

# Wood C&S

## 2016

### 7<sup>th</sup> Wood Coatings and Substrates Conference

#### When and Where:

Thursday & Friday, September 22 & 23, 2016  
The University of North Carolina at  
Greensboro  
Elliott University Center  
507 Stirling St, Greensboro, NC 27412  
Cone Ballroom

#### Featuring:

Industry and Research experts discussing new changes in wood substrates  
Expert Speakers on coatings science, raw materials, and technology for wood coatings

#### Sponsored by:

University of North Carolina at Greensboro  
Piedmont Society for Coatings Technology  
Wood Coatings Research Group

#### Keynote Speakers:

**Thursday: Challenges in Formulating Coatings for Wood**  
**Dr. Mojan Nejad – Assistant Professor, Sustainable Bioproducts Department, Mississippi State University**

**Friday: Methods to Characterize Stresses and the Fracture Energy of Coatings**  
**Dr. Mark Nichols**  
**Ford Research and Advanced Engineering, Ford Motor Company, Dearborn, MI USA**

#### Who should attend Wood C&S?

- Chemists and Formulators dedicated to improving wood coating performance and ease of manufacture.
- Raw material and equipment suppliers requiring competency in the wood and wood coatings discipline.
- Students interested in pursuing a career in the coatings, material sciences, and chemical sciences disciplines.
- Educators interested in the wood coatings market and related material science technologies.
- End users who need coatings to add value to their products.

#### Complete **Wood C&S** Conference Information:

[r.obie@woodcoatingsresearchgroup.com](mailto:r.obie@woodcoatingsresearchgroup.com)

<http://www.uncg.edu>

[www.piedmontsociety.org](http://www.piedmontsociety.org)

For abstracts, registration information, directions, maps and corporate sponsors contact:

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# Wood C&S 2016

## Program Overview

	<b>Thursday Sept 22, Cone Ballroom-A</b> Chemistry and Physical Chemistry of Coatings
<b>1:00 - 1:30 p.m.</b>	<b>Innovative Waterborne Binder and Coatings Technology for Wood Knot Sealing</b> Rebecca Ladewski <sup>1</sup> , Chris Peters, Jerome Caron, Charles Hegedus <sup>2</sup> , Stephanie Garrell Dow Chemical Company
<b>1:30 - 2:00 p.m.</b>	<b>Novel Multiphase Waterborne Acrylic Coating Systems for MDF Substrates</b> Jim Bohannon Alberdingk Boley
<b>2:00 - 2:30 p.m.</b>	<b>Vegetable Oil Microemulsions for Wood Stain and Coatings Applications</b> Bill Leightner ADM Evolution Chemicals
<b>2:30 - 3:00 p.m.</b>	<b>Colorants for Wood Stains Formulations</b> Vincent Shing Sensient Colors LLC
<b>3:00 - 3:15 p.m.</b>	Break
<b>3:15 - 4:15 p.m.</b>	<b>KEYNOTE ADDRESS</b> <b>Challenges in Formulating Coating for Wood</b> Mojgan Nejad Assistant Professor, Sustainable Bioproducts Department, Mississippi State University  <b>Mojgan Nejad, Ph.D.</b> is currently working as an Assistant Professor at the Sustainable Bioproducts Department, Mississippi State University (MSU), leading a research lab focusing on development of lignin-based resins for coating and adhesive applications along with number of wood coating projects in collaboration with industries and Forest Product Laboratory (FPL, Madison). Mojgan has a bachelor degree in Applied Chemistry and PhD in Wood Coating. Her PhD dissertation, conducted at the University of Toronto (UofT), focused on “Modeling correlation between coating properties and their performance when applied on preservative treated wood“. Mojgan worked as a postdoctoral researcher at the “Center for Advanced Coatings Technology” in University of Toronto for three years prior to joining MSU in August 2014. Dr. Nejad also holds a Professor (status only) position at the Mechanical and Industrial Engineering Department in University of Toronto which allows her to supervise graduate students working on collaborative projects.
<b>4:15 - 5:45 p.m.</b>	<b>Sponsor Table Top Exhibits and Networking</b>
<b>6:45 p.m. - Until</b>	<b>PSCT Scholarship Fundraising Dinner – Open to all; RSVP at time of Registration</b> Sammy G’s Tavern

# Wood C&S 2016

## Program Overview

	<b>Friday Sept 23, Cone Ballroom</b>
	Cone Ballroom-A Additive Technology / UV Technology / Resin Technology
8:00 – 8:15 a.m.	Welcome
8:15 - 8:45 a.m.	Chemistry, Properties, and Applications of Halloysite Clay & Advanced Natural Iron Oxides In Coatings Brian Newsome Applied Minerals Inc.
8:45 – 9:15 a.m.	Advancements in Ultrafine Mineral Filler Technologies for cure rate, optical, and mechanical performance in Aqueous PUD and 100% Solids UV cure systems Scott Van Remortel Unimin Corporation
9:15 – 9:45 a.m.	Matting Energy-Curable Coatings Through Novel Dispersant Technology Christian Maus Evonik Industries
9:45 – 10:00 a.m.	Break
10:00 – 10:30 a.m.	Healthy UV Curing on Wood Jim Raymont EIT Instrument Markets
10:30 – 11:00 a.m.	New Crosslinker Technology for Wood Coatings Sunitha Grandhee, Rajesh Kumar, Xiaopei Deng, Nikolay Lebedinski & William Wu, BASF Corporation, Wyandotte
11:00 a.m.– 11:30 a.m.	<b>Isocyanate-free Urethane for Industrial Wood Applications</b> Rebecca Ortiz, Yanxiang Li, Paul Popa, John Argyropoulos, Nahrain Kamber, David Pierce Dow Chemical Company
11:30 a.m. – 12:55 p.m.	Open Lunch, Table Top Exhibits, and Networking
1:00 – 2:00 p.m.	<b>KEYNOTE ADDRESS</b> <b>Methods to characterize stresses and the fracture energy of coatings</b> Mark Nichols Ford Research and Advanced Engineering Ford Motor Company Dearborn, MI USA  Dr. Nichols received his B.S. from the University of Michigan in 1987, his M.S. from the University of Illinois in 1989, and his Ph.D. from the University of Michigan in 1992. All his degrees are in Materials Science and Engineering. Dr. Nichols joined Ford Research Laboratory in 1992 to work on the durability of elastomers. His current research is focused on automotive coatings. Topics of particular interest include: coating weatherability, corrosion, the fracture behavior of coatings and films, color science, and rheology. He is currently a Technical Leader and heads the Paint and Corrosion Research group in Ford's Materials and Manufacturing Research Department. In addition, Dr. Nichols is the Editor-in-Chief of the Journal of Coatings Technology and Research. Dr. Nichols is the co-author of the book, <i>Mechanical Properties of Coatings</i> , has published over 60 peer-reviewed research papers, and holds 8 U.S. patents. Dr. Nichols was a 2008 recipient of the Henry Ford Technology Award for his role in the implementation of a 3-wet paint process at Ford.

Thursday Sept 22, Cone Ballroom-A

1:00 p.m.

**Innovative Waterborne Binder and Coatings Technology for Wood Knot Sealing**  
Rebecca Ladewski<sup>1</sup>, Chris Peters, Jerome Caron, Charles Hegedus<sup>2</sup>, Stephanie Garrell  
Dow Chemical Company

The discoloration of paints applied on wood knots or on tropical woods has been a problem. Extractive components from the wood permeate the coating, resulting in discoloration or blistering, essentially causing coating failure. Conventional wisdom holds that species migration from the wood is worse into and through waterborne coating systems than solvent borne systems due to the high water solubility of the bleeding components. However, an innovative waterborne polymer dispersion has been developed that prevents knot bleeding to a greater extent than solvent borne alkyds and shellac. Used as a clear sealer or pigmented primer, the polymer dispersion prevents the extractives from penetrating the topcoat paint, while still allowing water vapor and volatile terpenes to evaporate through the primer film, reducing the risk of blistering. Test methodology and head-to-head knot sealing comparisons will be presented.

1:30 p.m.

**Novel Multiphase Waterborne Acrylic Coating Systems for MDF Substrates**  
Jim Bohannon  
Alberdingk Boley

Medium Density Fiberboard (MDF) is a substrate made from compressed wood fibers. It is used in furniture, cabinets, and a variety of building materials primarily for interior products not exposed to weather. It is used as a base to laminate with melamine paper and other laminates, or it is finished with liquid coating systems. The face of the MDF is much denser than the center, and it is easily cut to form different profiles for edges. One of the challenges in coating MDF is making it smooth and resistant to water and stain damage. This presentation will show how new multiphase waterborne acrylic resins allow the possibility to formulate low VOC coatings with excellent performance. Properties include excellent build/holdout, low fiber raise, excellent block resistance, stain and water resistance. One and two component formulations cured with carbodiimide have been explored.

2:00 p.m.

**Vegetable Oil Microemulsions for Wood Stain and Coatings Applications**  
Bill Leightner  
ADM Evolution Chemicals

ADM Evolution Chemicals is an affiliate of the Archer Daniels Midland Company (ADM). ADM was founded as the Daniels Linseed Oil Company in 1903 and has continued to supply linseed oil to the coatings industry since that day.

Microemulsion technology has not previously been used in wood coatings applications. In this presentation the key properties of vegetable oil microemulsions such as low interfacial tension, high shear stability and low viscosity will be discussed. Applications in stains and pigment dispersions which exploit these properties then be reviewed.

2:30 p.m.

**Colorants for Wood Stains Formulations**  
Vincent Shing  
Sensient Colors LLC

Wood stain is a special form of protective coating which not only protects wood substrates, but also preserves the natural beauty of wood substrates. Due to the unique nature of wood stains, only certain types of colorants are suitable for wood stains formulations. This paper examines the major types of colorants for wood stain coloration; both water-based and solvent-based options will be discussed.

#### KEYNOTE ADDRESS

3:15 p.m. Cone Ballroom - A  
**Challenges in Formulating Coating for Wood**

Mojgan Nejad  
Assistant Professor, Sustainable Bioproducts Department, Mississippi State University

A deep understanding of substrate properties is the first step in formulating a durable coating. When it comes to wood a biological material formulations becomes more complex than other common building materials such as metal and concrete.

Hygroscopicity of wood, variation between and among wood species, changes in surface properties and chemistry of wood as a result of weathering and treatments are some parameters that should be considered when formulating wood coating. This talk covers some fundamental aspects of wood and coating properties in correlation with coating performance on wood. Conclusions will be drawn based on our previous studies focused on evaluating coating performance on preservative- and heat-treated wood during long-term natural weathering. Knowing how individual wood components (cellulose, hemicellulose, lignin and extractive) and wood anatomy impact coating performance will help us to develop coatings with higher durability performance on wood and wood products.

Friday Sept 23, Cone Ballroom-A

8:15 a.m.

**Chemistry, Properties, and Applications of Halloysite Clay & Advanced Natural Iron Oxides In Coatings**

Brian Newsome  
Applied Minerals Inc.

8:45 a.m.

**Advancements in Ultrafine Mineral Filler Technologies for cure rate, optical, and mechanical performance in Aqueous PUD and 100% Solids UV cure systems**

Scott Van Remortel  
Unimin Corporation

This presentation discusses new research into the real time curing behavior of ultrafine nepheline syenite and thermally treated silica in UV cure PUD systems using modified FTIR techniques. Furthermore, research into the benefits of other alternative ultrafine low refractive index silica and alkali alumino silicate fillers in Aqueous UV cure PUD and 100% solids UV cure wood coating formulations will be discussed. The optical, mechanical, formulation, and economic considerations when using optically transparent and ultrafine sizes mineral fillers will be presented.

9:15 a.m.

**Matting Energy-Curable Coatings Through Novel Dispersant Technology**

Matthew Carroll, Sylvia Hicking, and Christopher Howard  
Presented by Christian Maus  
Evonik Industries

Energy-curable coatings continue to grow and provide multiple benefits to the wood coatings and graphic arts industry. The ability to decrease gloss levels within the traditional 00% solids or solvent reduced systems has always been a challenge. With this in mind, novel dispersants are being developed to allow the formulator the ability to utilize common silica-based matting agents to achieve extremely low gloss levels. Not only is it possible to achieve low gloss levels, but these novel dispersants perform at a rheological profile which is commercially acceptable. In this study, novel dispersant technology is explored to provide formulation guidance on how to achieve low gloss or matte systems, while maintaining a workable viscosity using traditional matting agents.

10:00 a.m.

**Healthy UV Curing on Wood**

Jim Raymond  
EIT Instrument Markets

The talk will focus on using UV measurement and process control to diagnose and cure UV ailments seen on wood lines. It will use examples and production data to show how to diagnose, treat and prevent problems related to UV processing. Maintenance and proper care of UV sources and measurement instruments will be covered along with information on the care of UV LEDs systems.

10:30 a.m.

**New Crosslinker Technology for Wood Coatings**

Sunitha Grandhee, Rajesh Kumar, Xiaopei Deng, Nikolay Lebedinski & William Wu,  
BASF Corporation, Wyandotte

Carbodiimides based on aromatic isocyanates have not been explored industrially as crosslinkers for interior applications. Use of aromatic carbodiimides with acid functional polymers, has advantages over traditional 2K PU coatings. It leads to coatings with no residual isocyanate monomer which can be a great benefit from health and safety standpoint. In addition, the crosslinking happens at room temperature, so the coatings can be applied to heat sensitive substrates like wood. This topic will cover the earlier challenges faced in bringing this chemistry towards commercial success and how the challenges have been mitigated and has paved a way for bringing an alternate crosslinking system which can have potential beyond wood coatings.

11:00 a.m.

**Isocyanate-free Urethane for Industrial Wood Applications**

Rebecca Ortiz, Yanxiang Li, Paul Popa, John Argyropoulos, Nahrain Kamber, David Pierce  
Dow Chemical Company

Two component polyurethanes are used in a variety of industrial coating applications due to their excellent weatherability, toughness, and chemical resistance. When formulated as ambient cured systems, traditional two component polyurethanes typically must balance cure speed and pot life. A new isocyanate-free urethane chemistry based on the reaction of polycarbamates with polyaldehydes offers performance attributes of a high quality urethane while having the ability to decouple pot life from cure speed. This allows for the development of formulations with longer pot life that provide coatings which dry fast and develop hardness very quickly. For the applicator, these attributes provide faster return to service, higher production throughput and less material waste. Additional coating benefits, including good weatherability, excellent appearance, chemical resistance, and mechanical properties, will be described for applications over wood substrates.

**KEYNOTE ADDRESS**

1:00 p.m. Cone Ballroom - A

**Methods to characterize stresses and the fracture energy of coatings**

Mark Nichols  
Ford Research and Advanced Engineering  
Ford Motor Company  
Dearborn, MI USA

While the use of fracture mechanics is commonplace in structural design, fracture mechanics has only recently been applied to organic coatings. The role played by both stresses and the toughness or fracture energy of a material is complex, but can be simplified for the case of coatings, where the material is thin and is firmly attached to a substrate. Both the stresses and fracture energy can change over time, particularly when the coating is exposed to a hostile environment, such as outdoor weathering. Chemical changes in the coating binder lead to changes in the mechanical properties of the coating. Methods to characterize stresses and the fracture energy of coatings will be discussed and illustrated through examples including automotive body paint and hardcoats on polycarbonate headlamp lenses.

The University of North Carolina at Greensboro  
The Wood Coatings Research Group  
The Piedmont Society for Coatings Technology

## Seventh Wood Coatings and Substrates Conference

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Location: The University of North Carolina at Greensboro  
Elliott University Center (EUC)  
Cone Ballroom  
540 Stirling Street, Greensboro, NC 27412

Directions: [http://www.uncg.edu/online\\_map/](http://www.uncg.edu/online_map/)

### Registration Form

Online registration at [http://piedmontsociety.com/2016\\_Wood\\_C\\_S\\_Registration.html](http://piedmontsociety.com/2016_Wood_C_S_Registration.html)

**Seating is limited, so register early**

Last Name \_\_\_\_\_ First Name \_\_\_\_\_

Company or Affiliation \_\_\_\_\_

Mailing Address \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

Registration Fee: The Cost of the Conference is Free.

A \$20 donation to the Piedmont Society Scholarship Fund is requested for admission to the Conference in lieu of a registration fee.

Parking: Parking is available in parking decks throughout the campus for \$2.00/hr for the first hour, \$1.00/hr for each additional hour, up to a maximum \$7.00/day.

The most convenient parking deck to the EUC is the Walker Avenue Parking Deck Deck. See <http://parking.uncg.edu/map.html> for other locations

Lunch: There is a wide range of Restaurants within EUC and within walking distance of the UNCG Campus.

Questions: Please direct your questions to: Ron Obie  
[r.obie@woodcoatingsresearchgroup.com](mailto:r.obie@woodcoatingsresearchgroup.com)

Please Return The Completed Form to:  
Ronald Obie  
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