

# WOOD C&S

## 2022

### 10<sup>th</sup> Wood Coatings and Substrates Conference Hybrid Conference

#### When and Where:

Thursday & Friday, September 22 & 23, 2022  
Hybrid Conference  
University North Carolina Greensboro  
and Virtual

#### 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  
Wood Coatings Research Group

#### Keynote Speakers:

**Dr. Junyong (J.Y.) Zhu, Ph.D**  
Scientific Leader  
USDA Forest Products Laboratory (FPL)  
Madison, WI

**Dr. Richard Eley, Ph.D.**  
Retired - Senior Scientist and Head of the Rheology and Interface  
Science Laboratory, Polymer Physics Group  
Akzo Nobel Coatings, Strongsville Research Center

#### 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.
- Wood manufacturers, scientists, and technologists
- 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)

<https://chem.uncg.edu/>

<https://www.woodcoatingsresearchgroup.com/wood-coatings--substrates-conference-2022.html>

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

Ronald Obie

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

# WOOD C&S 2022

## Program Overview

	<b>Thursday Sept 22, Alexander Room</b> Wood Substrates and Additive Technologies in Coatings
<b>1:00 – 1:10 p.m.</b>	Welcome
<b>1:10 - 1:40 p.m.</b>	Improving Wood Coatings Surface Properties Using Modified Natural Waxes Mike Watson Clariant Corporation
<b>1:45 - 2:15 p.m.</b>	Overall Technical & Regulatory Review of Light and Heat Stabilizers Additives for Improved Wood Coatings Durability Dr. Mouhcine Kanouni Clariant Corporation
<b>2:20 – 2:50 p.m.</b>	A “Tail” of Two Dispersant Technologies for Wood Coatings Matthew Burge BYK USA, Inc.
<b>2:50 – 3:20 p.m.</b>	Sponsor Spotlight / Commercials
<b>3:30 – 4:00 p.m.</b>	Furniture Fanatics Erin West Eastman Chemical Company
<b>4:05 – 4:35 p.m.</b>	The State of Kitchen Cabinet Manufacturing in North America Tim Workman TW Workman, LLC Consultant to APCI – Cabinet Works Group
<b>4:40 - 5:25 p.m.</b>	<b>KEYNOTE ADDRESS</b> Using Wood as a Template for Producing Advanced Structural Materials through Delignification: Status, Challenges, and Potentials Dr. J.Y. Zhu USDA Forest Service, Forest Products Laboratory, Madison, WI Dept. of Biological Systems Engineering, University of Wisconsin-Madison  <b>Dr. J.Y. Zhu</b> is a scientific leader at the USDA Forest Products Laboratory, Madison, Wisconsin. Currently, he holds an adjunct appointment at the University of Wisconsin-Madison. He was the inaugural Fulbright-Aalto University Distinguished Chair in Energy and Sustainable Use of Natural Resources (2016), Helsinki, Finland. Prior to the current position he had been with the Institute of Paper Science and Technology for 10 years (now part of Georgia Institute of Technology). His research covers a broad area of wood utilization for producing fibers, biofuels and biochemicals through fractionation. His recent research including wood cell wall engineering through wood chemical treatment for producing advanced wood structural materials. He has co-authored over 200 peer refereed papers and over a dozen of US patents. His work is frequently cited by the broad scientific community with google scholar h index of 70. His scientific accomplishments were honored with several major national and international awards including the IUFRO (International Union of Forest Research Organizations) Scientific Achievement Awards in 2019, US Forest Service Chief’s Honor Award in 2019, the AIChE (American Institute of Chemical Engineers) Andrew Chase award in 2016. Dr. Zhu is a Fellow of AIChE, TAPPI, and IAWS (International Academy of Wood Science).
<b>7:00 p.m. - Until</b>	Wood C&S Fellowship Dinner – Open to all; RSVP at time of Registration Steak Street 3915 Sedgebrook St, High Point, NC 27265

# WOOD C&S 2022

## Program Overview

	<b>Friday Sept 23, Cone Ballroom</b>
	Cone Ballroom-BC Polymer Chemistry and Physical Chemistry of Coatings
<b>7:45 – 8:20 a.m.</b>	<b>Networking Coffee and Welcome</b>
<b>8:30 - 9:00 a.m.</b>	<b>Design of New Aqueous Acrylic Resins for Coating and Staining Wood</b> David Fenn PPG Industries, Inc.
<b>9:05 – 9:35 a.m.</b>	<b>Renewable Multipurpose Polyurethane Coatings</b> David Folkman Alberdingk Boley USA
<b>9:40 – 10:10 a.m.</b>	<b>Nuvolve™ Engineered Polysaccharides as Sustainable Performance Additive in 1K Water-based Polyurethane Dispersions</b> JORGE MOK, Christian Lenges, Natnael Behabtu, Ibrahim Sendijarevic, Aisa Sendijarevic Troy Polymers Inc
<b>10:10 – 10:25 a.m.</b>	<b>Break</b>
<b>10:25 – 10:55 a.m.</b>	<b>Deep Matte Wood Coatings with Improved Burnish Resistance</b> Hossein Riazi and K. Michael Peck Evonik Corporation, USA
<b>11:00 – 11:30 a.m.</b>	<b>Automated Dynamic Testing for Drying, Hardness, and Adhesion of Paints, Coatings, and Adhesives</b> Ronald Obie and Cameron Anderson ADEPT Material Science
<b>11:30 a.m. – 12:55 p.m.</b>	<b>Open Lunch, Table Top Exhibits, and Networking</b>
<b>1:00 – 2:00 p.m.</b>	<b>KEYNOTE ADDRESS</b> <b>Applied Rheology and Coating Performance</b> Dr. Richard R. Eley Senior Scientist (retired), Akzo Nobel Coatings, Strongsville, OH Adjunct Professor (retired), Dept. of Mechanical Engineering, University of Delaware  <b>Dr. Richard Eley</b> is retired from Akzo Nobel Coatings, Strongsville Research Center, where he was Senior Scientist and Head of the Rheology and Interface Science Laboratory, Polymer Physics Group.  He received his Ph.D. in Physical-Inorganic Chemistry from Kent State University and completed a post-doctoral position at Georgetown University. He taught chemistry at the U.S. Naval Academy, Annapolis, following which he had a 36-year career in the Polymers and Coatings industry with ICI Americas and Akzo Nobel. He was also Adjunct Professor of Mechanical Engineering, University of Delaware for 23 years.  Dr. Eley is the author or co-author of over 30 publications, including a recent comprehensive review titled “Applied Rheology and Architectural Coating Performance”. He received the Mattiello Award and three first-place Roon Awards from the Federation of Societies for Coatings Technology (FSCT, now American Coatings Association). He has served on and chaired technical committees and organized short courses for the American Chemical Society, the Society of Rheology, and FSCT. He has presented numerous invited lectures and tutorials at universities, technical conferences, and for private industry in the UK, the Netherlands, Greece, Japan, Canada and across the United States.

Thursday Sept 22, Alexander Room

1:10 p.m.

Improving Wood Coatings Surface Properties Using Modified Natural Waxes

Mike Watson  
Clariant Corporation

Commercially available synthetic waxes already play an important role for different kinds of surface variations in wood coatings, such as scratch resistance, modification of slip and haptic properties, matting effects and more. As we constantly assess and modify our wax portfolio to meet the changing needs of the market, Clariant has been developing new wax technologies based on renewable and sustainable raw materials, while still recognizing the objectives of performance and cost optimization. Technical information will be presented on Clariant Advanced Surface Solutions for wood coatings, with an emphasis on sustainability, to help the audience understand how and why the products work.

1:45 p.m.

Overall Technical & Regulatory Review of Light and Heat Stabilizers Additives for Improved Wood Coatings Durability

Dr. Mouhcine Kanouni  
Clariant Corporation

Regulatory authorities across many regions are reviewing the health hazards of light and heat stabilizer additives used in various applications, including wood coatings. As a result of this ongoing scrutiny, some additives are being reclassified requiring the final products (wood coating) to be labeled as well which puts formulators and end users at higher health hazard exposure risk. In this presentation, we will first review the fundamentals of light & heat stabilizer additives for wood coatings (UV filter, radical scavenger). Then, we will briefly review the details of these regulatory changes for light stabilizer additives. Finally, we will examine a study case of waterbased coating allowing formulators to develop a state of art wood coating formulation with best weathering resistance and totally label free.

2:20 p.m.

A “Tail” of Two Dispersant Technologies for Wood Coatings

Matthew Burge  
BYK USA, Inc.

Over the years enamel and/or pigmented finishes have steadily grown in popularity for wood furniture type coatings. Once predominantly solvent-borne technologies in furniture coatings have expanded to other technologies like aqueous, 100% UV and waterborne UV. Today, pigmented wood coatings are now a staple in many consumer wood product markets- be it cabinets, furniture, millwork or flooring. Especially within the North American cabinet market, pigmented finishes represent well over 50% of all OEM finish offerings. In many cases, pigmented or painted coatings are more popular to consumers than traditional wiping stain finishes. Pigmented coatings are aesthetically pleasing and offer an endless array of color options; however, they can pose a challenge to both coating formulators and manufacturing teams to ensure proper coloristic properties and particle orientation within a pigmented coating. A “Tail” of Two Dispersants will showcase two different, but unique, pigment wetting and stabilizing chemistries and how they are tailored to optimize dispersing performance for waterborne and solvent-borne coatings. This presentation will focus on chemical structure, stabilizing mechanisms, and why and how to properly select a pigment wetting additive..

3:30 p.m.

Furniture Fanatics

Erin West  
Eastman Chemical Company

The U.S. & Europe are home to one of the largest indoor furniture markets in the world; however, the market is extremely fragmented, with only the top 10 brands accounting for a quarter of the market. High fragmentation in the market coupled with moderate growth could potentially hinder established brands and new entrants from growing sales and market share without better understanding the needs and satisfaction gaps that exist in the furniture market. This presentation will be an introduction to the Eastman 2022 Wood Furniture Consumer Insights Study. This study dives in to these questions and more by examining consumer satisfaction with the quality of wood furniture and how U.S. & European consumers define quality when it comes to wood furniture.

4:05 p.m.

**Introduction of Kitchen Cabinet Manufacturing in the United States**

Tim Workman

TW Workman, LLC

Consultant to APCI – Cabinet Works Group

The presentation introduces a past-to-present view of the kitchen cabinetry manufacturing industry. To accomplish this review, milestones introduce this progression. The milestones are automation in manufacturing, construction techniques, advance in wood coatings, and increases in retail channels. Each milestone presents its own historical development and cause/effect in the industry. This presentation closes on the current opportunities and needs in the industry of cabinetry

**KEYNOTE ADDRESS**

4:40 p.m. Alexander Room - Virtual

**Using Wood as a Template for Producing Advanced Structural Materials through Delignification: Status, Challenges, and Potentials**

Dr. J.Y. Zhu

USDA Forest Service, Forest Products Laboratory, Madison, WI

Dept. of Biological Systems Engineering, University of Wisconsin-Madison

We have been working with Prof. Liangbing HU's group at the University of Maryland on this topic for a few years. The group have a few interesting concepts to produce advanced wood structure materials, such as wood that is super strong and highly moldable. These concepts utilize wood as a hierarchical and structure material to turn into advanced materials by chemical and mechanical modifications to keep the wood structure intact rather than deconstructing wood into fibers and sugars. Superwood is developed based on wood densification. Conventional thermal densification of wood can only achieve limited densification and some level of improvement in strength. Delignified wood can be substantially densified, e.g. 5 times, to result in a very strong wood capable of replace steel and aluminum, but much lighter. Moldable wood is based on the concept of partial reversibility of hornification of air-dried fibers that resulted in compressible and stretchable wood cells for producing highly moldable wood parallel to the fiber direction.

This presentation is to introduce these novel concepts and to seek inputs from the wood coating community for making these concept into commercial reality by addressing problems such as reduced wood hydrophobicity through delignification to subject wood prone to water attack. The wood coating community can guide us in our future work to provide information to facilitate collaboration.

Friday Sept 21, Cone Ballroom-A

8:15 a.m.

**Design of New Aqueous Acrylic Resins for Coating and Staining Wood**

David Fenn

PPG Industries, Inc.

Aqueous acrylic resins are widely used for many coating applications due to their excellent durability, weatherability and reasonable cost. The commercial availability of a wide range of acrylic monomers allows the mechanical properties of the resins to be adjusted easily depending on the end use. However, the unique challenge of protecting and beautifying a complex and porous substrate such as wood present plenty of opportunity for the design of new resins that can deliver enhanced performance.

The problem is where to start. There are many variables that can be manipulated, including the composition of the resin, the mechanism of stabilization in water, the resin microstructure and the dispersed particle morphology. This presentation will highlight the application of a range of characterization techniques to develop a fundamental understanding of how these variables impact the film formation process and the surface, bulk and interface properties of the resulting coating.

8:50 a.m.

### Renewable Multipurpose Polyurethane Coatings

David Folkman

Alberdingk Boley USA

More environmentally friendly and "greener" approaches to wood finishing are being driven by stricter regulations and by consumer demand. This focus has resulted in a wide variety of new and improving technologies being developed to meet performance requirements and maintain environmental compliance. Continuing developments in renewable bio-based products have led to new and exciting resin possibilities. Specifically, the scope of this presentation will focus on the application of polyurethane dispersions made from vegetable oils. These resins will allow the formulator the ability to make "greener" finishes than previously possible that offer durability and high performance. This talk will explore a range of products from traditional oil finishes to high durability 2K waterbased polyurethanes for wood substrates.

9:25 a.m.

### Nuvolve™ Engineered Polysaccharides as Sustainable Performance Additive in 1K Water-based Polyurethane Dispersions

JORGE MOK, Christian Lenges, Natnael Behabtu, Ibrahim Sendjarevic, Aisa Sendjarevic

Troy Polymers Inc

Enzymatic polymerization is under development as scalable technology to convert sucrose to engineered polysaccharides. Control of polymer properties and material characteristics creates the potential for a novel differentiated biomaterial platform. The series of alpha-1,3-polyglucose (glucan) materials is being developed using this new process technology. This paper details first application results for the use of glucan in water-based Polyurethane Dispersions (PUDs), where the impact of glucan was systematically evaluated. As part of this study, two forms of glucan were evaluated: The glucan wet cake which is a high surface area morphology of the glucan system and microcrystalline glucan (MCG) which has a well-defined platelet structure. Incorporation of high levels of glucan wet cake and MCG into 1K PUDs resulted in increased modulus for the films while maintaining high levels of elasticity and overall strength, improving the overall film toughness. Furthermore, it was determined that the addition of glucan improved the hydrolytic resistance of 1K PUD films. Additionally, glucan improved the adhesion strength of the 1K PUD to aluminum. Depending on the morphology of the glucan form, the resulting films can show gloss reduction, where glucan wet cake effectively reduced the gloss while MCG essentially maintains the gloss of the base PUD. Based on the observed performance, glucan can be used as sustainable performance additives in water-based PUDs, where they can enhance the film toughness while improving the hydrolytic resistance and also adjust for film/coating appearance. Initial data is presented which demonstrates the performance of PUDs with glucan in an application such as wood protective coatings.

10:10 a.m.

### Deep Matte Wood Coatings with Improved Burnish Resistance

Hossein Riazi and K. Michael Peck

Evonik Corporation, USA

Matting of clear wood coatings is a critical aspect in capturing the natural beauty of the substrate and appealing to consumer demands. Maintaining this visual appearance is vital to coating during product lifespan and with deep matte finishes, resistance to burnish and polishing is of particular concern. Recent work has identified interesting synergies of a matting technology that pairs the efficiency and clarity of silica matting agents with the physical durability and protective ability of organic particles. The plastic deformation and energy dissipation of these particles resist polishing forces and protect the matting structure of the silica. This combination has shown excellent synergy and allows formulation of durable deep-matte finishes with excellent burnish resistance. There are also significant benefits in reduced viscosity build at high matting agent levels. This presentation will review the technical details of the synergy and characteristics in different wood coating systems.

10:45 a.m.

### Automated Dynamic Testing for Drying, Hardness, and Adhesion of Paints, Coatings, and Adhesives

Ronald Obie and Cameron Anderson

ADEPT Material Science

Characterization of dry and cure of Paints, Coatings, and Adhesives is a very important aspect of paints, coatings, and adhesives development. It can be challenging to assess dry and cure of these products on a quantitative non-biased basis. Although there are many different techniques utilized to assess drying, curing, and performance, some are often qualitative at best. It would be useful to have quantitative techniques available to access these properties. In this paper, we introduce a

novel Automated Dynamic Dry Time Recorder (ADDTR) device that measures dry and cure of coatings similar to mechanical dry time recorders according to ASTM Method D5895. However, the novel device is capable of recording and graphically displaying the coating drying profile as it dries so that drying time events may be easily identified, archived, and analyzed, even for clear coatings. Such analysis allows easy and quantitative comparison between different coating systems, chemistries, driers, etc. In certain configurations, the tester may be utilized as a hardness, toughness, and adhesion tester as well.

#### KEYNOTE ADDRESS

1:00 p.m. Cone Ballroom - A

#### Applied Rheology and Coating Performance

Dr. Richard R. Eley

Senior Scientist (retired), Akzo Nobel Coatings, Strongsville, OH  
Adjunct Professor (retired), Dept. of Mechanical Engineering, University of Delaware

The rheology of architectural and industrial coatings plays a critical role in their performance, for example in film leveling and the incidence of coating defects of various kinds, such as sagging, dripmarks, or edge withdrawal. Consequently, the ability to formulate paints having the necessary flow properties is essential for coatings technologists. Experienced formulators have said that as much as half the cost of new product development can be consumed in getting the rheology right. Unfortunately, the quality-control viscosity measurement devices in everyday use in the development laboratory are of little help in this endeavor. Among other shortcomings, most such instruments apply shear stresses which are far from those involved in important coating flow processes. The rheological properties required for a successful coating must be defined with due regard to the prevailing conditions of stress involved in application and film formation. This requires that rheological properties must be measured over a wide range of shear stresses. This presentation, in part, discusses the use of controlled-stress rheometry to characterize coatings, and presents ways of applying the results effectively to the analysis of coating flows. The methodology is fundamental but not unduly time-consuming, since the objective is to provide sound yet timely guidance to formulators. Using the method of "shear stress mapping," key regions of the non-equilibrium flow curve are identified for the control of paint flow processes. Using this approach, simple but strong correlations were obtained of paint flow metrics to the viscosity at the relevant stresses. The fact of high correlation means one can expect that an appropriate rheology adjustment will correspondingly improve performance. Further, it is demonstrated that shear stress, not shear rate, is the correct independent variable both for experimentation and for the graphical presentation and analysis of viscosity data. The yield stress parameter, particle flocculation, and sedimentation will also be discussed as time permits, as well as an oscillatory shear method of direct measurement of the yield stress.

The University of North Carolina at Greensboro  
The Wood Coatings Research Group

## Tenth Wood Coatings and Substrates Conference

Thursday & Friday, September 22 & 23, 2022

Location: The University of North Carolina at Greensboro  
Elliott University Center  
Alexander Room and Cone Ballroom  
540 Stirling Street, Greensboro, NC 27412

Directions: <https://parking.uncg.edu/access/access.html>

### Registration Form

Online registration at <https://www.woodcoatingsresearchgroup.com/wood-coatings--substrates-conference-2022.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.

Parking: Parking is available in parking decks throughout the campus for \$10.00/day.  
The recommended parking deck is the Oakland Avenue Parking Deck.  
See <https://parking.uncg.edu/access/access.html> for other locations

Lunch: There is a wide range of Restaurants within EUC and within walking distance of the UNCG Campus for lunch Thursday. A box lunch will be provided Friday to allow opportunity for networking and visiting Sponsor booths. Please indicate if you will be attending lunch on Friday

Please RSVP me for dinner on Thursday evening YES / NO

I will be attending the Networking Lunch on Friday YES / NO

Please indicate lunch Preference (Note, this is not a reservation but a count) Turkey / Ham / Veggie Wrap

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



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