by again polycondensation reaction with BDO (1,4-butanediol) and TPA or DMT, can be easily dyed at low temperatures with disperse dyes without carrier and is known as its very good elasticity properties. Generally PBT fibers are used in intimate, ready-to-wear, active and sportswear apparels, swimwear, carpets, automotive and home upholstery applications.

Seamless technology is capable to meet the needs of consumers with performance, functionality and comfort. These technologies have some advantages over the cut and sew products. Seamless technology improves the aesthetic value and comfort, fredom of body movement, gives softness to the garment and minimizes the surface friction of the seams. In seamless machines, gloves, hats, socks, sweaters, sportswear can be produced. PBT fibers can be used in seamless sport wears, tights and intimates. These fibers provide more elasticity, comfort and softness on seamless sportswear than polyester fibers due to their good elasticity properties. In seamless technology polyester fibers generally are used with other fibers such as nylon, elastane.

In this study, PBT/Nylon blend knitted seamless fabrics were dyed with disperse, acid and metal complex dyes at 98oC in one bath. The color strength, colorimetric properties and fastness properties (rub and wash fastness) of these fabrics are investigated.

Keywords: poly (butylene terephthalate) fiber, PBT, elastic polyesters, easy dyeing, elasticity, seamless technology

P-0141

Effect of Yttria Addition on the Microstructure and Mechanical Properties of Alumina Doped Hydroxyapatite

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In the present study, hydroxyapatite-alumina (Al2O3)-yttria (Y2O3) composites with different ratios of additives were prepared via pressureless sintering between 1100oC and 1300oC for 4 hours to produce new candidate bioceramic for load bearing applications in human body. The rate of Al2O3 was wt%2.5 and it was wt%0.5, %1.5 and %2.5 for Y2O3. Scanning electron microscopy (SEM) and X-ray diffraction patterns (XRD) were used to study the microstructure and phase analysis. Density, porosity, microhardness and compression strength measurements were carried out to determination of mechanical properties of monolithic HA as well as composites. Y2O3 addition HA-A binary composites helps to improvement of properties.

Keywords: Hydroxyapatite, Alumina, Yttrium oxide

MARMARA ÜNİVERSİTESİ

P-0144

The Standing and Significance of Technical Textiles in Manufacturing of Sportswear

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Textile and readymade products were initially used for basic needs, but with the technological improvements and revolutionary innovations coupled with intense competitive market conditions, they became one of the most sought after material in various disciplines which in turn led to researching and producing different textures. In the future, in addition to fashion-specific characteristics of the products and fabrics, the use and demand for multifunctional interactive textile products that could also serve other purposes will rise. The production of technical textile products, with their various fields and purposes of use as well as their high technical and performance attributes show a rise in the field of sportswear similar to other areas of use. The characteristics of the materials employed are also increasing gradually. In this context, the garments the athletes wear and the materials they use have great importance in terms of technical textiles. In this study, the contribution of technical textile production on various sports is analyzed, and in addition to literature research and sample applications, the latest developments in technical textile products used in different sports were evaluated. The research conducted reveals that the technical textiles have an effect on different sports and the performance of athletes.

Keywords: Technical textile, sportswear textile, athlete garments, wearability

P-0145

The Effect of Different Washing Methods in Frequently Used Denim Fabrics on the Fabric Characteristics and the New Generation Denim Fabrics: An Industry 4.0 Application

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Marmara University

With the rising demand for products made from denim, this type of fabric became one of the most frequently used material that appeals to almost all age groups. Denim fabrics became an indispensable material in fashion industry thanks to different types of washing methods and processes used. This is why meeting the consumer demands is a highly significant competition element in the denim sector. The purpose of this study is to determine how fabrics are affected by color extraction processes the producers use in their collection because of high demand from customers, and to analyze the effects of washing methods commercially employed widely in the denim sector on the denim fabric. 3 different finished fabrics were washed with 5 separate washing methods. Following the washing process, the fabrics' tearing strength, tensile strength, and resistance to sweat, color and rubbing fastness were measured, and as a result, no increase in strength values was observed for rinse washed fabrics while the softeners used caused an increase in tearing strength. The new generation denim fabrics, specifically Industry 2.0 and Industry 4.0 technologies were also analyzed in the study.

Keywords: denim fabric, washing methods, denim 2.0, denim 4.0

P-0149

Lanthanum Oxide Doped Hydroxyapatite-alumina Composites as a Bioceramic

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In the present study, hydroxyapatite-alumina (Al2O3)-lanthanum oxide (La2O3) composites with different ratios of additives were prepared via pressureless sintering between 900oC and 1300oC for 4 hours to produce new candidate bioceramic for load bearing applications in human body. The rate of Al2O3 was wt%5 and it was 0.5, %1.5 and %2.5 wt% for La2O3. Scanning electron microscopy (SEM) and X-ray diffraction patterns (XRD) were used to study the microstructure and phase analysis. Density, porosity, microhardness and compression strength measurements were carried out to determination of mechanical properties of monolithic HA as well as composites

Keywords: Hydroxyapatite, Alumina, Lanthanum oxide, Sintering

P-0151

The Role of Textile Sector in Personal Protective Equipments

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As stated in the regulation about the usage of Personal Protective Equipment at workplaces, PPE: It means all tools and devices which have been designed appropriately in order to protect employees against one or more risks that affect health and safety due to the works carried out. Regulation on the Use of Personal Protective Equipment in Workplaces appendix 2, PPE is collected under 9 main titles, which are: Head protectors, Ear protectors, Respiratory system protectors, Hand and Arm protectors, Foot and Leg protectors, Skin protectors, Body and Abdominal protectors, Body protectors. Personal Equipment can be collected under 2 titles as Respiratory system and Body protection.

In respiratory protection, it is foreseen that the respiratory system is protected against volatile and chemicals caused by the works carried out. On the one hand, in body protection, it is foreseen that hands, eyes, ears, head and feet are protected by personal protectors against any danger. The equipment that will be used, must be selected in accordance with the workplace conditions and job attributes.

Personal Protective Equipment has evolved over its history according to usage areas. The development has taken place in different forms for the 9 mentioned PPE. PPE market is also an important sector for the technical textile industry. PPE has become a significant area for textile sector in terms of business and technological development. Particularly, developments in the textile sector have also led to important developments in terms of Respiratory System Protectors, Hand and Arm Protectors, Foot and Leg Protectors, Body and Abdominal Protectors and Body Protectors. The most striking changes in the properties of today's PPE are the increase in protection features of protectors and the extension of the protection period.

In this study, the role and effect of the textile industry in the development of PPE has been examined.

Keywords: Personal Protective Equipment, PPE, Textile Industry

P-0163

Camera-based Onloom Quality Control of Woven Fabrics with Complex Jacquard Patterns

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The German textile and clothing industry is one of the largest industrial sectors in Germany with around 1200 companies. A key feature of the industry is the high number of small and medium-sized enterprises. The textile sector in particular, with a share of 75 %, is strongly influenced by SMEs

In order to control the quality of the fabric produced, the product is manually checked by personnel. The manual inspection has an error detection rate of approx. 70% and is time-consuming and labour-intensive.

The solution to be developed focuses primarily on the field of jacquard weaving. On-Loom automated defect detection enables the cost-intensive inspection of goods to be reduced on the one hand, and fast reaction to defects on the other. The errors can be detected and corrected directly in the development phase and not only identified in a subsequent process.

The solution is based on a three-step approach. First, a virtual preview of the fabric produced on the machine is generated by means of simulation. Image data are then recorded on the machine by means of image acquisition. Subsequently, a comparison is made between the simulation and the acquired image data using robust calculation algorithms. With the help of this comparison, possible errors can be identified and classified.

The potential in Germany is enormous. Research has shown that in the area of Saxony / Thuringia alone, approx. 50,000 running meters of jacquard fabric ("Africanadamast") are produced every day. The amount of work required for the manual quality control of this quantity (approximately 10 m/min average viewing speed) is approx. 83 employee hours per day per weaving mill. Due to the automatic fault detection, this effort (approx. 18,000 man-hours per year) can be reduced by approx. 30 % (= 120,000 € per weaving mill per year).

Keywords: Quality control, jacquard weaving, image processing

P-0165

Price Perceptions for Smart Textile Products According to Different Economic Indicators

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Individuals at different economic levels most likely perceive products more expensive or cheaper. Smart textile products are mostly expensive different from standard products because such products are made using the most modern technical knowledge and methods. The study attempts to highlight the differences in price perceptions of university students for four kinds of high-tech products in textile area. The smart products are smart shoes, socks, tops and wristband. 4 separate items indicating the economic situation of participants are used: (1) living situtation (live alone or with somebody else), the type of accommodation (detached/regular house, semidetached/ maisonette/duplex, retirement accommodation), home location (metropolitan - city/suburbs, regional /rural community), sort of transport (car –driver, car –passenger, taxi, public transport, or walking) and occupation.

Keywords: price perceptions, economic indicators, accommodation type, sort of transport, home location, occupation

MARMARA ÜNİVERSİTESİ

P-0166

Effect of Microwave Energy on Sound Absorption of Chemical Treated Agricultural Fibers

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The fibers that are obtained from agricultural plant wastes are biodegradable, recyclable, renewable, more economic and sustainable. They are alternative environmentally friendly technical textile materials because of their high sound absorption performance. In this study, okra fibers were obtained from okra stem wastes by use a specially designed machine. The stem wastes were from Aegean Region of Turkey. The okra fibers were pre-treated with 5 % sodium bisulphate and 5 % acetic acid by conventional and microwave energy processes. The result of the fiber diameter and sound absorption properties of the fibers was investigated. The fiber diameters of treated fibers with microwave energy were more thin than the conventionally treated fibers. Acetylation of okra fiber was improved to sound absorption performance. All results of treated fibers with microwave energy were better than the conventional method.

Keywords: agriculture waste, surface modification, ultrasonic energy, natural fibers, okra fibers, sound absorption

P-0167

Electrochemical Cleaning of Welds with Carbon Fiber Brushes

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Welds on stainless steel generally show noticeable irregularities in appearance and form after the welding process. Weld cleaning therefore plays a crucial role in metal processing. Nowadays pickling is the most common cleaning method. Nearly 65% of all produced raw steels are pickled at least once. During pickling, the component is dipped in a highly toxic pickle and washed afterwards. Through the use of a highly toxic pickle, pickling poses a danger to both humans and the environment. Therefore especially the disposal of used pickle and wastewater is complicated and causes high costs. In addition to the environmental impact, the long exposure time of more than 15 minutes is a limiting factor for the cycle time of welded components.

This research work focuses on an alternative weld cleaning METHOD: Electrochemical cleaning of welds with carbon fiber brushes. Main advantages are drastically reduced process times (< 1 min) and reduced burdens to human health and environment. As electrolyte a low concentrated phosphoric acid is used, which is far more environmentally friendly compared to toxic pickles. A disadvantage of the cleaning method is that it can only be done manually at the moment. This research paper includes the comparison of concentration and amount of toxic exhaust and wastewater for the electrochemical cleaning method with conventional weld cleaning methods. The results are used to automate the process of electrochemical cleaning in future studies.

Keywords: weld cleaning, carbon fiber, electrochemical

P-0171

Improvement Study of Comfort and Protection Properties of Arabic Shemagh Textile

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The Arabic shemagh is considered as one of the remarkable textile in Arabic fashion culture. It has functional and asthetic features as protection from sun and cold weather in desert environments. It shields the face from dust and sandstorm when used as facial scarf.

It is also protecting the head from different environmental factors by providing thermal balance and comfort in hot and cold atmosphere which is one the important textile properties and known as comfort performance.

Based on cited above, this study aim to improve the comfort and protection of arabic shomagh textile that directly subjected to ultraviolet rays, dust and dirt. It also try to fulfill the need of thermal exchange between the body and environment.

Twelve samples were prepared with variable raw materials and composite textile: 100% cotton, viscose - cotton 30/70 %, polyester- cotton 50/50%, bamboo 100%,1/1 plain - 1/3 twill.

The results of this study were:

There is significant contribution of the raw material type in weft yarns of textile background on comfort and protection properties of shemagh textile.

There is a significant contribution of raw material type in decorative pattern yarn on comfort and protection properties of shemagh textile.

There is a significant contribution of textile composite type of textile background on comfort and protection properties of shemagh textile.

Keywords: protection properties, comfort properties, bamboo fibers

Arabic shemagh textile



a sample of how arabic shemagh look like

P-0176

Development of Self-Reinforced Bio-Polymer Composites

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The demand for lightweight composite materials is continuously increasing in various industries. Lightweight structures are in the key interest of the mobility sector, e.g. the automotive and aerospace industry. This trend applies also for the consumer industries, e.g. sporting goods. Self-reinforced polymer composites (SRPCs) offer high stiffness, and high impact properties at low weight [1]. Usually a thermoplastic matrix faces is reinforced by fibres made from the same polymer. Using the same polymer enables an excellent fibre-matrix-adhesion [2]. SRPCs are much easier to recycle as the reinforcing fibres do not have to be separated from the matrix [3]. Besides the growing demand for new lightweight materials, the demand for the replacement of fossil-based materials has grown as well. The properties of bio polymers can also be enhanced by self-reinforcing the polymer. The bio polymer Polylactid (PLA) is used in the presented paper.

SRPCs can be manufactured by commingling two thermoplastic multifilament yarns with different melting temperatures. The material properties can be tailored upon request by combining different fibre mixtures. The commingled yarns are woven into a textile. These textiles are stacked and subsequently consolidated into a composite. Only the low melting temperature polymer is molten during the consolidation process. The fibres with the high melting temperature remain intact and act as the reinforcing phase of the composite. The focus of this work is on the production and testing of such composites.

The development of such self-reinforced polymer composites is shown. Finally an outlook on further development and the possible applications is given.

Keywords: Polylactic acid (PLA), self-reinforced polymer composites (SRPC), hybrid yarn, mechanical testing

P-0180

The Categories of Sports and Exercise-related Products Purchased in the UK and the Reasons for Their Preference

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The purpose of the study is to explain whether the purchasing of sports clothing, footwear, equipment or accessories is for sports use or not. In addition, it is found that the most preferable product category for exercise by individuals in age from 18 to 37. 304 voluntary participants were conducted which lived in Nottingham, UK and had studied or worked in Nottingham Trent University. Participants were asked to answer why they have bought sports clothing, footwear, equipment or accessories in the past 12 months for either yourself or someone else. Out of them, 189 (% 62,4) had made purchases only for sports use when 43 (% 14,2) was for non-sports use. 19 (% 6.2) was not only for sports use but also non-sports use. 14 (% 4.6) persons said that they don't know or can't remember the purchasing cause. For sport use, clothing and footwear were bought by 158 persons, equipment and accessories were by 43 ones, and any purchase of sports goods was by 48 ones. For non-sports use, 30 persons said that they bought clothing and footwear when few prefered to buy equipment and accessories or any purchase of sports goods. In the past 12 months, some items were purchased not only for sports use but also non-sports use: clothing and footwear by 18, equipment and accessories by 12 and any purchase of sports goods by 10. As a result, the most preferable product category is found as clothing and footwear for sports use and other reasons.

Keywords: sports, clothing, footwear, equipment, accessories, purchasing

P-0181

Functional Nanofibers for Wearable Electronics

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Wearable electronic based on textiles hold great potential for the next growth of the wearable electronics market. One of the ultimate objectives of wearable electronics is to integrate with clothes with the textile advantages such as soft, comfort, breathability and high sustainability. Various components of sensors, actuators, energy generators and storages and so on have been used in smart garments. All electronic devices require power and this is a significant design challenge for e-textiles and smart clothing. The developments of wearable and fabric based energy harvester/storage devices are very important due to their promising applications in next generation autonomous and wearable healthcare and other technologies. These materials can be applied in a wide range of nanofibrous self-powered and active sensing uses. In this study, it was striving to apply nanofibers of composite polymers into flexible electronics. Power generation can be achieved by functional nanofibers that harvest energy from motion and thermal gradient. These Nanofibrous based mechanical energy harvestings including flexible piezoelectric nanogenerators. The base polymer, poly(vinylidene fluoride) (PVDF) and its copolymer were used for this purpose because of their flexibility, adequate mechanical strength, ease of processing and high chemical resistance. Through an electrospinning the in-situ mechanical stretch and electrical poling could enhance its performance. The woven nanofibrous fabric and nonwoven mat were analyzed and investigated in details by piezo-resonance test, XRD, and FTIR. It could be claimed that, this new nanofibrous fabric is a step forward into E-textiles and wearable electronic.

Keywords: Wearable Electronics, Functional Nanofibers, Energy generators

P-0194

Cellulose and Protein Waste based Recycled Wallpaper Design

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Chicken feathers contains high amounts (%91) of keratin. It means that Chicken feather fibres (CFF) contains high amount of protein and they have hollow and slightly hard structures. Cross links occur when these fibres heated and these links ensure that the structure becomes more porous as well as strengthening. CFF is 6-8 times stronger than cellulosic fibres. They have superior properties compared to mostly used natural fibres such as wool and cotton in some special application areas. Due to the fineness of the fibres, the contact surface of CFF structure is higher. Its resistance to deterioration in wet conditions is high, and tends to preserve its structure even in wet conditions. Due to its crystalline structure, it is stable and durable, which causes its areas of use to expand and become a cheaper alternative to expensive technical fibres. The aim of this study is to develop recycled materials based wallpapers. The wallpapers were prepared by blending CFF at different rates (5%, 10%, 15%) to cellulosic paper wastes. The CFF fibre is first separated from the main structure of feather. After the separation, soft fibres were selected and these fibres were washed and cleaned with polar solvents (ethanol etc); after drying, their physical properties were determined. The cross-sections of these fibres are thin (up to 50 microns) and their lengths are between 10-30 mm. Due to the structural characteristics of the chicken feather, which is considered as waste, it has the potential of being a very good isolation material. The most important advantages of CFF is being a natural and sustainable resource.

Keywords: By-product, breatable wallpaper, biomaterials, composite.

P-0197

Virtual 3D Prototyping Between Fashion Design and Modern Garments Production

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In this paper, the design of the corset is transposed through virtual sewing. The patterns and parameters of the fabrics are simulated for a suit, a dress and a coat. The number of variations is unlimited and the modules are provided in a short time on an anthropometric model. Changes in the high frequency markets caused by global competition in the garment industry have led production and business systems to set a permanent goal of production: short delivery times, high quality clothing products and a favorable price on the market. Modern concepts of design require optimum time in designing clothes.

Keywords: 3D, fashion design, garment industry, quality

MARMARA ÜNİVERSİTESİ

P-0199

The Investigation of Heating Effect of Reduced Graphene Oxide Coated Nonwoven Fabric

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The interest in textile based wearable devices has started to grow, especially for their flexibility and light weight features. Smart textiles like heating fabrics can find applications in numerous fields such as sports, leisure, medical and automotive. Most of the heating elements use the principle of Joule's heat, which is generated when an electric current is passed through a conductive material. All conductive materials are heating elements in principle. Heating textiles can be manufactured from any type of textile products such as nonwoven fabric, knitted fabric, woven fabric and embroidery. In this study, the wearable and flexible heaters based on highly conductive reduced graphene oxide coated polyester/viscose nonwoven fabric has been developed. The polyester/viscose nonwoven fabric was coated with graphene oxide through a simple dip coating process. Three different graphene oxide dispersion concentrations (1 mg/ml, 2 mg/ml and 4 mg/ml) were studied. The coating process was repeated 5 times in order to increase the graphene oxide content on the fabric surface. Then, the graphene oxide coated nonwoven fabrics were chemically reduced with aqueous solution of Vitamin C to obtain electrically conductive reduced graphene oxide. To determine their potential as heaters, electro-thermal performances of the devices were studied in terms of applied voltage. The electrical resistivities and surface properties of nonwoven fabrics were also examined.

Keywords: heating, reduced graphene oxide, coating, nowoven fabric, electrical conductivity

P-0201

Bleaching of SeaCell® Active/Cotton Blend Fabrics with Hydrogen Peroxide

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Seaweed-based SeaCell® fibers have been considered as new materials for textile industry. In this study, hydrogen peroxide bleaching of woven fabrics obtained by blending seaweed-based SeaCell®Active fibers, which have antifungal and antibacterial activity, with cotton yarns at two different ratios was investigated. Bleaching process was performed in a laboratory dyeing machine at different hydrogen peroxide concentrations. The effect of some important parameters such as temperature, pH and process duration on the bleaching performance was also examined. The color measurements of the bleached SeaCell®Active/Cotton blended fabrics were characterized by utilizing Datacolor SF 600 +. Tristimulus and Whiteness Index Values were calculated according to the CIELab system with D65/10° observer values. The results revealed that the highest Whiteness Index value was obtained as 64.40 with 25/75 SeaCell®Active/Cotton blended fabric which processed at 90°C for 60 min in a bleaching bath with pH 10 containing 30 ml/l H2O2. However, the highest L* value was found as 92.36 with 50/50 SeaCell®Active/Cotton blended fabric which processed at 90°C for 60 min in a bleaching bath with pH 7.5 containing 30 ml/l H2O2. It was seen that the fabrics with two different blend ratios had the closest results to Whiteness Index and L* value of the 100% cotton fabric in the determined processes.

Keywords: bleaching, hydrogen peroxide, SeaCell®Active, blend fabric, color measurements

P-0203

Use of Technological Fibers in Clothing Design, Innovative Appearances and Expectations

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Textile and fashion industry, which is one of the dynamic sectors of today, evolves towards more innovative, technological, functional, aesthetic and creative looks than traditional structure by experiencing radical changes in terms of used materials and production methods, models and silhouettes and also marketing methods in recent years.

Innovative products, such as new textile fibers, technological textiles, intelligent clothes, intelligent textiles, which have been put forward as a result of technological developments and collaborations experienced in industries such as textile, chemistry, computer, electrical-electronic and machinery have gained considerable importance nowadays, increasing.

In this context, the clothing needs and expectations of a social being are also rapidly changing due to the environment and conditions they live in, socio-cultural needs, economic and psychological conditions, and especially dynamics such as fashion.

In this study; technological fibers, fabric constructions and usage in garment production will be examined and samples from innovative studies will be evaluated in the axis of manufacturer and fashion designers and the thoughts and expectations of consumers will be evaluated.

Keywords: Technological Fibers, Clothing Design, Innovative Appearances, Expectations

P-0205

Study of the Optical Illusion on Body Image Perception

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The current study, aimed to investigate the effect that optical illusion garments have on a woman's self-perception of her own body shape. First, we created different optical illusion garment by using color contrasts. Second, a short survey based on visual perception is addressed to women in order to compare the different optical illusion garments to determine if they met the established "ideal" body shape.

Fashion, which can be identified as a social and psychological phenomenon, is being shaped according to the changes in people's lifestyles, and meets with clients with various consumer needs and expectations, and the fabric styles with new materials, different surfaces and textures, and technologies.

Optical illusion and the Optical Art, emerged in the '60s by being affected by the optical illusion, manifested themselves mostly in the fields of fashion and textile. Many designers have designed clothes with visual optical motions by making use of the works of the optical artists and by using more black and white

Keywords: optical illusion, body shape perception, color contrast

MARMARA ÜNİVERSİTESİ

P-0206

Effects of Carbon Nanotube-phosphorus Based Flame Retardant Combinations on Flammability of Polypropylene

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Flame retardant polypropylene (PP) fiber is widely used in textile industry and related fields such as transportation, electric wire and cable, and decorative materials, due to its good processing performance, excellent chemical and thermal resistance in addition to its low cost [1]. PP burns rapidly without leaving a char residue due to its fully aliphatic carbon structure [2]. Phosphorous based flame retardant additives for PP have gain importance for more than 30 years after realizing health and environmental impact of halogenated compounds because of toxic gas and smoke formation [3]. Especially phosphorus based intumescent systems requires the use of more additives at higher concentrations. The concentration of additives can be reduced by incorporating synergist.

In this study, carbon nanotube was added to polypropylene containing two different type phosphorus based flame retardant, including ammonium polyphosphate (Exolit AP 760) and organic phosphorous compound (Aflammit PCO 900) in different ratios between 0.5 to 2.0 wt %. All samples were blended in twin screw micro compounder (DSM Xplore) at 180 °C and injection molded at 185 °C. Thermal properties and flammability of the prepared samples was determined by thermogravimetric analysis (TGA), limit oxygen index (LOI) and micro combustion calorimetry (MCC). Results showed that phosphorus based flame retardants improve flame retardancy of polypropylene effectively. By comparing the LOI values of samples containing organic phosphorus and APP at the same level of loading, it could be concluded that the organic phosphorus is more effective than APP. The LOI values of carbon nanotube and phosphorus containing samples slightly decreased. On the other hand, TGA results showed that the weight loss of carbon nanotube and phosphorus containing samples is lower than the samples containing only phosphorus based flame retardant.

Keywords: technical textile, flame retardant, polypropylene, carbon nanotube, micro combustion calorimetry

P-0209

Investigation of Color and Function Characteristics of Natural Colors Obtained From Roses

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In this study, rose leaves obtained from rose plants were used as natural dye source. The natural dye solutions extracted from Rosa Rugosa flowers and the silk, wool, linen and cotton materials were colored according to the conventional method. Prior to painting, pre-mordanting was performed on the materials using three different mordants, potassium aluminum sulfate, potassium bitartrate and ascorbic acid. CIELab, K / S values of silk, wool, linen and cotton samples painted with natural dye solutions extracted from rose leaves were compared. The strength and% elongation values of the raw materials and treated materials were investigated. Washing and rubbing fastness properties of the dyes have also been examined.

In the works done, pink and tones, yellow tones were obtained. The fastnesses are among the values accepted by the industry in general.

Keywords: Rose leaf, natural dye, spectroscopic measurements, strength and elongation, fastness properties.

P-0210

3D Bioprinted Syntethic Blood Vessels Scaffolds For Cardiovascular Tissue Engineering

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Construction of the 3D bioprinted scaffolds using additive manufacturing for tissue engineering studies is widely popular and crucially required to provide sufficient environment for cell attachment and stimulation of new tissue development [1]. Polycaprolactone (PCL) is one of the most preferred synthetic polymers for due to its features such as having high mechanical properties, being biodegradable and easiness of the process. However, blending a synthetic polymer together with a natural polymer may enhance the properties of the synthetic blood vessels. Therefore, ethyl cellulose and collagen can be perfect candidates as natural polymers due to their similarity to the extracellular matrix, low toxicity and high biocompatibility [2,3].

In this present work, an original 3D bioprinting method has been developed by modifying an exceptional 3D printer. Instead of using solid filaments, polymeric composite was dissolved using an organic agent and bioprinting was conducted. Using a composite material consisted by PCL, Ethyl Cellulose and Collagen, bioprinting was carried out to create the ideal scaffold material for cardiovascular tissue engineering. Produced samples were characterized by scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), tensile strength measurements and in-vitro MTT assay. According to the test results, using the blend of a synthetic polymer with the natural one to create new hybrid scaffold structure increased mechanical and chemical properties of the material. Also presence of the Human Collagen which is a natural protein quite often found in the human body causes the composite of the scaffolds to be more biocompatible, bioabsorbable and more desirable results from the in-vitro and in-vivo tests. As a conclusion, 3D bioprinted blood vessel scaffolds are found to be promising to be used in cardiovascular tissue engineering.

Keywords: Polycaprolactone, Ethyl Cellulose, Collagen, Additive Manufacturing

P-0211

Effect of Voltage on Scaffold Using EHD Bioprinting Hybrid System

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Tissue engineering applications aim to growth of new tissues by reconstructing damaged tissues with scaffold biomaterials. Bacterial cellulose (BC) is a promising biomaterial for tissue engineering, but the poor processability limits its application. Thus, mixing BC with a synthetic polymer, such as Polycaprolactone (PCL) is a good choice to increase its processability. This study is combined the 3D printing and Electrohydrodynamic (EHD) hybrid systems to prepare a 3D Bacterial Cellulose (BC) / Polycaprolactone (PCL) scaffolds for the purpose of tissue engineering applications. Various voltage values were applied to the different BC/PCL blend solutions to investigate the effect of the voltage on scaffolds. The morphology of 3D-EHD printed BC/PCL scaffolds were characterized by Optical Microscope and Scanning Electron Microscopy (SEM). BC/PCL solution with 5:10 (wt ratio) and 1 kV was found best sample to use for tissue engineering applications.

Keywords: EHD bioprinting, bacterial cellulose, polycaprolactone, tissue engineering

P-0212

Investigation of Lipolytic Slightly Halophilic Bacteria on Salted Goatskins

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Leather, which is a by-product of the meat industry, is a leading export for many countries. Among the leather materials, goatskins are used for production of gloves, shoes, boots, bags, rugs, drumheads and other products. Hence, high quality goatskins are very important to obtain extremely durable leather products. When the animal is alive, good animal husbandry and animal health care are necessary for better goatskin quality. After animal is slaughtered, the goatskins are preserved with sodium chloride collected from salt mines, salterns, salt lakes. Halophilic microorganisms may exist in salt used in skin preservation and these halophilic microbial communities may be involved in deterioration of goatskins. The detrimental activities of these microorganisms may reduce skin quality causing surface defects and skin damage, decreasing tensile strength and consequently reducing its market value. Therefore, the aim of this study is to determine lipolytic slightly halophilic bacteria on thirty salted goatskin samples (Australia, Africa, Bulgaria, Greece, Kuwait, Dubai, Israel, USA, Turkey). The total bacterial counts of lipolytic slightly halophilic bacteria on the salted goat skins were detected on agar medium containing 1% Tween 80 (w/v), 0.5% yeast extract (w/v) and 1.5% (w/v) NaCl. After incubation at 37°C for 7 days, opaque zones around the colonies were taken as evidence of lipase activity. According to our experimental results, total counts of lipolytic slightly halophilic bacteria were found between 10^2-10^6 CFU/g. The results obtained from this study clearly showed that the goat skins were contaminated with lipolytic slightly halophilic bacteria found in salt which is used in skin preservation and the quality of these skins is adversely affected by these bacteria. In conclusion, we recommend using efficient antimicrobial implementations in short-term preservation period of goatskins with salt to control bacterial growth.

Keywords: Salted goatskins, leather industry, lipolytic slightly halophilic bacteria

P-0213

Proteolytic Slightly Halophilic Bacterial Numbers on Salted Goatskins Belonging to Different Countries

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Goatskins are among the important leather materials which are used for footware, jacket, trousers, gloves, wallet, blanket, small rugs, and other leather goods. The quality of raw goatskins is closely related with the quality of leather products. To prevent bacterial damage, goatskins are cured with salt obtained from salt lakes and salterns. These raw salts contain metabolically active halotolerant *Bacteria*, slightly halophilic *Bacteria* and moderately halophilic *Bacteria*, extremely halophilic *Archaea* which may reduce the quality of goatskins. Hence, we focused on determination of proteolytic slightly halophilic *Bacteria* on salted goatskins belonging to Australia, Africa, Bulgaria, Greece, Kuwait, Dubai, Israel, USA and Turkey. These salted goatskin samples were separately placed into steril brine solution containing 1.5% (w/v) NaCl and the flasks were shaked in incubator for 4 h at 25°C. Then, direct and serial dilutions were prepared from the brine solutions. To determine total proteolytic slightly halophilic bacterial counts on the salted goatskins, 100 µL of each bacterial dilutions were evenly spread onto agar media containing 2% (w/v) gelatin and 1.5% (w/v) NaCl. These test media were incubated at 37°C for seven days. After incubation, surfaces of the test media were flooded with Frazier solution for 10 minutes. Clear zones around colonies were accepted as positive protease activities and these colonies were counted. While 63% of salted goatskins contained 10^5-10^6 colony forming unit of proteolytic slightly halophilic *Bacteria*, 37% of the salted goatskins contained 10^2-10^4 colony forming unit of proteolytic slightly halophilic *Bacteria*. These results clearly showed that salts used in goatskin preservation worldwide contaminated goatskins with proteolytic slightly halophilic *Bacteria* which damage collagen of the skin and degrade the quality of final leather. Therefore, we suggest effective antibacterial applications during salt curing process of goatskins to prevent bacterial damage on the goatskins.

Keywords: Proteolytic slightly halophilic bacteria, salt-cured goatskin, leather industry

P-0214

The Antibacterial Effect of Green Synthesized Silver Nanoparticles on Cotton Fabric

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The interest for non-toxic and efficient antimicrobial finishing of textile materials is rapidly growing in medical, healthcare, hygiene and protective textiles. Silver and silver based compounds are known as powerful antimicrobial agents for textile materials. The synthesis of silver nanoparticles can be prepared by a variety of chemical methods. Some of these methods are expensive and potentially hazardous to the environment.

This research is focused on antimicrobial activity of cotton fabrics treated with silver nanoparticles which were synthesized by a "Green Synthesis" method. For this aim, silver nanoparticles were synthesized using Sığla tree leaf aqueous extract as reducing agent and no toxic chemicals were used as reducing agent. Then the silver nanoparticles were applied to cotton fabrics with and without atmospheric plasma treatment. The antibacterial activities of the untreated and treated fabrics were investigated according to AATCC-100 standard.

The properties of antimicrobial fabrics were investigated by using Fourier Transform Infrared Spectroscopy (FTIR-ATR), and Scanning Electron Microscopy (SEM). The results showed that silver nanoparticle treated cotton fabrics had good antibacterial activity. The SEM micrographs of the cotton fabrics indicated that silver nanoparticles were well dispersed on the surface of the fabrics.

Keywords: Cotton, Antimicrobial, Green Synthesis, Atmospheric Plasma, Silver nanoparticle

P-0215

Investigation of Heat Conductivity of Chicken Feather and Pumice Stone Reinforced Composite Materials

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In this study, thermoplastic-based based on polypropylene chips composites were produced by making use of pumice stone with different grain structures and chicken feather as reinforcement. In the composite production process hot-pressing machine was used to develop novel composites. Prior to the production process, the pumice stones were determined in the sizes of 0-1mm, 1-2mm and 2-3mm by passing them through a regular sieve. Then, chicken feathers with 0-1 mm granule structure were chopped in a blender and mixed with pumice stones separately. These mixtures were sewn in between polypropylene nonwoven fabrics. The composite plates were obtained by placing polypropylene chips on top and bottom of the sewn fabric. The samples for thermal conductivity tests were cut with a diameter of 28 mm from these plates. And the P.A. HILTON LTD. H940 heat conductivities of these samples were tested. By reinforcement materials such as chicken feather and pumice stone, it is aimed to improve the heat conductivity properties of the composites.

Keywords: Pumice, chicken feather, polipropilen, composite, heat conductivity

MARMARA ÜNİVERSİTESİ

P-0216

Protective Fabric Development for the Upholstery Sector

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The deregulation of trade in the textile industry of the world has led to a great increase in imports of curtains and upholstery fabrics made in third world countries, be about especially in China. China is able to meet a significant percentage of world textile production with much cheaper production of domestic production goods, which is worrying about the companies in the sector. China's cheap, abundant labor, low labor costs, and high raw material prices, which are well below world prices, are the factors that increase the competitive power in the global market. For this reason we need to be different from by producing more innovative products with added value. We can classify them as technical textiles that we will customize as textile sector and high value textile with innovative added value.

Upholstery fabric, is the type of fabric that is used in furniture production and constitutes the most important visual part of the furniture. But the above-mentioned conditions have to obligation more important in functionality beside the fabric visual.

Textile products may require multiple functions such as flammability, antibacterial, water repellent, soil repellent, waterproof, antistatic depending on the customer's request. The functionality of the textile material is very important because it protects the person and the place from fire, bacteria, static electricity, and also the water repellency of the fabric, which will make it difficult to pollute it. The project has developed a multifunctional upholstery fabric that combines the protective functions of water repellency, soil repellency, water repellency, antibacterial and antistatic beyond the BS 5852 CRIP 5 flammability test standard

Keywords: protective fabric, Upholstery, innovative

P-0218

Pomegranate Tannin Based Nanofibers for Wound Dressings Design

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With today's developing technology, a transition from macro dimensions to nanoscale dimensions has begun. This transition has brought along innovations that meet the needs of low cost, high efficiency and people uses. An example of wound dressings created by nanofiber production that will look at innovations in the field of textiles. Although there are many production methods, the most preferred is nanofibers attraction with electro-spinning. This results in a high surface area / volume ratio, a high length / diameter ratio and the ability to control the pore size in porous fibres. Polymers generally used in textile are polyacrylonitrile, polyamide and polyethylene. The electro-spinning production of nanofibres is the main factor that determines the nature and use of the polymer fabric.

The main purpose of this project is to produce nanofibers with new properties based on the natural tannins and different polymers found in nature. These nanofibers produced is designed for use in wound dressing applications. Tannins are water-soluble plant polyphenols, naturally found in many foods, responsible for binding and settling proteins. It is also a defence mechanism created by plants to prevent attacks and to protect against bacteria. Plants, tree shells, seeds and fruit shells are located. Nanofibers can be produced using pomegranate from fruits containing tannins. Pomegranate grains are soluble and obtained in high amounts of tannins and are used as polymers in nanofiber production. It is thought that the wound will reduce the wound healing process by preventing the wound from getting infected compared to the normal wound dressings. However, because it is composed of biopolymer, it reduces the dressing changing time of the wound dressing and shows an environment-friendly feature.

Keywords: Electro-spinning, Tannin, Nanofibers, Wound dressings

P-0220

Production of the Fluorescent Coloured Cotton Fabrics for High Visibility Clothing

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To enhance the high visibility characteristics of clothing, the fluorescent dyestuffs are widely used in textile coloration. The fluorescent coloured textiles are used either for decorative purposes or for technical safety for anyone who wants to make himself visible, e.g. motorcyclists, workers, etc. In this work, 100 % cotton fabrics were dyed by the exhaustion method with the fluorescent dyes, namely, C.I. Direct Yellow 96, C.I. Direct Red 277, C.I Direct Blue 199, C.I Direct Orange 26 and Remazol LM Yellow FL. The % SRF values of the dyed fabrics were measured by a spectrophotometer. The chromaticity coordinates and the luminance factors of the dyeings were calculated to investigate the conformance of the dyed fabrics with the EN 471 standard. The fastness tests were also carried out for each dyed sample.

Keywords: high visibility clothing, fluorescent dyes, cotton fabrics

MARMARA ÜNİVERSİTESİ

P-0222

From Oak to Fabrics Testing and Analyzing Study of Cork Coated Textile structure

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Cork retains unique qualities of flexibility, elasticity and compressibility. Its extreme resilience, impermeability, lightness and insulating efficiency make it ideal for a large number of applications, such as a closure for wine and spirits. Cork is used in industries as diverse as floors (floating floor and cork tiles), shoe manufacturing, construction (insulator planks), automotives (gaskets), leisure (fishing rods), upholstery (cork textile) and a wide range of cork finished articles (handbags, wallets, accessories).

It is also 100 per cent% natural, and made from a renewable source, cork is fully recyclable. It is durable, lasting for around 20 years without signs of deterioration, and is resilient to scratches. Cork is waterproof, fire-resistant and flame retardant. It is insulating, hypoallergenic, stain resistant and dirt repellent. It doesn't fade and is not marked by water.

In order to assess the quality of a material, it undergoes a testing process with a wide variety of parameters and test methods.

In the test of the force-strain effect with different degrees of direction results in the following RESULTS:

\ The strongest stretch and thus most elastic could be observed at 0 °, 75 ° and 90 °

\ At 45 °, the lowest elongation is recorded, with the largest force being used here.

In the test of the Force-stretching effect after multi-cyclic loading results:

\ The sample in the warp direction is much more elastic, since it can withstand more force after the multi-cyclic load up to the strain limit.

¬ During processing, no toxic dyes and preservatives are used, so that the groundwater is not chemically contaminated

¬ The cork is fire-resistant and antibacterial. The raw material cork is lighter and more flexible than leather

Keywords: Cork, Oak, Leather

P-0223

Development of Novel Barium Sulphate Reinforced Composites for Stab and Slash Resistance Applications

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Pure Barium Sulfate is found as white, odorless powder or small crystals with a density of 4.49 g / mL, melting point of 1580 °C and boiling point of 1600 °C. Barium Sulphate (BaSO4) has a high level of flameretardancy can be used in the construction of durable materials. Although Barium Sulphate is a toxic substance but it does not dissolve in water and the level of solubility is very low, so it does not pose any danger to human health (unless it is taken to body in high amounts).

The purpose of this study is to form a structure resistant to stab and slash resistance effects by composing Barium Sulphate Compounds with some high resistance fibers such as kevlar, aramid, etc. When Barium Sulphate is composited with high pressure and heat, it will be ensured that Barium Sulphate is not dispersed or damaged, homogeneous distribution and toxic factors are minimized by making use of double layer gelling structures.

In addition to reducing the effects of Kevlar-Barium Sulphate Composite on human health by stab and slash that caused by sharp materials in daily life, the main aim is to avoid complex and high cost composite structures by developing with a strong structure that contains Barium Sulphate.

Keywords: Composite, Kevlar, Barium Sulphate(BaSO4), Cutter and Piercing Materials

P-0226

Development of Composites Feinforced with Hybrid Aramid and Carbon Woven Fabrics for Drone Body

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The composite materials are frequently mentioned in these days and also their usage areas are very wide. This is because they have use strength in construction and also they have very lightweight. The composites are developed with ballistic test methods. Hereby they are used in aviation and defence industry. The composite materials are quickly entering to our life. And important point of the composites in our project like that; it will be used for the drone body part. The strength and lightness are very important parameters in the drone body design. So the hybrid fibre-reinforced composites are one of the improved property.

The same and different orientations have been considered in the combination. The reinforcing fabrics which produced by woven technique with Twill pattern have been selected. Two different types of the composite body examples were made with created by the aramid-carbon hybrid fabrics and epoxy resin. The reinforced composite structures were manufactured by vacuum infusion process with epoxy matrix and these fabrics. The tensile, compression, three-point bending, free fall, impact mechanic tests were applied to the body of drones with different characteristics. The according to the test results, it was tested whether the composite materials prepared with the same and different orientation technique were suitable for the drone body.

Keywords: Aramid-Carbon Hybrid Fabrics, Reinforced Composites, Epoxy Resin, Vacuum Infusion.

P-0227

Development of Composites Reinforced with Carbon Woven Fabrics for Drone Body

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Today, the use of textile reinforced composite materials, especially light weight and strength is more than many materials have become widespread. Due to these characteristics, the development and use of textile reinforced composite materials in the aerospace and defence industries shows an increase in the same direction. In this study, it is aimed to produce and develop the drone body of carbon fiber fabric reinforced composite materials, which has a very wide usage area, especially in aviation industry, in line with the increasing use of composite materials.

In the production of textile reinforced composite structures, carbon fiber based woven fabric structures were preferred. Woven fabrics are determined as woven fabrics produced using Dim knitting structure. Weaving fabrics used as reinforcement material to produce composite structure were used as different Routing and layers. In the production of composite materials, Thermoset epoxy resin was used as Matrix Material. The vacuum infusion method was used in the manufacture of textile reinforced composite structures. In order to determine the mechanical performance of composite structures, tensile strength, impact strength and three-point bending strength tests were performed. Mechanical performance of the obtained composite structures is interpreted on whether or not they are suitable for the production of drones.

Keywords: Carbon Fabrıcs, Reınforced Composites, Epoxy Resin, Vacuum Infusion

P-0233

Gaining Easy Cleanability Attribute for Fabrics Made of Different Raw Materials and in Different Constructions

Mahir Torsun

Kadifeteks Mensucat San. A.Ş

Kadifeteks has completed a project on easy cleanability as part of TÜBİTAK-TEYDEB project. Product produced as part of the project is 100% and being sold to many countries around the world. This R&D project is created as Kadifeteks customers demanded easy cleanability feature for the products made of other raw materials.

The main objective of this project is treatment of the fabric qualities mentioned in the project with chemical compound that gives easy cleaning feature to the polyester based upholstery fabrics. The problem with these types of fabrics is that fabric raw materials and fabric densities of those fabrics are completely different from fabric structure completed successfully before. The main reasons causing this difference are low density as well as porous fabric structure. In that extent, effects of the easy cleanability chemical with polypropylene, acrylic and mixtures analyzed. Once the conformity of easy cleanability chemical compound with those raw materials is achieved, trials are conducted on fabrics with porous structure.

At the end of R&D project, the fabric qualities specified in this project are found to be successful with oil, food, pen ink stains.

Kadifeteks made difference on product basis with the studies carried out using specified qualities, increased its sales and profits.

Kadifeteks exports majority of those products to many countries around the world, making contribution to the country's economics.

Keywords: Easy clean, Upholstery Fabric, Pen Stain, Oil Stain

P-0234

Production of Flame-Retardant Polypropylene Yarn And Identification of Production Parameters

Mahir Torsun

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Use of flame-retardant textiles gained importance with the increasing risks of fire in working and living spaces. In most countries, flame-retardant material use is mandated under laws in areas with high fire risk, working environments involving high temperatures, public transportation vehicles and similar areas. In textile products, phosphorus, phosphorus and nitrogen compounds as well as halogen based flame-retardant materials are used.Additionally, intensive research efforts are continued all around the world to develop innovative materials. Inorganic based materials and advantages of nanotechnology are often used in those researches. Furthermore, nano materials are known to cause some problems in terms of human and environmental safety.

In this study, flame retardant masterbatches obtained from various companies are used. In the trial studies, each masterbatch group is mixed with raw PP chips in specific ratios. The mixture is treated in extruder to obtain PP yarn. The most suitable extruder operation conditions are identified in trials, and flame retardant PP fibers are produced. Thus, various studies are conducted to develop flame-retardant fiber production parameters. LOI values of the yarns are identified and performance tests are conducted. In those tests, product samples with LOI values exceeding 24 are considered successful in terms of flame-retarding features, and it is decided to produce fabric using those yarns. Fabrics are woven in different constructions using those flame-retardant yarns produced as part of the study. Then, those fabrics are subjected to tests for assessment of their flame-retardant features. The study demonstrated that PP based upholstery fabrics gained flame-retardant features.

Keywords: Flame Retardent, Polypropylene, Limit Oxygen Index

P-0235

Production of Airplane Seat Fabric that Meets Aviation Standards

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Aviation seat fabrics have high flame-retardant, low smoke and gas emission features. These fabrics are used in new airplanes and overhauled airplane seats. Existing products in the market are European and American origin high priced products. In this project, we are targeting to gain ability to produce a new fabric in a quality that can be alternative to aviation seat fabrics that are imported and have high added value without making an additional investment to the existing production lines.

Fundamental attributes expected from aviation fabrics are specified by international standards. Those attributes are; Flame-retardant, Tensile strength, resistance to dry cleaning, abrasion, etc.

In order to produce fabrics bearing those attributes; yarns made of wool and nylon blend raw material are produced, then fabrics in different constructions are made from those yarns, and the fabrics are prepared for use by dyeing and chemical finishing. The tests demonstrated that fabrics gained those attributes, and can be used as airplane seat fabric.

We found out that companies making production for aviation field should not only meet the values in tests and standards required by the customer but also relevant certificates (AS9100 quality management system) must be obtained. After getting detailed information on the subject, studies to obtain relevant certificates are completed. As a result of this project, trial orders have been made.

Keywords: airport, seatcover, fabric, seat, flame retardant,airplane fabric

P-0236

Outdoor Fabric Development

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Outdoor fabrics have high light-fastness, high physical resistance, high water and dirt repellent properties. They are mostly used on garden furniture and automotive industry. Existing products in the market are European and American origin, high priced products.

In this project, we are aiming to produce a new fabric having a quality that can be alternative to imported outdoor fabrics without making an additional investment to our existing production lines.

Fundamental attributes expected from an outdoor fabric are specified by international standards. Therefore, performance of an outdoor fabric is assessed based on those attributes. Those attributes include; fire retardantfeature, oil repellent feature, tensile strength, spray test, abrasion, light fastness and light fastness under climate conditions.

In order to produce fabrics with those attributes; yarns made from polyester, acrylic and polypropylene raw materials are produced, then fabrics in different constructions are made from those yarns, and the fabrics are prepared for use by dyeing and chemical finishing. The tests demonstrated that 4 out of 7 fabric types bear aforementioned attributes which means outdoor fabrics can be produced, and the advanced level studies are currently being carried out for the project.

Keywords: outdoor fabric, UV, Flame Retardant, upholstery

MARMARA ÜNİVERSİTESİ

P-0237

Decorative Rug Development

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Kadifeteks also steered towards new areas in addition to classical products in order to reinforce its leading position. As a result of the researches on new areas in terms of new products that can be produces at our plant, we have come to conclusion that production for carpet industry can be made using existing yarns and machinery. Standard carpet production is made by creating face to face weaving lattices with pile and base yarns. Basic assessment criteria for a standard carpet are; density of knots per centimeter, pile height and technical specifications of the used materials. Therefore, production of this type of carpets are high in cost and difficult both in terms of substance and production process. On the other hand, carpet's heavy weight, difficulty of cleaning, inability to wash in washing machine and easy bacteria growing potential due to piles are disadvantages of carpets. Therefore, we anticipate that development of a lightweight carpet with low cost, easy to clean, washable in washing machine will make difference in the market.

In this project, the goal was to create base and pile structure which is important for a carpet on standard weaving machines without using carpet looms. It is decided to use a thick chenille yarns for pile surface and thinner yarns for base surface. Sample lightweight carpets are woven on standard weaving looms using yarns in different thicknesses. In order to facilitate stability of these samples and give features of a carpet, coating and lamination treatments are made on the back of those fabrics. In the trials, different attributes are achieved using different materials in lamination and coating chemicals on the initial group of samples.

Keywords: decorative rug, easy clean, Light carpet

P-0238

Development of New Upholstery Fabric by Giving Radiance Feature to Upholstery Fabric

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Velvet fabric is produced on face to face weaving machines at our plant. Polyester and wool blend yarns are used in production of those fabrics. Manufacturing of those products at the same costs with the far eastern manufacturers that are using the same method does not seem feasible under current competition conditions. Here, the most significant factors are raw material, workmanship and energy costs. Therefore, this project is designed to give appearance of classical velvet fabric to upholstery fabric produced using chenille yarn on flat weaving machines as an alternative to classical velvet production method.

In the project, it is decided to use noodle effect chenille yarns depending on different fabric constructions. As known, marks in the directions of weft and warp on fabric surface cannot be avoided in classical production method using those types of yarns. Therefore, considering thermal behavior of textile fibers, it is aimed to increase volume of fabric surface appearance. The main objective here is to primarily identify effects of expansion in textile fibers at certain temperatures on the structures in yarn and fabric form. Thus, it is important to identify steam temperature, thermal and mechanical treatment parameters that will give velvet-like appearance on fabric surface. The basic R&D element of this project lies here.

Both thermal behavior of fibers and behavioral changes in fabric structure against heavy mechanical treatment are evaluated in this study.

Achieved fabric appearances are assessed by comparing to velvet fabrics. The successful results obtained in this project enabled production of low cost velvet-like fabrics that can compete with the far eastern manufacturers as an alternative to velvet fabrics.

Keywords: upholstery fabric, velvet, radiance feature

MARMARA ÜNİVERSİTESİ YAYINEVİ

P-0239

Development of Functional Upholstery Fabric with AntistaticFeatures

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Comfort features of rapidly developing textile industry products have gained importance. Static electric on textile material causes product to attract dust and lint. This impacts both comfort and quality of the product. Therefore, antistatic feature of textile materials gained importance.

In this study; primarily conductivity mechanism and production methods for conductive textile materials are researched. Considering production cost, it is decided to give antistatic feature to textile materials by finishing treatment. Therefore, antistatic finish treatment chemicals are researched in the market. Those chemicals are transferred to fabrics by absorption in 10g/L, 20g/L, 30g/L, 50g/L and 100g/L ratios. Conductivity measurements showed that the best results are achieved with 20g/L and 30g/L ratios. This range is subjected to repeated trials, and optimum results are observed in 25g/L ratio. Those studies are applied to fabrics made of polyester, polypropylene, acrylic as well as their blend. Thus, our organization has become capable of producing upholstery fabric with antistatic features.

Keywords: Antistatic, functional Upholstery, fabric

MARMARA ÜNİVERSİTESİ

[P-0240]

Characteristic Properties of Astrakhan Furs Produced from Lambskins

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Karakul sheepskins have a great importance in world wide double face leather production due to the specific fibre character of the skins. Furs produced from Karakul sheepskins are referred as astrakhan and have a high economic value. This is due to the unique curls, color and the pattern of the Karakul sheepskin fibres. Besides, Karakul is native to Central Asia, the livestock is limited that results higher sales prices to Astrakhan. Therefore in recent years as a result of the developments occurred in fur processing industry, it is enabled to provide the astrakhan appreance to some lambskin types by special manufacturing techniques. Although it is known as some double face factories put the astrakhan manufacturing in practice, there isnt any study found in literature. Accordingly in this study, it was aimed to produce astrakhan furs from lambskins by the design of special production recipes and techniques and to determine the characteristic properties in terms of testing grammage and softness, tensile and tear strengths, water vapor and air permeability as well as rubbing fastness properties. As a result of the study, detailed information about astrakhan furs were achieved that results valuable product manufacturing having special patterns and effects to double face industry.

Keywords: leather, double face, karakul sheepskins, astrakhan

[P-0241]

Increasing Leukocyte Hormone in the Body by Adding Ginger Nanofiber to Artificial Kidney

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Today so many people die because of kidney insufficiency. As a result of scientific work in the USA, artificial kidneys have been produced and it is still being continued to research. In the scientific work, it has been determined that there is a decrease in the leukocyte hormone and there is a decrease in the electrolyte balance in the body of the human who is connected to the dialysis machine. Accompanied by the information about this subject, there is a high amount of leucocyte hormone in the ginger fiber. With the electrospinning method, it will be produced nanofiber production from ginger vegetable. The blood which is cleaned by microchips in the artificial kidney will be cleaned with filtration without being given to the body so that the blood will be fed from the leukocyte. Thus, it may increase the amount of leukocytes in the blood. By increasing the number of white blood cells(leucocyte) in the body, it will raise body immunity.

Keywords: Nano-fiber, ginger fiber, elektrospinning, artificial kidney

MARMARA ÜNİVERSİTESİ

[P-0243]

Printability of Bamboo Jersey Fabrics in Thermal Transfer Printing System

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Thermal transfer printing system, which works transferred onto textile fabric by heat of the image formed in the film material surface, is a printing system used in textile industry. The exactly transferring onto the textile fabric of the image on the film material and the remain stable of the transferred image after the use and washing conditions are an important indication for a quality print. In this study, the main properties of the knitted bamboo fabrics were determined and then, it was transferred of the image in the thermal printing system on the fabrics at 3 different temperatures. And then it was performed the washing process of fabrics before and after printing and measured the values of L*a*b*, the gloss and the light resistance of the printed fabrics.

From the obtained data, the printability of the bamboo jersey fabrics in the thermal printing system and the resistance of the print after the standard washing were determined.

Keywords: Bamboo, Jersey, Thermal print, Printability

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