



(Preliminary Program - Subject To Change)

Tuesday, September 13

8:30 am - 11:30 am

Filtration Tutorial

Instructor: **Norman Lifshutz**

11:00 am - 12:30 pm

Steering Committee Meeting

1:00 pm - 3:00 pm

Session 1: Innovation Keynote Session

Innovation In Nonwovens Award Presentation

"Regenerative Medicine: Current Concepts and Changing Trends"

Anthony Atala, M.D., Wake Forest Baptist Medical Center

"Challenges to Continued Innovation of Textile-Based Medical Devices: What the Future Holds for FDA's 510(k) Clearance Process"

Peter Mayberry, Mayberry & Associates, LLC

After this presentation, audience members should have a thorough understanding of the process used by the U.S. government to approve new/improved medical devices made from nonwovens and other technical textiles; They will know how and why concerns have been raised regarding the approval process for new/improved medical devices; Understand the conclusions, recommendations, and implications of a major report on the issue that was released in late-July, 2011, by a scientific committee tasked by the U.S. government to study the approval process; and identify potential next steps, opportunities to get involved, and the impact this issue could have on innovation in medical device manufacturing.

"The Shape of Sustainable Non-Woven Packaging"

Don Scott, Malnove Packaging & Packaging Solutions

3:30 pm - 5:00 pm

Session 2: Market Trends & Analysis

Session Chair: **Gero Nordmann**, BASF Corporation

"Raw Materials Forecast"

Alex Lidback, IHS

"Disposable Diaper Trends in Emerging Markets& How They Compare With Developed Markets"

Carlos Richer, Richer Investment

"Bridging the Gap Between Safety and Sustainability"

Susan Rutherford, Underwriters Laboratories Inc.

Building the new green economy will take more than simply developing green products-it will require developing, manufacturing and validating products that meet safety as well as sustainability requirements. As regulators, manufacturers and consumers march down the path of enhanced environmental options, many traditional materials and processes will be challenged. This session will focus on the evolution of safety as it evolves to include larger objectives of sustainability. As new standards are developed and innovative solutions introduced, the marketplace will present unique opportunities for those ready and able to take on the challenge.

Wednesday, September 14

7:30 am - 8:30 am

Building & Industrial Mat and Insulation (Joint Committee Meeting)

Fibers & Process Committee Meeting

8:30 am - 10:00 am

Session 3: Building Science I

Session Chair: **Zuzana Salkova**, Arclin

"Transformation of the Insulation Industry through Green Building and Indoor Air Quality Standards"

Stephany I. Mason, Air Quality Sciences, Inc.

Update on standards for indoor air quality and how they relate to insulation, with particular emphasis on formaldehyde. This will also include discussion on how these IAQ standards, sustainability, and Green Building have impacted the insulation industry.

"Novel Binder System for Thermal Insulation"

Jeffrey Goodison, Arclin Canada Ltd.

This paper will discuss a novel chemistry for Fiberglass and Mineral Wool insulation products. This chemistry enables manufacturers to produce high grade residential and commercial grade thermal insulation with high recovery, low flame spread and smoke generation at reduced oven temperatures and equal to lower product density and LOI as conventional phenolic bonded insulation. This binder is non- formaldehyde based.

"Nonwoven Structural Insulated Panels for Construction Applications"

Idris Cerkez, Auburn University

Royall M. Broughton, Auburn University

This study proposed an alternative material to current wallboard and sheathing products so as not to suffer from a combination of deficiencies including fragility, poor environmental resistance, high cost and/or low insulation value (R value).

Session 4: Nano Fibers

Session Chair: **Fred Lybrand**, Elmarco

"Forcespinning™: An Important Advancement in Nanofiber Production"

Dr. Bharath Raghavan, FibeRio Technology Corporation

Forcespinning™ is a new technology to process polymers into nanofibers using centrifugal force. This paper discusses Forcespinning™ system focusing on solution spun Nylon 6, Polyvinylidene Fluoride (PVDF) and melt spun Polypropylene (PP). The process has distinct advantages over conventional techniques to fabricate nanofibers. Forcespinning does not require high voltages and eliminates the requirement of specific dielectric properties of the material as required in electrospinning. The process not only makes uniform fibers in the nanometer range, but also has higher yields. Forcespinning™ has advantages in melt processing polymers over melt blown technology. Forcespinning™ technology eliminates the hot and high velocity air as required in melt blown technology.

"Industrial Nanofiber Needs of the Technical Textile Industry: A Case Study"

Fred Lybrand, Elmarco

"Soybeans for Fibers and Films"

Robina Hogan, United Soybean Board

The fibers and film industry represent a potentially high volume usage for soy protein. The target audience for this fiber development is for textiles, nonwovens, medical applications, filtration, composites as well as resins for films and packaging.

10:30 am - 12:00 pm

Session 5: Building Science II

Session Chair: **Jim Connaughton**, Dow Chemicals

"Building Science II Presentation"

Mark Babb, National Wire Fabric Inc.

"Latest Techniques for Web Imaging and Quality Control"

Andy Broomfield, ABB Inc.

Nonwovens producers are continually challenged to provide products of ever higher quality and uniform appearance. Modern quality control and web imaging systems present an opportunity for the producer to improve yields, lower costs and improve customer satisfaction. This presentation discusses the latest techniques in Web Imaging and scanning Quality Control Systems technology, with an emphasis on detection and classification of web defects. Included is a basic overview of system topology, integration, system hardware (cameras and lighting) selection, and a treatment of simple and advanced defect classification systems.

"High Speed Video Troubleshooting of Non-Woven Operations"

Amber Krieger Livesey, 20/20 Hindsight, a division of Monitoring Technology LLC

Non-woven operations run much faster than the human eye can see. Several companies use high speed video recording systems to catch process issues and then take action to improve efficiency and increase mean time between failures. This presentation provides a brief summary of how high speed video works and case histories from non-woven applications."

Session 6: Modeling & Characterization

Session Chair: **Selcen Kilinc-Balci**, NIOSH

"An Outstanding Technique for Characterization of Hydrophobic Pore Structure"

Krishna Gupta, Porous Materials Inc.

Attendees will learn about a technique that can accurately determine structure of hydrophobic pores. Also, the ability of water intrusion porosimetry to determine the undistorted true pore structure of hydrophobic materials. Superior performance of water intrusion technique compared with mercury intrusion technique.

"An Overview on Modeling Fluid Absorption in Fibrous Media"

Hooman V. Tafreshi, Virginia Commonwealth University

This presentation reviews the current state of the art in performing computationally-inexpensive simulations of fluid absorption in fibrous media. Our review starts with a discussion on the available microscale simulation methods for predicting the capillary pressure and relative permeability of fibrous fabrics, and continues to review how the information generated via microscale simulations can be incorporated in a macroscale model that predicts the rare of fluid spread and penetration in a nonwoven fabric. Our macroscale model is developed by numerically solving Richards' equation of two-phase diffusive flows in porous media using finite element method. In this review, we also discuss the effects of fiber orientation and fiber diameter distributions on capillary pressure and relative permeability, and their influence on the rate of fluid absorption in fibrous media.

"Three-Dimensional Structural Characterization of Hydroentangled Nonwovens"

Lalith Bhargava Suragani Venu, North Carolina State University
Nagendra Anantharamiah, College of Textiles NC State University
Behnam Pourdeyhimi, College of Textiles NC State University
Eunkyoung Shim, College of Textiles NC State University

This technique is a block-face imaging technique (based on micro-tomography principle), employed for sectioning the hydroentangled web structure that has been stained and embedded in a polymer matrix for sequential processes. The techniques introduced in this work evaluate the hydroentangled web structures with respect to the fiber orientation, amount of surface fibers transferred into the bulk of the web structure, and changes in packing density across the fabric.

2:00 pm - 3:30 pm

Session 7: Fibers & Process I

Session Chair: **Seshadri Ramkumar**, Texas Tech University

"High Performance Thermally Bonded Nonwovens"

Behnam Pourdeyhimi, PhD, North Carolina State University

This presentation describes the process of thermal bonding and how the process can be controlled to form high performance nonwovens. These type of nonwovens will offer the potential for new markets in technical textiles.

"Beyond Defect Detection- Process Monitoring for Nonwoven Materials"

Jochen Koenig, Schenk Vision

It has become more and more important for nonwoven manufacturers to try and keep ahead of their competition. They are looking to reduce costs as well as provide a superior product. The presentation will introduce the attendees to one of the process monitoring options available to this industry. EasyMeasure is unique to the nonwoven industry as it is non-radioactive and non-scanning, and can also be combined with defect detection which is extremely important to manufacturers. The topic is of particular interest, especially in the current economic climate, to many nonwoven end customers as well, who want to know how manufacturers can provide them the best product and at the best cost.

"Utilization of Pre-Cleaned Greige Cotton in Nonwovens: A Sensible Approach"

Paul S. Sawhney, USDA-ARS-SRRC
Chuck Allen, USDA-ARS-SRRC
Brian Condon, USDA-ARS-SRRC
Doug Hinchliffe, USDA-ARS-SRRC
Michael Reynolds, USDA-ARS
Ryan Slopek, USDA-ARS-SRRC

Because of the currently ongoing, strong "green" wave of "naturally sustainable" consumer products, many researchers and manufacturers of nonwoven products want to incorporate cotton into their products. However, the existing entities in this "nonwovens arena," who mostly deal with manufactured (clean and consistent) fibers, generally do not have the required facilities to process, especially, the greige (non-bleached) cotton. However, we (the USDA-ARS) have developed a meaningful strategy/approach/technology to resolve the said difficulties and limitations of the existing NW manufacturers by enabling them to use greige cotton that is now supplied as pre-cleaned and even sterilized, if so desired for specific applications.

Session 8: Medical

Session Chair: **Royall M. Broughton**, Auburn University

"Nanofibrous and Nanocomposite Nonwovens for Bone Tissue Engineering Applications using Human Stem Cells"

Elizabeth Lobo, North Carolina State University

Scaffold based strategies for functional bone tissue engineering involve the use of three dimensional, biocompatible, biodegradable structures to provide an adequate template for ex vivo cell expansion and maturation, native tissue ingrowth, and restoration of the original tissue qualities with respect to bone's biochemical constituents, morphology, form, and function. This presentation will focus on our creation and use of nanofibrous and nanocomposite nonwoven scaffolds for bone tissue engineering using hASC.

"Antimicrobial and Durable Press Finishing of Cotton Fabrics"

Idris Cerkez, Auburn University

Royall M. Broughton, Auburn University

People attending this presentation will learn about an inexpensive and practical way of creating multi-functional (antimicrobial and durable press) cotton fabric.

"Braiding Electrospun Nanofibers for Tendon/Ligament Tissue Engineering"

Wan-Ju Li, University of Wisconsin-Madison

John Barber, University of Wisconsin-Madison

Andrew Handorf, University of Wisconsin-Madison

This study demonstrates that we have successfully fabricated a new tissue engineered scaffold that has favorable biological and mechanical properties for tendon/ligament tissue engineering. With the advantageous properties, the novel braided nanofibrous scaffolds are able to enhance cell activities and matrix production in bioreactor culture. To our best knowledge, the braided nanofibrous scaffold to culture stem cells is a new approach for tendon/ligament regeneration.

4:00 pm - 5:30 pm

Session 9: Fibers & Process II

Session Chair: **Uday Raval**, Pall Life Sciences

"New Line of HDPE Resins for the Nonwovens Market"

William G. Todd, Lyondell Chemical Company

When designing either mono or bicomponent fiber resins one must understand the importance that the resin properties have on the following end use properties: bonding strength, surface smoothness, surface stickiness, softness and shrinkage. This presentation will help your understanding of how HDPE resin's molecular architecture affects the end use properties on nonwoven fibers.

"Neucel Improves Productivity at Dissolving Pulp Mill with Integrated System"

Jim L. Pigott, CMC, MAJIQ Inc.

This presentation will provide an overview of the successful implementation of a proven integrated IT system for logistics and operations management of a specialty pulp mill's business management requirements. It will show how Customer Services, Production, Shipping and others can benefit from the improved productivity of having this information at their fingertips.

"Electronic Nonwovens by Atomic Layer Deposition"

William J. Sweet III, North Carolina State University

Christina Devine, North Carolina State University

Christopher J. Oldham, North Carolina State University

Gregory N. Parsons, North Carolina State University

Jesse S. Jur, North Carolina State University

Real-time monitoring of the electrical properties during tensile loading is examined as a method to evaluate the mechanical performance of the coated fiber systems.

4:00 pm - 5:00 pm

Session 10: Student Poster Presentations (10 Minute Presentations)

Session Chair: **NC State University**

"Ultra fine fibrillated Lyocell fiber and its application in wet-laid nonwovens"
Wang Xiwen, South China University of Technology

"Effects of Polymer Type and Compatibility on Structure Development and Mechanical Properties of Bicomponent Nonwoven Fibers"
Mehmet Dasdemir, North Carolina State University
Nagendra Anantharamaiah, North Carolina State University
Benoit Maze, North Carolina State University
Behnam Pourdeyhimi, PhD, North Carolina State University

"Oil Absorbing Cotton Nonwoven Pads"
Vinitkumar Singh, Texas Tech University
Seshadri Ramkumar, Texas Tech University

"Environmentally Friendly Processing of Cotton Nonwovens"
Sudheer Jinka, Texas Tech University
Uday Turaga, Texas Tech University
Todd A. Anderson, Texas Tech University
Seshadri Ramkumar, Texas Tech University

"Development of a 3D scaffold by the Electrospinning of Cell Culture Media"
Uday Turaga, Texas Tech University
Seshadri Ramkumar, Texas Tech University

"Determination of Dynamic Wiping Efficiency and Vapor Adsorption Capability of Novel Nonwoven Composite Wipes for Decontamination of Toxic Oil Spill"
Utkarsh Sata, TIEHH-Texas Tech University
Carlos Brun, Dept. of Petroleum Engineering, Texas Tech University
Aarav Chavda, St. Marks School of Texas
Kendall Ronald Jr., Texas Tech University
Kahan Chavda, St. Marks School of Texas
Seshadri Ramkumar, Texas Tech University

Thursday, September 15

7:30 am - 8:30 am

Binders & Additives Committee Meeting

Filtration Committee Meeting

Materials, Characterization & Modeling Committee Meeting

8:30 am - 10:00 am

Session 11: Emerging Technologies

Session Chair: **Behnam Pourdeyhimi, PhD**, North Carolina State University

"A New Generation of Splittable Fibers for Technical Applications"
Behnam Pourdeyhimi, PhD, North Carolina State University

A new core modified trilobal fiber has been developed that allows the formation of unique micro-denier structures with enhanced tear, breathability, durability, and hand. These structures open new possibilities for nonwovens in durable applications. Examples will be provided, and details of the processes utilized for the formation of such micro-denier nonwovens will be discussed.

"Nonwovens in Automotive Applications"
Mohit Ajitkumar Raina, Institut Fur Textiltechnik

A di-electric measuring system has been developed for determining the distribution of fibre in a multi-component nonwoven structure. Thus, it is possible to judge the localised homogeneity of a nonwoven fabric. The other development is an algorithm for image processing. Processed images of nonwoven structures allow to determine the percentage of thick and thin areas and the unevenness coefficient. The rising quality demands of the automotive industry necessitate online measuring systems.

"Soy Proteins in Fibrous Applications-Surface and Papermaking"
Robina Hogan, United Soybean Board

Exploring soy-based opportunities in the paper and nonwovens industries: pulp sourcing, wet strength aides, sludge additives and surface modifiers

10:30 am - 12:00 pm
Session 12: Filtration

Session Chair: **Norman Lifshutz**, Hollingsworth & Vose (Retired)

"An Overview on Micro- and Macro-Scale Modeling of Aerosol Filters"

Hooman V. Tafreshi, Virginia Commonwealth University

This presentation reviews the current state of the art in conducting computationally-inexpensive simulations of aerosol filtration via fibrous filters. Our review starts with a description of the available computational methods for conducting a microscale simulation of particle filtration via fibrous media, and continues to discuss how the information generated via microscale simulations can be incorporated in a macroscale model that can be used to optimize the actual dimensions (e.g., pleat geometry) of an air filter. In particular, we discuss the effects of fiber orientation and fiber diameter distributions on pressure drop and particle collection efficiency of a filter medium. This is accomplished by generating 3-D fibrous structures resembling the internal geometry of a fibrous mat, and numerically solving the governing equations of air and particle flow in the void space between the fibers.

"Filtration Efficiency of the Composite Media Prepared by Meltblown & Electrospun Nanofibers"

Muralidhar Lalagiri, Texas Tech University

Vinitkumar Singh, Texas Tech University

Seshadri Ramkumar, Texas Tech University

The objective of the study was to enhance the filtration properties of a nonwoven media by increasing porosity and surface area of nanofibers. In this study, Electrospun fibers were collected over a meltblown filter medium, which together constitutes to form a nonwoven composite media. Fibrous filtration is fractional thus efficiency depends on particle size. Testing of composite filter in this study for fractional filtration efficiency showed high particle removal efficiency with less airflow resistance.

"The Challenge of Emissions: Formaldehyde-Free Technology in Filtration Applications"

Mark W. Wolfinger, Lubrizol

Christophe Imbert, Lubrizol

Attendees will learn about a new generation of formaldehyde free binder systems and how these binders improve physical properties and their effect on filtration properties.

Session 13: Coating & Lamination

Session Chair: **Phil Jackey**, Omnova

"Extremely Water Absorbent Nonwovens Produced with Hydrophilic Water Based Emulsion Polymer"

John Norton, BASF Corporation

Christian Krueger, BASF Corporation

Typically swellable or highly water absorbent nonwovens are produced with Super Absorbent Polymer (SAP) or Bentonite. The SAP and Bentonite are powders and require special equipment to produce the finished absorbent product. BASF has developed water based hydrophilic emulsion polymer, which is free of organic solvent and has low viscosity. It can be easily applied to nonwovens by standard application methods, such as saturation or padding. These treated nonwovens have the ability to absorb water more than 10 times of its weight. Potential end uses range from absorbent hygiene applications to water storage systems for green roofing and geotextiles used to seal landfills.

"Advances in Ultra Low Formaldehyde Binders"

Paul Nedwick, Dow Chemical USA

John Haigh, The Dow Chemical Company

Maureen Nunn, The Dow Chemical Company

The need for reduced or ultra low formaldehyde content in finished nonwovens and textile products or reduced formaldehyde emissions in manufacturing locations drove the initial development of many innovative offerings by acrylic emulsion manufacturers. Similarly, methods were developed to quantify both formaldehyde content and formaldehyde emissions. Often, the choice of moving to an alternative low or ultra low formaldehyde binder required a compromise in one or more key properties. This paper presents an update on more recent advances in ultra low formaldehyde binders utilizing new crosslinking technologies. More importantly, work will be presented that demonstrates that going ultra low formaldehyde binder technology does not mean having to accept less performance than that imparted by standard n-methylolacrylamide based self-crosslinking chemistry.