techtextil
NORTH AMERICA symposium

Techtextil North America Symposium 2010

May 18 – 20, 2010

Techtextil North America Symposium continues to be the industry's leader presenting the best education forum for high-level technical textiles. Renowned international specialists and leading industry consultants cover the latest technology and market trends in a broad range of topics and a variety of formats. The symposium draws attendance from the highest-level industry professionals eager to learn what the experts have to say.

Registration Fees: (Free Expo Hall Pass included with Symposium Pass)

	Before May 14, 2010	**After May 14, 2010**
Exhibit Hall Only Pass:	Pre-Registration: FREE	Onsite: $50.00
3–Day Symposium:	Pre-Registration: $850.00	Onsite: $995.00
1–Day Symposium: (May 18 or 19)	Pre-Registration: $425.00	Onsite: $550.00
1/2–Day Symposium: May 18, 19 or 20 Morning May 18, 19 or 20 Afternoon	Pre-Registration: $300.00	Onsite: $400.00

***Please note that the 2010 Symposium is still in development, so keep checking back for regular updates.*

**** For Academia, Student, Nonprofit or Government agencies, special rates are available. Please contact us at 770.984.8016 x411 for full details.*

Tuesday, May 18, 2010

9:00 a.m. - 11:30 a.m.

Room B401&402

TT01: General Session

Session Chair: William C. Smith, Techtextil North America Symposium Director, Industrial Textile Associates, Greer, SC, USA

The opening session for the Techtextil North America Symposium is a general session, the only one of the morning, and will feature our keynote speaker, along with a panel of industry participants to review the "industry as a whole", the economy, trade, the state of industry and opportunities to expand or enter the technical textiles arena.

► Keynote Address: Textile Trade Trends and Technical Textiles

Kim Glas, Deputy Assistant Secretary of Commerce for Textiles and Apparel, USDOC, Washington, D.C., USA

Ms. Glas will address the range of trade issues affecting the technical textiles industry, and can include some information on the Department's Sustainable Manufacturing Initiative. She will present data on the situation of U.S. imports and exports for calendar year 2009, the leading shippers and markets, and the trends in fastest growing markets. Ms. Glas will discuss the current status of Free Trade Agreements. She will present the common textile and apparel provisions of Free Trade Agreements. Ms. Glas will briefly describe the importance of the Berry and Kissell Amendments to the domestic textile and apparel sector. She will speak about the FY 2010 Congressional grants for this sector. The two new Administrations initiatives: The National Export Initiative and the Sustainable Manufacturing Initiative will be discussed. At the conclusion of her presentation, Ms. Glas will be available for a question and answer session.

► Welcome and Industry Overview Worldwide

Michael Jänecke, Director Techtextil, Messe Frankfurt GmbH, Frankfurt, Germany

The Director of Techtextil shows worldwide gives us an international perspective on the technical textiles industry from his unique vantage point.

► An Update on the Status of U.S. Manufacturing Sector, and Implications for Technical Textiles

Tom Murphy, Executive Vice President, RSM McGladrey, Inc., Minneapolis, MN, USA

The US Manufacturing Sector has seen significant challenges over the last two years seeing production levels decline by over twenty percent and capacity utilization in the seventy percent range. Yet, contrary to public opinion driven by inaccuracies and the lack of fact based media reporting, the U.S. manufacturing sector is still the largest in the world. Another major factor impacting the image of manufacturing is the loss of over 2.1 million jobs since the recession started in December of 2007.

Conventional wisdom would blame this loss of jobs on globalization and the free trade agreements the US has entered into. This could not be further from the truth. The loss of jobs is due to innovation in process and products and capital investments in equipment, lean manufacturing and technology. These investments have paid significant dividends in improved productivity. Never before have we seen this level of productivity improvements during a recession. The US continues to outpace global rivals in the rate of industrial research and development at 2.7 percent of gross domestic product. Manufacturers are the technology leaders among companies with research and development investments as reported by the National Science Foundation. This leadership role is what has kept US manufacturing competitive on a global basis. So, in conclusion, we have made it this far and now need to approach the future with a consistent, steady, methodical approach where we monitor activities very closely and move forward cautiously.

► US Textiles Outlook and the Importance of Technical Textiles

David Trumbull, NTA Vice President of International Trade, National Textile Association, Boston, MA, USA

With U.S. free trade agreements in effect with 17 nations and concluded or in process with about a dozen more, the complexities of international trade mean that member companies of NTA will continue to rely on their trade association to represent them in negotiations and explain to them how the rules of these agreements affect their businesses. NTA has emerged as one of the “clearing houses” for information on regional availability of fabrics with the several trade agreements. Foreign trade zones within the U.S., formerly not an option for most textile products, now pose new challenges, and perhaps opportunities for U.S. textile companies. NTA staff regularly advise the U.S. government both as regards import policy and how best to promote U.S. exports of textile products.

► The REAL State of the Industry 2010 - What have we learned?

William C. Smith, Techtextil North America Symposium Director, Industrial Textile Associates, Greer, SC, USA

Make no mistake, many undercapitalized, less innovative and smaller companies are having a very difficult time. We can't and shouldn't candy coat things, we must be realistic. But many companies are reinventing themselves, even smaller ones. The major ones prepared for this downturn long ago by stepping up R&D, reduced expenses, and/or moved into new areas, new markets. While their core/traditional business is down, they are doing reasonably well. How is the technical textiles industry coping? What have we learned? What markets offer opportunities? There are no miracle product/markets out there. It will be a challenging and slow recovery, and we must take a deliberate and patient approach. We'll look at some of these efforts and some of the developments and markets that may offer opportunity, if you are willing to work for them.

1:30 p.m. - 4:00 p.m.

Room B405

TT02: Technical Textile Research

Session Chair: Dr. Martin Jacobs, Executive Director, National Textile Center, Spring House, PA, USA

The National Textile Center again participates with Techtextil North America in presenting the latest, most relevant work being done by the National Textile Center Universities. Always one of our most popular sessions highlighting research in our industry that will drive developments to improve materials and make possible new products. The final selection of topics and presenters will be determined by the National Textile Center at a later date based on status of the projects and relevance of the work, but it is anticipated that research currently being done in the fields of biomedical textiles, energy, biohazards, environmental, and textile manufacturing (high-tech process control) will be presented. An added feature this year will be a number of poster sessions highlighting the work of students in the field of technical textiles, whether or not they are part of the National Textile Center.

► Technology Transfer at the National Textile Center

Dr. Martin Jacobs, Executive Director, National Textile Center, Spring House, PA, USA

Opportunities for effectively transferring the technology generated by NTC research to companies in the Industry will be presented. These include information exchange with project teams, direct participation on project teams, and membership on NTC committees.

► Molecularly Imprinted Fibers with Recognition Capability

Bogdan Zdyrko, Ph.D., Research Assistant Professor, Clemson University, Clemson, SC, USA

Several ways to obtain fibers with recognition capacity have been explored. We have used atom transfer radical polymerization (ATRP) to prepare molecularly imprinted polymer networks (MIPs) on flat model surfaces and PET textile material with enhanced binding of the template molecules. A second method, which has been explored, is a surface protein imprinting employing polymer brushes. We also explore possibility to prepare alginate fibers with protein recognition capacity.

► Cellulose/Soy Protein Based "Green" Composites

Dr. Anil Netravali, Cornell University, Ithaca, NY, USA

BC is a ‘green’, biodegradable/compostable material with unique properties and promising applications. Inexpensive ‘green’ carbon sources obtained as waste or by-products from food production processes were utilized in BC production. The individual sugar components present in the carbon source and the individual component consumption pattern during fermentation is being studied using HPLC. In addition, a process was developed to modify natural fibers such as sisal using BC. BC was impregnated with soy resin to form ‘green’ nano-composites with good mechanical properties.

► Engineered Reinforced Structures from Short Fibers

Yong K. Kim, Ph.D., Chancellor Professor, University of Massachusetts, Dartmouth, MA, USA

NTC sponsored research on the electrostatic orientation of fiber in the fabrication of special fiber oriented non-woven fabrics and laminar composites has been extended into applying this technology to the field of high performance bulk and sheet molding compounds (BMC and SMC). Previous experimental results have proven some concepts of electrostatic principles for achieving the directional orientation of fibers in the web. Beyond the use of electrostatic principle to orient the short fibers (length less than 6mm) in flocking, the longer (10 -30 mm long) fibers can be oriented using electrostatic forces and fiber webs of these oriented fibers can be formed. The most important factors in fiber orientation are electrostatic field density and the length of the fibers.

► Electrospun Composite Nanofibers for Lithium-Ion Batteries

Xiangwu Zhang, Ph.D., Assistant Professor, North Carolina State University, Raleigh, NC, USA

In this project period, LiFePO4/C composite nanofibers were synthesized by using a hybrid method, which is based on a combination of electrospinning and sol-gel techniques. Polyvinyl alcohol (PVA) was used as polymeric matrix of the LiFePO4/C composite system, and they were eventually converted to carbon during a calcination/carbonization step to improve the conductivity of LiFePO4 nanofibers. LiFePO4 precursor and polymer matrix solutions were prepared separately and mixed before electrospinning. SEM analysis was carried out to investigate the effect of solution composition on the morphology of nanofibers before and after calcination/carbonization.

► Logistics of Closed Loop Textile Recycling

Jeffrey A. Joines, Ph.D., Assistant Professor, North Carolina State University, Raleigh, NC, USA

Designing and optimizing the supply chain has become a priority of the US textile complex. However, the focus has been primarily on forward supply chain operations, with little consideration of utilizing recovered products or recycled raw materials and the reverse supply chain. As such, many of the current networks and/or products are currently not suitable for closed loop recycling. Developing closed loop recycling systems has the potential to have a significant positive environmental impact, and, if efficient, a positive impact on revenues of textile company. Developing an efficient closed loop recycling system for textiles involves both creating processes to transform the used material into a desirable output. This project will investigate and focus on setting up and operating appropriate manufacturing and logistics distribution structures.

► Challenges in Advanced Nanofiber Wound Dressings

Marian G. McCord, Ph.D., Associate Professor, Textile Engineering, Biomedical Engineering, North Carolina State University, Raleigh, NC, USA

Conventional textile-based wound dressings are cost-effective and highly absorbent, but used alone, fail to provide optimal wound healing conditions (hemostasis, non-adherence,

maintenance of a moist wound bed, etc.). Modern wound dressings often incorporate multiple non-textile components (films, gels, antimicrobials, and biological) that provide advanced functionalities at a significantly higher cost. Electrospun nanofiber dressings have demonstrated the potential to revolutionize wound care by providing significantly enhanced moisture management, barrier properties, and bioactivity. Nanofiber webs are inherently weak and difficult to handle. Deposition of electrospun nanofiber coatings on a conventional textile bandages addresses the need for structural support, but faces challenges. These issues may be addressed.

Room B406

TT03: Natural Fibers and Sustainable Materials in Technical Textiles

Session Chair: Edward Gregor, President, Edward C. Gregor Associates, LLC, Charlotte, NC, USA

Use of sustainable materials in Technical Textiles is becoming an important issue in our industry. While synthetic fibers dominate, natural fibers, such as flax, cotton, and kenaf, among others, are still widely used and are 'making a comeback' in many areas. Others, like PLA fibers, though, man-made materials, are also sustainable. Important differences between "sustainable" and "green" are noted. Natural and sustainable fibers have an important role in technical textiles. Included will be unique applications, including those in composites.

► Sustainability…Shades of Green: An Introduction

Edward Gregor, President, Edward C. Gregor Associates, LLC, Charlotte, NC, USA

There are many definitions and opinions of what a biopolymer is and what constitutes sustainability. The moderator of the session will briefly define and set the stage for the session, including the most common accepted definitions of biopolymers and sustainability.

► The Advantages of Flax and Natural Fibers in Composites

Stuart Smith, Business Unit Manager, Norafin GmbH, Allschwil, Switzerland

The use of various natural fibers in the manufacture of technical textiles and nonwovens addresses the needs of our times. It is very important to provide materials with functional and environmentally friendly product solutions. Flax has naturally given strengthening qualities, low weight when compared to carbon or glass fibers, and good vibration absorbing properties. The processing of flax fibers presents a meaningful alternative to synthetically manufactured fibers depending on the objective. Flax could be used in a composition with a material structure or in combination with other natural fibers. The advantages of flax fibers, an in-depth presentation of possible applications, as well as the special treatment of flax fibers in the production process will be presented using different examples.

► Sustainable Alternatives to PVC for Contract and Coated Fabrics

Edward Gregor, President, Edward C. Gregor Associates, LLC, Charlotte, NC, USA

Flexible PVC has an excellent reputation with many end-uses in technical textiles. It's an ideal material with diverse properties and is un-matched for its combination of weathering properties, ease of processing, including printing, colorability, flame retardant properties and low-cost and has become a mainstay throughout the industry. In spite of flexible PVC's wide use there are concerns about potentially toxic ingredients, such as phthalates, heavy metals, dense smoke upon burning and vinyl chloride. Now, a flexible thermoplastic olefin (TPO) is available that equals or exceeds the properties of flexible PVC without detectable toxic materials, such as halogens or heavy metals often found in PVC. This paper will describe in detail the TPO along with it's outstanding weathering, equivalent range of shore hardness, flexibility and hand (tactile) and flame retardant properties. Also, embossing and printing, colorability, non-yellowing properties while retaining the inherent properties of the polyolefins, allowing for optimal mechanical properties.

► Bio-Resorbable Implants for 21st Century Medicine; Opportunities and Challenges

Robert F. Valentini, MD, PhD, President, Concordia Medical, Warwick, RI, USA

With an active and aging world population, the market for fiber-based medical implants is established and growing. Textile scaffolds and structures that support tissue repair, deliver cells or therapeutic agents, and can be delivered using minimally invasive or interventional approaches, are at the core of most devices in this space. This is particularly true for bioresorbable implants which are degraded by the body once their function is complete. Potential products target the repair and regeneration of a range of tissues including tendon and ligament; bone and teeth; the heart and vascular system; and non-healing lesions of the skin. Balancing these needs and opportunities are a number of important challenges that may limit the development of new bioresorbable, textile-based medical products. Challenges include; limited availability of novel polymers and fibers, increased product development costs, difficulty in obtaining regulatory approval, and the battle for reimbursement from payers.

► Greener Technical Textiles – With Zero-Emission Thermoset Technology

Gero Nordmann, Market Development Manager, BASF Corp., Charlotte, NC, USA

In today's environment, there is an ever increasing desire to 'circle the square' reaching high-performance, durability, light weight and manufacturing flexibility without increasing or even trying to lower overall system costs. This presentation will discuss a new enabling technology platform engineered towards these ends: cross-linked acrylic thermosets. These are zero-emission systems which contain no volatile or hazardous components at any stage of their life cycle. They are easy to use and ideally suited for today's 'greener' technical textiles. Their application potential in natural fiber as well as other fiber materials will be outlined in the presentation.

Room B407

TT04: High Performance Narrow Fabrics

Session Chair: Louis Franconi, Vice President, Bally Ribbon Mills, Bally, PA, USA

We often think of narrow fabrics as straps and tie-downs, but there is more to it. These materials (defined as fabrics, woven, knit, or braided, of 12 inches or less) make an important contribution in many areas such as FR materials for fire service and other areas, for medical components, for use in aerospace, safety systems, and the like. Some topics in development: three dimensional woven structures, safety & fall protection - narrow fabrics to meet the new e-6 specification, and narrow fabrics in medical devices.

► Three Dimensional Woven Fabrics - Quad Axial Isotropic Woven Narrow Fabric Structures

Louis Franconi, Vice President, Bally Ribbon Mills, Bally, PA, USA

Traditionally woven fabrics were limited to simple, flat two-dimensional fabrics woven in the 0 (warp) and 90 (weft) degree direction. As shuttle looms became more consistent, weavers figured out how to construct seamless tubular structures that found use early on as replacement arteries, veins and stents. Gradually, over time weavers found ways to modify typical narrow fabric gang looms such that they were able to produce 2 and even 3 dimensional structures in complex shapes such as “H”, Cruciform, “T”, “I”, “V” Sections, etc. These innovative shapes found new ways to provide a lightweight solution to technical textile applications by featuring structures having high fiber volume, a reduced number of layers and a significant increase in strength. For the first time methods of producing near net shapes, yielding anatomically correct structures, that could be made into medical devices and for use as replacement parts for the human body. Ways of producing these structures and the structures themselves will be discussed. Of particular interest to most audiences will be a specially constructed Quad Axial Isotropic loom able to weave product in the 0, 90, +/- 45, (bias) degree direction as well as in the “Z” (binder) direction.

► Narrow Fabrics used in Medical Device Development

Robert Torgerson, Senior Development Engineer, Direct Flow Medical, Inc., Santa Rosa, CA, USA

Medical devices are looking at nano technology, coatings, laminates, and other concepts that will bring the next generation of devices to meet the marketing demands. Don’t be afraid to look outside the box (look at other industries) for ideas to help with solving problems and create the next generation of medical devices. If you are in the business of developing medical devices that use narrow fabrics, challenge your supplier to help with the development of your device. They may have a little secret that will help in your solution to your problem. May need to look outside your company to people that have been in the business a long time to give that extra bit of experience that may be needed with creating the solution to your problem.

► Liquid Crystal Fibers in Narrow Fabric

Forrest Sloan, Ph.D., International Marketing Manager, Kuraray America, Fort Mill, SC, USA

Wholly aromatic polyester LCP fiber is one of several high performance fibers used in fabric and webbing applications. Each fiber type brings a balance of properties and difficulties, and as a result these fibers are used in a wide range of end uses. The purpose of this presentation is to compare and contrast the properties of the various fibers with possible end uses, highlighting those areas that are most appropriate for the given fiber type. Test data from different fiber types in similar webbing constructions are presented and discussed.

► Braiding, A time Tested Technology - Principles, Applications and Solutions for these Modern Times

Joseph Loos, General Manager, Barbett Industries, Reading, PA, USA

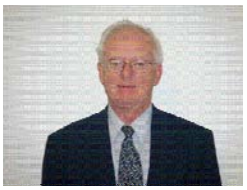
Braided structures can be used in a wide array of finished product. Stretch cords, drawcords, RickRack, soutach, cordedge, striper bands, curly cord and mushroom cord are many different braided products that are used to solve specific application problems. Discussion will be centered around plain braids, diamond braids, Three Horned Plain braiding, flat and Hercules patterns, as well be the major parts of a vertical Maypole Braider. Yarns influence the braided structure in many different ways. Fill or weft yarns give body to a tubular braid and help it maintain its round shape. Fill yarns, which are pulled to the center of a tubular braid, are totally encapsulated by the braid structure. Warp yarns are directed thru the center of each quiot. Quiots make up the inner circle of the figure 8 track that each carrier follows. Warp yarns make for a good means of controlling the “Chinese Handcuff” effect and thereby braid elongation when under tension. Warp yarns can also give body and mass to braids that would otherwise be considered thin and flat. Many flat braided products are referred to in terms of “lines”. The term “line” will be discussed, as well as how it has an effect on braid size.

Wednesday, May 19, 2010

8:30 a.m. - 11:00 a.m.

Room B405

TT05: Military – Developments to Impact the Industry



Session Chair: Eugene Wilusz, Ph.D., Senior NBC Scientist, Warfighter Science, Technology and Applied Research Directorate, Natick Soldier RD&E Center, Natick, MA, USA

Always the most popular session at the Techtextil North America Symposium. For 2010, we include a session on doing business with the government with a speaker from DSPC. Other subjects under development include a variety of subjects: ballistics, chemical, FR, etc. A special talk will focus on customization of nonwoven military uniforms – is this the future?

► Doing Business With the Defense Department

COL Kurt D. Wilson, Director Clothing and Textiles Directorate, Defense Supply Center, Philadelphia, PA, USA

Key areas of working with the Defense Department will be covered. Some of the areas will include an overview of the Defense Supply Center, Philadelphia and its recent reorganization, the key points of contact and a review of how they do business. Also covered are some changes to improve efficiency, including a review of the DSC Life Cycle Logistics model and their use of Radio Frequency Identification and the plan to institutionalize it across the supply chain.

► Mass Customization Of Nonwoven Military Uniforms

Dr. Hoon Joo Lee, *Assistant Professor NCSU, Raleigh, NC, USA*

This research deals with the design of textiles and clothing systems with the aim of increasing protection against hazardous chemicals while reducing thermal burden. We design a combat uniform made of hydroentangled nonwoven fabric grafted with fluorosilane and make it superhydrophobic and superoleophobic. Developing a new class of military uniforms produced with computer-aided technologies and nonwoven materials, which need advanced manufacturing facilities instead of human resources, could be a stepping stone for the production of a new-generation of military uniforms.

► Fibrous Armor Developments

James N. Singletary, Research Associate, DuPont Protection Technologies, Richmond, VA, USA

Ballistic resistant helmets are typically designed to stop pistol bullets and fragments from bursting munitions. Their protective ability is most easily characterized by the likelihood of a projectile to arrest inside the helmet shell at a given impact velocity. Helmet shells made from composites of high strength plastic fibers such as para-aramids and extended chain

polyethylene (ECP) woven or direct formed fabrics can offer very high ballistic penetration resistance per weight, and have been commonly used in police and military helmets since the 1980s. We present results of a combined numerical and empirical effort to combine improved penetration resistance against pistol bullets and fragments offered by new armor composite materials with acceptable dynamic deflection. Facing a lack of medical consensus on acceptable dynamic deflection, we first benchmark the performance of incumbent helmet designs that have been used extensively by military and police. We then compare the penetration resistance and dynamic deflection of single- and multi-component helmet designs with newer, higher performance armor composites to this benchmark, using finite element modeling, crater depths left in clay head forms, and high speed movies of impacted helmets deforming in air. We use the results to elucidate trends in relating laminate mechanical properties to penetration resistance and dynamic deformation, and to demonstrate helmets using new materials that combine improved penetration resistance and equivalent dynamic deflection compared to incumbent designs.

► Development of Nonwoven Fabrics for Military Applications

Stephen P. Szczesuil, Textile Technologist, US Army Natick RD&E Center, Natick, MA, USA

The United States Marine Corps has taken the initiative to develop state-of-the-art nonwoven composite fabric technology for use as alternate fabric application for Combat Utility Uniforms (CUU's), equipage, shelters etc. This effort is being conducted via a Small Business Innovative Research (SBIR) contract. The objective of the SBIR is to utilize latest nonwoven technology to enhance performance and reduce lifecycle costs for combat type clothing. Concept includes development of lightweight composite material that offers high durability, high breaking and tearing strength, breathability, and cost reduction to replace current woven uniform material. Included is to design a Fire Retardant (FR) fabric and heavy-duty fabric for tentage and equipage applications. Nonwovens will be considered for disposable FR Medical, cook uniforms, Navy Shipboard uniforms along with Air Force and Coast Guard uses.

► Nanofiber Media for Protection against Hazardous Aerosols

Dr. Howard Walls, RTI International, Research Triangle Park, NC, USA

Aerosols or airborne particles (including pathogenic microorganisms and liquid droplets of chemicals) can be a significant threat to people in certain environments (e.g. soldiers, first responders, and healthcare workers). Two significant parameters in designing personal protection equipment for hazardous working conditions are the burden on the user and the level of protection provided. Electrospun nanofibers have the potential to significantly reduce burden while maintaining necessary protection for users of personal protective equipment. Our electrospun nanofiber media has demonstrated HEPA efficiencies (99.97% for 0.3 m particles) at half the pressure drop of commercial fiberglass HEPA media. The nanofiber media can be operated at higher flow rates than fiberglass HEPA and is able to withstand exposure to dust, chemical vapors, and some oils. On going work is improving these materials to be robust enough for real-world use.

Room B406

TT06: Filtration - Practical Opportunities in Nonwovens

Session Chair: Dr. Behnam Pourdeyhimi, Distinguished Professor, Executive Director of Nonwovens Cooperative Research Center, The Nonwovens Institute, North Carolina State University, Raleigh, NC, USA
Developments and opportunities for nonwovens in a broad range of technical filtration applications with a focus on the "hot topics" of *clean air, clean water and safe blood*. A look at some of the work of the Nonwoven Institute in these areas as well as commercial introductions.

► The Affects Of Increased Surface Area Media On Air Filter Performance

Dave Healey, Director, Synthetic Technology, Hollingsworth & Vose Company, East Walpole, MA, USA
A new filter media design has been developed that takes advantage of added surface area for filtration in an HVAC Bag filter media (and potentially other filter applications). Due to design limitations the amount of “standard” media that can be incorporated into a filter is limited for HVAC Bag filters. The size of the duct limits the number of bags and the width of the bags while the proper opening of the bags limits the length of the bags. As the bag length or the number of bags is increased at some point the improvements gained from added surface area are lost due to the losses from the filter design. These limitations have led to a relatively stagnant performance level in this filter design area. A new filter media design (NanoWave®) eliminates concerns of charge decay by providing a stable mechanical efficiency while lowering pressure drop and simultaneously increasing dust holding capacity. The unique and innovative NanoWave® design utilizes a fine fiber structure and forms a three dimensional structure where the surface area can be increased by as much as 3 times that of a standard two dimensional fine fiber media.

► Super High Surface Area Fibers

Carol Clemens, President, Allasso Industries Inc., Raleigh, NC, USA
This presentation discusses the creation of super high surface area fibers, their features and benefits and the applications areas that can be enhanced with the use of such fibers. The fibers are produced using a bi-component spunbond process resulting in unique fiber shapes. The fibers provide large surface area, are stronger and more economical to produce than most microfibers and provide a high surface to volume ratio. Fibers can be formed using a variety of polymers and an extractable polymer. The fabric produced from these fibers exhibit many advantages such as improved the water absorption, greater filtration efficiency and high wicking capabilities. To date, the fibers have only been used to produce engineered fabrics, but trials using knitted and wovens materials are on the horizon.

► Measured Breathability In A Composite

Mike Budai, Coating and Laminating Manager, Dynatec, Inc., Hendersonville, TN, USA
This discussion will review the latest in hot-melt lay down technologies being utilized in the development of nonwoven filtration composite products. The key to successful use of these

technologies is to create composites without sacrificing fluid flow or breathability, provide a measured repeatable flow of the composite and yet do this at faster production speeds. This technology will also produce tri-laminates with a scrim insert in a single pass. This is accomplished thru the use of a fiberized spray of very fine monofilament fibers of thermoplastic polymers. In addition these technologies can be used to reinforce a lightweight nonwoven to enable pleating without the addition of a scrim. This is done by strategically placing beads on the surface of the material. The coat weights can be as little as 1-2 GSM allowing more pleats per inch, or heavier coat weights to provide structural integrity to the composite and yet maintaining soft hand. Coat weight accuracy can be within 1/2%. This process is non contact and will not affect the surfaces of any substrate.

► Durable Elastomeric Microfiber Nonwovens

Nagendra Anantharamaiah, The Nonwovens Institute, North Carolina State University, Raleigh, NC, USA

Multilobal fibers have traditionally been used to impart functionality like better absorbancy or conductivity. Modification in the polymer feed and cross-sectional geometry enables better spinnability and imparts better physical properties. Trilobal fibers have been used in the carpet industry to add finishes for prevention of soiling or staining. Spunbonding process using bicomponent filament technology, where two compatible polymers are extruded together to produce continuous filament webs has been discussed. This process of nonwoven fabric manufacture combined with the fiber fracturing process using Hydroentangling is discussed. In particular, this paper deals with using the modified Tipped-Trilobal filament cross-sections to spin elastomeric polymers. This type of cross-section also enhances the fracturing of such filaments to produce microfiber webs that have considerably higher surface area, which are flexible and highly durable.

► Aerosol Filtration Properties of Electrospun Nylon-6 Nanofiber Webs

Bong-Yeol Yeom, The Nonwovens Institute, North Carolina State University, Raleigh, NC, USA

► Functional Fiber Coatings Based On Adsorption Of Denatured Proteins

Jan Genzer, Chemical and Biomolecular Engineering, Celanese Professor, NCSU, Raleigh, NC, USA

We describe a robust and flexible approach for tailoring the surface properties of hydrophobic fibers though adsorption of denatured proteins. We will demonstrate that he protein coating provides a flexible platform for rendering the surface of the modified fibers hydrophilic and endowing the fibers with unprecedented functionality. In our presentation we will discuss the results of a few selected case studies involving the modification of model hydrophobic surfaces and polypropylene fibers by means of lysozyme and fibrinogen coatings. Specifically, we will demonstrate that coatings functionalized by denatured lysozyme overcoats are capable of scavenging heavy metals from waters and can be used as attachment points for metallic particles that may provide special biological functions (i.e., antimicrobial properties). We will also show that the adsorbed protein layer can facilitate attachment of polymerization initiators that are subsequently used to grow long polymer chains via surface-initiated (“grafting from”) polymerization.

Room B407

TT07: Unique Fiber and Yarn Developments

Session Chair: Gerald Mauretti, President, EY Technologies, Fall River, MA, USA

Not the normal review of high performance fibers, this session will discuss the development of some of the exotic, but *useful and practical fibers,* and for unique and special yarns for demanding applications. Areas such as nanotechnology in fibers and yarns and additives to impart special properties such as antimicrobial and antibacterial, conductivity, added strength will be discussed.

► Conductive Polyblend Fibers Made Of Polyamide-6/ Polypropylene/ Polyaniline For Smart Textile Applications: Electrical And Mechanical Properties

Azadeh Soroudi, Researcher-Polymer Technology, School of Engineering, University of Boras, Boras, Sweden

This study discusses the preparation of conductive polyblend fibres made of three different polymers; Polypropylene (PP) and polyamide-6 (PA6) as two common textile grade polymers and Polyaniline (PANI) as an intrinsically conductive polymer (ICP). A commercial melt processable polyaniline-complex (Panipol CXL) was used to prepare both PP/PANI and PP/PA6/PANI blends. In PP/PANI binary fibers, the highest conductivity is observed in fiber prepared at the draw ratio of 2, whereas ternary blends of PP/PA6/PANI show the maximum conductivity in fibers prepared at draw ratio of 5. A smoother surface and less diameter variation was observed in SEM micrographs of fibers prepared using a ternary blend of PP/PA6/PANI than those of the PP/PANI fibers. Mechanical properties of the prepared fibers were quite promising to be used in a knitted network.

► Zero-Halogen FR-PET Filament That Will Not Generate Flaming Drips

Ming-Ming Chen, Global Technologist, Federal-Mogul Corporation Systems Protection, Exton, PA, USA

In response to regulatory requirements, customers' demands and the lack of commercially available flame retardant PET (FR PET) filament that will not generate flaming drips when burned, a development project has been initiated to make a zero-halogen FR-PET filament that will meet UL1441 VW-1 flame test requirements and has low smoke density and low toxicity. The protection project team has successfully formulated and compounded a zero-halogen FR PET resin utilizing melamine based FR additives and extruded this compound to a continuous monofilament. Further work involves developing a robust process for commercializing this compound into a monofilament

► Highly Conducting Micro Fibers For Wearable Electronics

Willorage Rathna Pererâ, Ph.D., Engineering Director of New Product Development, EY Technologies, Fall River, MA, USA

The integration of electronics functionality to textile structures (electronic fabrics) offers a new and unique way to fabricate wearable military and commercial systems that sense,

communicate, compute, and carry power and data both on the battlefield and on the work environment. In e-fabrics, textiles provide the lightweight and comfort while embedded conductors provide the conductivity with secondary consideration given to properties such as conformability. The e-fabrics with attached cables have already been introduced, but they do not exhibit intrinsic qualities of textiles and have difficulty gaining user acceptance. With technological innovations appearing in both textile and electronics, electronic manufacturers are eager to introduce e-fabrics based wearable computers without attached cables. One major hurdle in producing e-fabrics is the lack of ultra fine conductors. To date, fine wires have not been commercialized due to many manufacturing challenges.

► Unique Microstructural Features of Innegra™ High Modulus Polypropylene Fibers
Brian G. Morin, CEO, Innegrity, LLC, Simpsonville, SC, USA
Innegrity has developed a new class of high modulus polyolefin multifilament yarn, which possesses an exceptional combination of high toughness and low weight. Produced at relatively high throughputs from commodity polymers, the cost/performance benefits of the yarn are substantial when it is used in tough, impact resistant composites where glass, carbon and aramid fibers are traditionally used. The high-modulus/low-density properties of Innegra S filaments arise from a number of unique structural and morphological characteristics imparted by Innegrity's novel fiber forming process. The purpose of the presentation is to describe these characteristics in relation to fiber properties and to highlight structural differences between Innegra S high modulus iPP (HMPP) fibers and conventional iPP fibers.

► Advanced Metal Clad Fibers - Meeting Today's Demanding Design Requirements
Jeff Martin, Business Development & Project Manager, Syscom Advanced Materials, Inc., Columbus, OH, USA
As electrical systems become more complex, traditional wire is less and less compatible with new engineering design requirements. Copper and other common electrical conductors are heavy, expensive, and breakable. A conductive metal-clad fiber, a conductive strand formed by adding a metalized coating to polymer fibers, provides a high strength lightweight and flexible alternative to metal wires. By diameter, conductive metal-clad fibers may be less conductive than a solid copper wire; however, these fibers have the ability to carry a current and can be engineered to fit a designed resistance. Coupled with strength greater than six times that of copper, lightness and flexibility, this is very useful in applications wherein electronics battle small spaces and severe stress.

► Advances in Metal Fibers
Pol Speleers, Product Market Manager, Bekaert Corporation, Zwevegem, Belgium
Conductive metal fibers are used in many textile applications where electro-conductivity or heat resistance are needed. By forming a conductive path in the textile fabric, static electricity can be discharged through the fabric to the ground. These fabrics can also reflect or absorb electro-magnetic waves radiated by an external source. Up to 30% of these metal fibers blended into a yarn, can give 40dB shielding effectiveness. A small volume of short metal fibers mixed with plastics during extrusion molding, can give plastics intrinsic electro-

magnetic shielding properties Electro-conductive yarns made from metal fibers can also act as resistance wire in heating textile fabrics. Depending on the power output needed, the percentage of metal fiber can be adapted into the fabric. Their unique chemical resistant properties makes them very suitable to use in any environmental condition.
This presentation will further highlight the unique characteristics of these metal fibers and the use in technical textile applications.

1:30 p.m. - 4:00 p.m.

Room B405

TT08: New Product Development

Session Chair: Jim Kaufmann, T.E.A.M. - Textile Engineering and Manufacturing, Woonsocket, RI, USA
In this recessionary time, it seems every forward thinking company is, or should be, focusing on developing new products - what will be the next product or variation needed to continue, compete, and grow. Often misunderstood and poorly done, the question is how to do it most effectively. That is the focus of this special session, expected to be one of our most popular. Look at product development as expanding your base, prepare for the future, and "growing where you are planted" – or expand and work with what you know best.

► New Product Development - Building Your Future
Jim Kaufmann, T.E.A.M. - Textile Engineering and Manufacturing, Woonsocket, RI, USA
The rate of new product development throughout all aspects of industry appears to be increasing exponentially every year. Conservative estimates suggest that 50 years from now, at least 75% of the products we produce will be obsolete, radically different, or will have been reduced to commodities. History shows that for a typical company, almost half of its sales 5 years from now will come from products that do not exist today. For example, thirty years ago the World Wide Web didn't exist. Today we can't live without our Internet access. Twenty years ago, most people had never heard of an airbag in an automobile. Today every car produced has at least two of them. Ten years ago, Palm held a 90% share of the market for PDA's (personal digital assistant) and everyone had to have one. Today Palm's share of the "smart-phone" market is approaching 3%. Very few recognize the "PDA" as a standalone market any longer. Five years ago, few knew what an I-phone was. Today it has 18%+ of the smart-phone market and most of us want one even if our service providers don't.
The goal of this presentation will be to introduce or hopefully re-introduce everyone to the need for innovation and new product development as a vehicle for building and brightening a company's future.

► Innovative, Customer Driven Product Development

John Wilson, The Quantum Group, Colfax, NC, USA

Innovative, customer driven product development has been a major ingredient in the success of new products. Product development, as vital as it is, is but one part of an innovation process that touches all aspects of the company's operations. This presentation looks briefly at all the elements of one innovation process but focuses on the portion devoted to product development. The review of the product development process will touch on identification of market and customer requirements, matching materials to application needs and tuning manufacturing methods to insure segment leading quality, total customer satisfaction and reinvestment-level margins.

► Developing Multifunctional Technical Textiles

Sean Hsu, Vice President, King-Tech Industries, Inc., San Diego, CA, USA

In addition to traditional fabric functionalities, new and evolving technologies ranging from high-visability and breathability to flame resistance and anti-germ characteristics can add numerous attributes to a fabric's functionality creating "technical", "specialty" and "high performance" products. But, is there such a thing as too much functionality? A new methodology will be discussed to help the designer/manufacturer's selection process and provide an understanding of when to say when.

► Incorporating the Supply Chain Into New Product Development

Joe Walkuski, TEXbase, Inc., Bozeman, MT, USA

Product development teams throughout our supply chain are certainly feeling pressured these days, with the top three factors being:

1. Internal pressure to create innovation while simultaneously reducing cost
2. A constantly shifting and shrinking supply chain
3. Legislation such as Reach and CPSIA

In order to be successful in today's environment, effective product development processes must include strategic supply chain relationships. It is the responsibility of leaders from both sides of the transaction to create an environment that facilitates clear and concise communication such that both supplier capabilities and buyer requirements are clearly understood by both parties.

► Challenges of Marketing New Products

Konstantin Goranov, General Manager, Salutaris, Atkinson, NH, USA

Traditionally, effective marketing strategies are based on market trends and an understanding of how the product fits customers' needs. Although this approach is applicable to the growth and maturity stages of the product lifecycle, it is difficult to collect accurate marketing information for products with new attributes and functionality. In most cases, the market managers and product development teams have to make numerous assumptions on the desired product performance and target applications. To minimize the risks of product launch failures, a set of specific metrics should be incorporated in the marketing plans for the initial stage of product introduction.

► Protecting Your Intelligent Property and Technology

Darrel Collier, Managing Director, International Market Solutions, Waxhaw, NC, USA

If product development and intellectual property (IP) is your companies' life blood, shouldn't you be aware how protect those assets? Shouldn't you understand the basics of safeguarding those valuables from a global perspective? This paper discusses the important topic of protecting your companies' IP from a business or technical leaders' perspective. It will cover basic aspects of the different legal systems in the world and how to protect your assets in each of those systems. This overview is for everyone in the company that has responsibility to protect a companies' IP including sales, marketing, technical, and manufacturing personnel (not your companies' lawyer).

Room B406

TT09: Protective Textiles

Session Chair: John Wasylyk, Vice President, Innovative Textiles, Inc., High Point, NC, USA

Though protective and safety textiles have been consistently included in this Symposium, this special session will focus on emerging markets, such development of retro-reflective fabrics for public/personal safety, soft body armor & standards, NBC, and arc-over protection, among others.

► Emerging Markets for Retro-Reflective Fabrics and Public Safety

Tom King, President, King Tech Industry, Inc., San Diego, CA, USA

Since invented, retroreflective clothing has become a very popular occupational and recreational wear, particularly in light of increasingly strict health and safety laws. While retroreflective clothing has been proven effective for enhancing safety, it shall be able to serve a broader spectrum. Most reflective fabrics for occupational and recreational wear market is limited for its stiffness and appearance; decorative but inferior reflective clothing short of safety effect, misleading the users. Participation in the evolving market of reflective clothing, requires knowing how the reflective fabric functions, and designing products attractive to the consumer, encouraging their use. Technical data of field testing as well as statistical and theoretical researches of reflective materials are analyzed in this paper. Design criteria of area reflective fabric and silhouette reflective safety clothing are suggested accordingly. The reflective effect on safety clothing can beneficial only when properly designed, made, distributed, and worn by people.

► R&D Initiatives: Nuclear Radiation-Blocking, Anti-Chemical, Biological Protection Systems

Ronald F. DeMeo, President and Chief Executive Officer, Radiation Shield Technologies, Coral Gables, FL, USA

The threat of nuclear radiation is driving global demand for more advanced personal-protection technologies as a terrorist attack involving a nuclear or radiologic weapon would be catastrophic. Current nuclear, biological, chemical (NBC) suits and personal protection equipment (PPE) available today for first responders offer limited shielding against these and

other threats and have no capability to protect against ionizing radiation. Current PPE's only offer low-energy alpha protection. They allow for heat stress to occur, inhibiting operations among first responders. Research and development efforts have focused on providing a solution to meet the growing threat of nuclear, biological and chemical radiation. This presentation will focus on the development of one multi-hazard protection product capable of addressing every type of threat.

► Arc-Over Protection

Hugh Hoagland, President, Arcwear, Louisville, KY, USA

The electrical industry, in a 10-year study of 120,000 workers found that there were 125 injuries per year, 77% of them were electrical arc injuries, with 21% being permanent disabilities and 2.4% resulted in fatalities. New regulations and standards are being developed by such bodies as NFPA in US, the CSA in Canada, IEEE/ANSI, in South Africa and other international bodies. This presentation explores the advances and challenges for PPE in electric and opportunities for textiles in this growing international market. The paper explores the cross-pollination effect of arc flash research on flash fire, combustible dust, and military applications. Many test methods will be reviewed and testing shown.

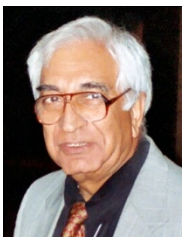
► Hypodermic Needle Puncture

John Cronin, North American Body Armor Market Manager, Warwick Mills, Inc., New Ipswich, NH, USA

According to the Centers for Disease Control and Prevention (2001), occupational exposures to blood-borne pathogens (BBP) from percutaneous needle-stick injuries are a concern for healthcare workers, public safety officers and others. Transmissions of life-threatening viruses, like Human Immunodeficiency Virus and Hepatitis C, as a result of needlestick injury, have been documented world-wide (Prüss-Ustün, 2005). To reduce occupational infections, US Federal Public Law 106–430 (2000) was passed; requiring employers to implement engineering controls and work practice safety procedures to eliminate hypodermic needle-sticks. The law is specific to the health-care industry however, the increased attention and questions about general compliance prompted revisions to OSHA regulations with much broader application.

Room B407

TT10: Nonwoven Technology Update



Session Chair: Dr. Subhash K. Batra, Principal, SKB Associates, LLC, Professor Emeritus, NCRC, NCSU, Raleigh, NC, USA

A fresh look at some of the techniques involved in producing high performance nonwoven fabrics- and what impact they may have on the end product and promise of products with new/improved properties. Needlepunch, improvements in web formation, stretch nonwovens among others, new fibers and variants, and updates on spunbond and meltblown.

► Practical Experience With Carded Nonwoven Web Weight Leveling and How It Affects Your End Product

Everette Scarboro, Jr. Regional Sales Director – North America, Oerlikon Textiles, Charlotte, NC, USA

Historical experience has shown that crosslapped web weight varies considerably from side to center to side. Techniques have been employed in the controls of crosslappers to minimize the “smile” effect but it was not until additional external devices were developed and sophistocated controls were employed that true leveling was accomplished. Several vendors of carding and crosslapping equipment offer measurement and compensating devices. At least two are unique and incorporate features at the card which facilitate the mechanical compensation. One system available in the market works uniquely with the crosslapper in stand alone mode and is even retrofittable to existing crosslappers. This makes it possible for the customer to acquire the levelling feature at lower cost and retrofit it to an otherwise well equipped line. Data can be shown to represent the weight profile without the leveling device and then with the leveling device activated. Discussion will include some mention of measuring devices downstream that give feedback to the crosslapper and thus create a “closed loop” system. Examples of financial benefits of leveling carded nonwoven webs and justification of the equipment will be shown.

► Machinery and Methods in the “Nanofiber” Meltblown Process

Timothy Robson, Business Development Manager, Hills, Inc., W. Melbourne, FL, USA

Unique benefits are possible through technology incorporating fiber forming capillaries made from grooves or slots in the design of a meltblown die tip allowing for the production of meltblown fibers down to 150nm at rates far in excess of known alternate methods. Other advantages include increased throughput or higher and reduced fiber diameter variation. Web uniformity is also improved. This new technology is compared with traditional methods through both theoretical and empirical analysis. Computational Fluid Dynamics and Finite Element Analysis models contrast key features of the different technologies illustrating the benefits and limitations inherent in the equipment. A design of experiments included the production of fibers and webs with varying hole dimensions so relationships between independent and dependent variables are established.

► Ultrasonic Technology And Processing To Enhance The Quality And Performance Of Nonwoven Materials

Bill Lynch, Key Account Manager, Hermann Ultrasonics, Bartlett, IL, USA

Ultrasonic bonding technology offers the Nonwoven Textile Market both a reliable and efficient bonding process at the same time meeting and exceeding the sustainability initiative by eliminating the need for adhesive materials and high thermal heat bonding processes. Continuous Ultrasonic processing is used for bonding and laminating multi layers of non woven materials and films improving the strength, performance, appearance and feel of the lamination. Other uses include embossing, perforation, slitting, cutting and splicing used in the Hygiene, Medical, Filtration, Wipes, Construction, Automotive and Home markets.

► Needlepunch: New Line Concepts For Nonwovens

Terry Purdy, Sales Manager, Dilo, Inc., Charlotte, NC, USA

Staple fiber nonwovens are used in a range of applications which require different bonding methods generally determined by fabric weight and properties. Mechanical, thermal and chemical means are most commonly employed in a three stage process involving fiber opening/blending, web formation and bonding. Web formation may involve one or more cards and the inclusion of a crosslapper if final weight and width demand it. Needle punching is a versatile process and the major mechanical bonding technology. Needling is also used to complement other processes as in the after needling of spunlaid webs and the finishing of woven upholstery fabrics. Examples of machine components incorporated in lines for automotive, geotextile, filtration and other products will be given. Major factors affecting line capacity and fabric quality are discussed.

► Benefits Of Inorganic Mineral Additives In Fibers For Nonwovens

Larry McAmish, Technical Services Manager, IMERYS Performance Minerals, Marietta, GA, USA

This presentation will present the results of trials conducted at several universities. In all cases the end products, fibers containing 20 wt% calcium carbonate maintained most of their physical properties at equal basis weights. There were also some novel effects associated with suspending high density, inorganic particles within a lower density polyolefin matrix. Some were surprising, like the improved stability of an electrostatic charge on this composite material due to triboelectric effects. In the specific case of staple fiber applications, there were additional benefits associated fiber surface effects that resulted in improved web formation both in carding and spunlacing. There were also some aesthetic property differences, resulting from physical changes to the fibers, and advantages from a sustainability perspective, resulting from the considerably lower carbon footprint of the mineral phase, which will also be discussed.

► High Performance Nonwovens For Outdoor Structures & Temporary Shelters

Nagendra Anantharamaiah, The Nonwovens Institute, NC State University, Raleigh, NC, USA

Outdoor structures and temporary shelters have evolved from basic tents to massive architectural structures and sports arena domes in the recent past. The repeated set-up and

take-down of such structures in various sectors (military, humanitarian aid or recreational) makes it prone to damage easily and need to be mended or disposed. Due to the variety of finishes applied to these fabrics that provide environmental resistance and other characteristics required of these types of materials, the cost and weight additions are major factors when one considers designing such structures.

Thursday, May 20, 2010

8:30 a.m. - 11:00 a.m.

Room B405

TT11: Technology for Growth

Session Chair: McAllister Isaacs, III, Principal, Media Alternative Consulting, Griffin, GA, USA

A look at many of the new/improved technologies available to create growth, with a focus on the practical – status and advantages. Included will be updates on nanotechnology and carbon fabrics and technology, laser joining of high performance fabrics as alternative to sewing, and the use of textiles in solar cells.

► Taking Innovations to Another Level

Jonathan Dyson, Head of Content, World Textile Publications Ltd., Editor, Future Materials World Textile Publications Ltd., Yorkshire, United Kingdom

As mankind enters the second decade of the 21st century, technology and textile companies, as well as research and academic institutions, are developing innovations in technical textiles which were unimaginable just a few years ago. Many of these developments are set to greatly advance growth in a wide range of end-user markets, as well as opening up major opportunities for growth in new markets. This presentation looks at five such innovations which have been developed over the past year.

► Advances in Self-supporting Nanofiber Mats by Electrospinning

Dr. Laura M. Frazier, Technical Director, *SNS Nano Fiber Technology, LLC, Uniontown, OH, USA*

The process of making nanofibers by electrospinning has been around for over a century. In the past, polymeric nanofibers have been commercially used in the area of filtration, as their high surface area and small pore size can greatly improve the efficiency of a filter. Typically, the nanofibers have been produced as thin layers on a substrate, due in part to the high cost and low production rate. We have recently developed a proprietary process for making nanofibers that allows us to produce nanofibers in larger volumes, using a much more efficient process. The nanofibers can be produced as a nonwoven mat in a continuous process. The nanofiber mats that are produced are self-supporting and can be up to 2 mm thick and 1 meter wide. This opens the door to new applications in areas such as wound care, membranes, protective clothing, tissue engineering, and specialty textiles, just to name a few. In addition, our proprietary process allows for particles to be electrospun along with the polymer. This greatly increases the potential uses for nanofibers, as insoluble active ingredients can be added that will be associated with the nanofiber either through encapsulation or entrapment. Our main focus has been on adding superabsorbent particles directly to the spinning solution, which become entrapped in the nanofiber matrix.

► Textile Based Solar Cells - An Access for the Energy Supply of Microsystems

Dr. Uwe Möhring, Textilforschungsinstitut, Greiz, Germany

Microsystems, which are responsive to environmental parameters and can detect risk situations, are required for the protection and the safety of people and goods. Thermo- and piezoelectric energy converters as well as micro fuel or solar cells are suitable for energy supply of such systems, independent from grid supply. Dye-sensitized solar cells based on dye-sensitized porous layers of zinc oxide are well compatible with textile structures because of their deposition and crystallization at low temperatures. The electrolyte plays an important role for the realization of such cells. It has to be textile compatible and good wetting is needed. It is necessary that it remains in the textile structure and can be easily sealed.
The coating of electrical conductive yarns and the development of suitable fabric structures for electronic applications are contents of the project.

► Laser Welding of Textiles

Dr. Jan Beringer, Scientific Head Department Function and Care, Hohenstein Institute, Boennigheim, Germany

In the project threshold values for laser power and related yarn temperatures, speed and pressure of the conveyor rolls were determined as well as the use of NIR-absorbers while welding different textile materials such as PES, PA etc. In order to assess the quality of the seams by inspecting them visually, a comprehensive series of tests of the welded areas were carried out with the help of a scanning electron microscope. Textile technology tests were conducted to evaluate tensile strength as well as watertight and windproof properties of the laser-welded seams. Finally a prototype T-Shirt was created to demonstrate the possibilities opened by the laser welding of thermoplastic textiles out of manmade fibres or laminated materials of those. This prototype is made of three-layered, laminated polyester fabric with PTFE membrane featuring different straight and round seam structures shows the full design spectrum of the laser welding technology. The possibilities of welding fabric blends such as polyester/cotton will be investigated in further projects.

► Activated Carbon Fiber Filter Media in Proton Exchange Membrane Fuel Cells for Automotives

Wei Liu, Ph.D., Doctoral Candidate, Polymer and Fiber Engineering, Auburn University, Auburn, AL, USA

Sulfur dioxide in air is poisonous for proton exchange membrane fuel cells (PEMFCs), which is one of the most promising alternative power sources to replace internal combustion engines due to their high efficiency and environmentally friendly features. During the operation of a PEMFC, at the cathode, sulfur dioxide is reduced to sulfur species that occupy the active sites of the platinum catalysts prohibiting the reduction reaction and thus shortening the fuel cell life time due to degradation. Due to a vast variety of poisoning sources, usage of an effective filtration system is suggested, rather than using a sulfur tolerant catalyst which may not be suitable for all contaminants. Activated carbon fibers (ACFs) are relatively new porous adsorbents that have advantages in flexibility of filter fabrication and faster adsorption rate in comparison with the conventional activated carbon particles. Filter media made from potassium permanganate impregnated activated carbon

fibers are applicable not only to fuel cell systems but also those electronics which are prone to be contaminated by some reducing gases.

► Innovative Technologies for Technical Yarn Extrusion Systems
Dr. Lassad Nasri, Head of Process Engineering Technical Yarn, Swiss Tex Winterthur AG, Winterthur, Switzerland
Technical textiles are textile materials intended for end uses other than non protective clothing, household furnishing and floor covering, where the fabric or fibrous component is selected principally but not exclusively for its performance and properties as opposed to its aesthetic or decorative characteristics. The definition enables understanding of how broad are the range of manufacturing and the end-use markets of technical and industrial textiles. In order to reduce the long and complex supply-chain fiber producers require a unique efficient and complete spinning system from chips to yarn. This paper discusses such a system.

Room B406

TT12: Smart/Intelligent Fabrics

Session Chair: Dr. Barbara Pause, President, Textile Testing & Innovation, LLC, Longmont, CO, USA
Smart and intelligent fabrics are more than wires woven into a fabric or garment, they are materials that "do something", by reacting to an outside stimuli to conduct electricity, change color, emit medicines or other desired properties, become FR, even change form. Included in this session will be Smart/Intelligent Coated and Laminated Textiles where the coatings contribute the desired properties.

► Smart Fabrics and Textile Enhancements: Harnessing Nature
Melinda E. Wales, Ph.D., Reactive Surfaces, Ltd., Austin, TX, USA
New developments in the application to decontaminating and medical textiles will be discussed. For example, enzyme-based approaches for elimination of fats and oils have produced new functional textiles with self-cleaning properties, while peptide additives can deliver antimicrobial function to most coatings and textiles to address health concerns, as well as odor-resistant properties. Quantitative antimicrobial evaluations of treated fabrics reveal that there are significant reductions in bacterial load on surface contact, which is of interest for wound dressing in the treatment of chronic wounds as well as odor reduction for clothing. Advancing our understanding of these new biomaterials for functional textiles is driving the research efforts to push the limits and capabilities of these additives.

► Quantum Dots For Coloration And Sensor Technology On “Smart Textiles”
Dr. Richard V. Gregory, Chair/Professor, Department of Chemistry and Biochemistry, Old Dominion University, Virginia Beach, VA, USA

An example of the potential for sensing will be demonstrated where the QD's either change color or other emissive characteristics based on their environment or exposure to certain agents. Use of polymeric semiconductors coated onto textile substrates employing methodologies previously developed by the author and co-workers provide an industrially feasible process for QD fiber based systems. The anticipated use of fiber based QD systems in sensing and potential for coloration and illumination will be discussed. Problems associated with immobilization of QD's on fiber and fabric surfaces and resultant effective quantum efficiency's will be detailed. Anticipated methods to enhance the QD properties and potential pathways to overcome present difficulties will be presented.

► Nano-Coating for Improved Textile Performance

Dr. Delwyn Evans, P2i Ltd., Oxfordshire, United Kingdom

Modern consumer and industrial textiles are manufactured from a wide range of materials that are selected for specific bulk properties, cost effectiveness and/or 'look and feel'. However, many of the materials chosen in this way do not display the optimum surface properties. Products for outdoor use can benefit from hydrophobic surface treatments to repel water. Those for industrial use can be enhanced, or find new applications, by surface treatments that give hydrophobic, hydrophilic or specific chemical functionality. A novel, patented technology can readily apply functional nano-coatings onto the surface of a wide variety of items made from a diverse range of materials. This presentation demonstrates how the nano-coating is being used in industry today, at the desired commercial through-put levels, to deliver value-added products into the market.

► Taking the Heat! Smart Cooling Textiles for Sport and Outdoor Applications

Dr. Barbara Pause, President, Textile Testing & Innovation, LLC, Longmont, CO, USA

Polymeric films with phase change material treatment have been developed which provide a cooling feature. The films are laminated to fabrics. These textile composites can be used, for instance, in ski helmets and backpacks to absorb excess body heat and, therefore, prevent perspiration. As a result, wearing a ski helmet or carrying a backpack will be more comfortable. The development will be introduced and test results will be discussed.

► Low Cost Conductive Nonwovens and its Applications

Davis Nhan, Research Scientist, Kimberly-Clark Corporation, Dallas, TX, USA

Kimberly-Clark has worked to commercialize a commodity level conductive nonwoven material for potential use in consumer applications. The material is a carbon fiber impregnated paper substrate that enables simple electrical functionality to disposable and semi-durable product forms. The conductivity of the material can be tailored by altering the recipe during the manufacturing process. This enables multiple commercial applications and several product executions like EMI shielding, radiating elements for RFID tags, therapeutic heating pads, portable/ plug-in air fresheners, etc. This presentation will discuss the need for a low cost conductive material and several applications that it can facilitate.

Room B407

TT13: Medical and Biotechnology

Session Chair: Deborah K. Lickfield, Ph.D., President, Lickfield Consulting, LLC, Easley, SC, USA

The Medical and Biotechnology area is one market that is poised to grow significantly, one that uses high technology, and one that involves many innovative ideas. The focus of this session will be on the market, those high tech and innovative ideas that hold great promise, and issues relating to the role of textiles-medical-areas.

► Medical Textiles – Where are We Heading Now?

Deborah K. Lickfield, Ph.D., President, Lickfield Consulting, LLC, Easley, SC, USA

This presentation will provide an overview of the medical products market sub-segments where traditional textiles and other fiber-based matrices are important. In the product areas which rely upon highly engineered fabrics, multiple-functionality is increasingly expected those fabric designs. Fabric and composite product designs may incorporate chemical modifications, novel geometric designs, new polymers or active integration with other types of performance delivery systems in order to define a new competitive plane. Certain areas will be highlighted in the discussion in order to study how technology is contributing to and influencing both product design and market competition. Included in that discussion will be advance wound care products, advanced patient care and monitoring, and a variety of newer offerings in both standard patient care and procedural support market sub-segments. The review will include a brief look at some university-based research that may provide fibrous materials with very specialized functionality that has application in the design of future medical products.

► The Emerging Role For Electro-Textiles In Medical Treatment Applications

Robin Cranston, Research Leader, Material Science and Engineering, Nano Fibrous Materials Group CSIRO Materials Science and Engineering, Clayton South, Victoria, Australia

Diseases that cause a compromised venous arterial condition can result in peripheral neuropathy with a high likelihood of foot ulceration leading to amputation. There is also a risk of developing venous leg ulcers from impact wounds. In the case of peripheral neuropathy there is a need for early stage detection and monitoring of at risk activities that could result in pressure ulceration in order to provide corrective footwear solutions or provide patient warnings. Pressure bandaging for venous leg ulcers or for lymphoedema is known to be beneficial however there is little or no data on the effects of bandaging as there are no means to continuously monitor and measure the bandaging pressures. Electro-textile devices will be discussed that have the ability to continuously measure temperature and point pressures in various wearable garments and to wirelessly transmit data to remote located clinicians and provide feedback to patients. These technologies have the ability to deliver improved patient solutions and impact on patient recovery time and overall health costs. Such devices also have a broader market for the physically disabled, workplace activity

assessment or rehabilitation and athletic performance measurement. The challenges in constructing such electro-textile devices will be discussed.

► Use of Copper Oxide in Medical Devices - From Reduction of Nosocomial Infections to Wound Healing

Gadi Borkow, Ph.D., Chief Medical Scientist, Cupron Inc., Gibton, Israel

A platform technology has been developed in which copper oxide is impregnated into polymeric fibers endowing the fibers with potent broad-spectrum anti-bacterial, anti-viral, anti-fungal and anti-mite properties. This durable platform technology introduces copper oxide-treated fibers and enables the mass production of woven and non-woven fabrics with no requirement for alteration of industrial procedures or machinery. This technology facilitates the production of anti-viral gloves and filters, anti-bacterial self-sterilizing fabrics; anti-fungal socks; anti-dust mite mattress-covers. This presentation will demonstrate the potential use of copper in new applications that address medical issues of the greatest importance, such as viral transmissions; nosocomial infections; wound healing and the spread of antibiotic resistant bacteria.

► Functionalized Medical Textiles - a Case Study for a Product Launch in a Highly Competitive Marketplace

Ben Favret, CEO, Vestagen Technical Textiles, Orlando, FL, USA

Successful launch of new medical or healthcare product in a competitive and tightly regulated marketplace requires a comprehensive understanding and domain expertise in the full value chain from bench side science in the laboratory to bedside patient care delivery. This presentation will provide scientists, engineers, managers and aspiring entrepreneurs a “Checklist of Questions” to answer for a medical or healthcare textile product to be successfully launched into the market or used to form the basis for a business plan for a new venture.

► Quality and Regulatory Aspects of Medical Textile Product Development

Elizabeth (Beth) Nichter, M.S., CMQ/OE (ASQ), Regulatory Affairs Specialist, Zeus Industrial Products, Inc., Orangeburg, SC, USA

Medical Textile product development can follow any framework or structure that a company has established for other textile products. In addition, evidence that the medical product is safe and effective for its intended use is required by FDA to market the material in the United States (other countries require CE Mark or equivalent according to individual country mandates). The chances of a successful timely launch of a new medical textile is enhanced when preparation of the submission documents for FDA includes adequate forethought regarding quality and regulatory aspects in the early stages of development.