WOOD C&S

2024

10th Wood Coatings and Substrates Conference
Hybrid Conference

When and Where:
Thursday & Friday, September 26 & 27, 2024
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. Mojgan Nejad, Ph.D
Associate Professor with a joint appointment in the Department of Forestry and Chemical Engineering and Materials Science
Michigan State University, East Lansing, MI

Dr. Véronic Landry, Ph.D.
Professor
Department of Wood and Forest Sciences
Director of the Research Center on Renewable Materials
Laval University, Québec City, Québec, Canada

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
https://chem.uncg.edu/
https://www.woodcoatingsresearchgroup.com/wood-coatings--substrates-conference-2024.html
For abstracts, registration information, directions, maps and corporate sponsors contact:
Ronald Obie
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WOOD C&S 2024

Program Overview

	Thursday Sept 26, Cone Ballroom C Wood Substrates and Additive Technologies in Coatings
12:00 – 12:50 p.m.	Sponsor Table Top Exhibits
12:50 – 1:00 p.m.	Welcome
1:00 - 1:30 p.m.	Alternatives to Fluorosurfactants for Waterbased Floor Care Coatings Anthony Moy BASF Corporation
1:30 – 2:00 p.m.	Pushing Performance Boundaries of Waterborne Wood Coatings with Multifunctional Reactive Silicone Additives Bryan Halton DyStar
2:00 - 2:30 p.m.	Synthetic clays at 60: Pioneering Rheological Solutions for Superior Wood Coatings Dr. Neil Grant BYK Additive Ltd. UK
2:30 – 2:50 p.m.	Sponsor Spotlight / Commercials
2:50 – 3:20 p.m.	A new thermoformable resin for the Medium Density Fiberboard industry Eric Lawson BASF
3:20 – 3:50 p.m.	Cabinetry insights presented by Eastman Sydney White Eastman Chemical Company
3:50 – 4:50 p.m.	KEYNOTE ADDRESS Sustainable Coatings: Utilizing Lignin for the Development of Biobased Resins Dr. Mojgan Nejad Department of Forestry and Chemical Engineering and Materials Science Michigan State University, East Lansing, MI **Dr. Mojgan** Nejad is an Associate Professor with a joint appointment in the Department of Forestry and Chemical Engineering and Materials Science Department at Michigan State University. She has a bachelor's degree in applied chemistry and a PhD in Wood Coating. Her current research projects are focused on developing lignin-based coatings, adhesives, foams, and composites, and most of them are conducted in close collaborations with industry partners. Dr. Nejad has won the Adhesive and Sealant Council Innovation Award for replacing 100% phenol with lignin in a phenolic resin formulation.
5:00 – 6:00 p.m.	Sponsor Table Top Exhibits
7:00 p.m. - Until	Wood C&S Fellowship Dinner – Open to all; RSVP at time of Registration To Be Announced

WOOD C&S 2024

Program Overview

	Friday Sept 27, Cone Ballroom
	Cone Ballroom-BC Polymer Chemistry, Physical Chemistry, and Analysis of Coatings
7:45 – 8:20 a.m.	Networking Coffee and Welcome
8:30 - 9:00 a.m.	Sustainability With LED Cured Coating Technology Joe Grefke Allied Photochemical
9:00 – 9:30 a.m.	The Protection of Wood Surfaces by Inventive Polymer Design George Wang Alberdingk Boley, USA
9:30 – 10:00 a.m.	Improving Manufacture Efficiency through the use of Waterbased UV Curable Polyurethanes in Wood Coatings Bob Wade* and Mike Jeffries Covestro
10:00 – 10:15 a.m.	**Break**
10:15 – 10:45 a.m.	**Zeta-potential: The higher the better? What does Zeta potential tell about design of wetting and dispersing additives** [1]Gillian Lazarus, [1] Matthew Burge, [2]Robin von Hagen and [2]Anne Vogel [1]BYK USA Inc. 524 South Cherry Street, Wallingford, CT 06492 [2]BYK-Chemie GmbH Abelstrasse 45, 46483 Wesel, Germany
10:45 – 11:15 a.m.	On Modeling Spreading and Leveling of Coatings Ronald Obie and Cameron Anderson Wood Coatings Research Group
11:15 a.m. – 12:55 p.m.	Open Lunch, Sponsor Table Top Exhibits, and Networking
1:00 – 2:00 p.m.	KEYNOTE ADDRESS Unlocking Surface Secrets: The Power of Confocal Raman Microscopy in Coating Analysis Véronic Landry*, Aurélien Hermann, Ingrid Calvez, Jérémy Winninger Department of Wood and Forest Science, Faculty of Forestry, Geography and Geomatics, Université Laval, 2405 rue de la terrasse, Québec City, Québec, G1V 0A6, Canada. **Dr. Véronic Landry** is a full professor in the Department of Wood and Forest Sciences and Director of the Research Center on Renewable Materials at Laval University. She specializes in wood protection through finishing and chemical modification approaches. Over the past years, she has worked on the development of environmentally friendly coatings (water-based, photopolymerizable, bio-based) and functional coatings (self-healing, self-stratifying) for indoor and outdoor wood products. She has also conducted various projects on wood impregnation and chemical modification to increase the hardness and dimensional stability of this material, as well as on the valorization of forest biomass

Thursday Sept 26, Cone Ball Room C

1:00 p.m.

Alternatives to Fluorosurfactants for Waterbased Floor Care Coatings

Anthony Moy
BASF Corporation

Concern continues to grow in the floor care coating market regarding the use of fluorosurfactants, with increasing regulatory pressure due to concerns about persistency and health effects of these chemicals. Fluorosurfactants provide a variety of beneficial properties in coatings, coupled with efficiency in use. For floor care coatings, fluorosurfactants are used to enable wetting of low energy tile substrates while providing excellent flow and leveling performance for smooth surface appearance. Recognizing this market need, research was done at BASF to examine various candidate chemistries as potential functional alternatives to fluorosurfactants. This session will review the research done to determine promising lead candidates, demonstrating comparable wetting and flow and leveling performance in floor care coatings relative to a benchmark fluorosurfactant. Aspects such as selection of surfactant candidates, application testing, and the latest findings in performance optimization will be covered. This work provides a framework for sustainable alternatives to fluorosurfactants for use in waterbased floor care coatings.

1:30 p.m.

Pushing Performance Boundaries of Waterborne Wood Coatings with Multifunctional Reactive Silicone Additives

Bryan Halton
DyStar

DyStar developed several novel multifunctional reactive silicone additives that behave somewhat like waxes, but have the ability tocrosslink with the resin. This study investigated the effects of adding these multifunctional additives and novel DyStar defoamers to amodern pigmented wood coating formulation. Performance properties have been tested against the KCMA and AWI chemicalresistance standards, as well as ASTM D-1308. Key findings demonstrate that sag resistance improved by up to 60% and opacityincreased by 0.3 ΔL units when incorporating the multifunctional additives. Stain resistance was maintained at 2.0 wt.% addition levels.Work is continuing to determine effects on stain resistance by increasing the weight addition of the additives. We are also determiningwhether there is improvement in chemical resistance with or without a wax component. Mechanisms of the utilized chemistries will bediscussed. We will also present performance enhancements relative to material costs so the audience can determine if theimprovements in sag resistance, opacity, and stain resistance demonstrate the value these additives can provide.

2:00 p.m.

Synthetic clays at 60: Pioneering Rheological Solutions for Superior Wood Coatings

Dr. Neil Grant
BYK Additive Ltd. UK

In 2024 BYK celebrates the 60*th* anniversary of one of its most important rheological products: LAPONITE, manufactured in the UK. A layered silicate manufactured from naturally occurring inorganic mineral sources it is used to improve the performance and properties of a wide range of industrial products. This synthetic phyllosilicate provides solutions to a broad range of rheology challenges in the wood coating industry. Anti-settling properties of the synthetic phyllosilicate stabilize highly filled pigmented systems without impacting spray or tinting viscosity. Pigment vibrancy or anti-burnishing properties are enhanced by post application pigment or wax stabilization due to the synthetic phyllosilicate's unique combination of anti-sagging and rapid viscosity recovery. Finally, the exceptional clarity of BYK's synthetic phyllosilicate dispersions ensures it always finds value as a rheology additive in varnishes, clear dip, and spray coatings. This presentation is designed to introduce the audience to the product technology of synthetic phyllosilicates including a handling guide, key performance properties and specific formulation examples.

2:50 p.m.

A new thermoformable resin for the Medium Density Fiberboard industry

Eric Lawson
BASF

Currently Medium Density Fiberboard (MDF) is the standard product for machined surfaces (routered) in the wood panel industry. Its relative uniformity and lack of voids, as compared to particleboard or oriented strand board, and defects as compared to plywood with its knotholes and other abnormalities, make it the most cost-effective choice for products such as moldings, cabinet doors, furniture fronts, retail displays, decorative wall panels, doors, and other applications. However, the current process removes viable material from the panel, which must be discarded, and leaves a rough surface which can unacceptably absorb finish coatings or glue for applying foils or papers. This requires time consuming steps to rectify,

limits design to linear shapes (such as moldings or parts for a five panel door), and represents the largest source of cost to produce such panels. BASF has introduced a thermoformable resin for the manufacture of MDF that allows the finished MDF panel to be thermoformed rather than routed. This frees the design capabilities, opening the door to more complex designs with greatly reduced cycle times, zero waste, greatly reduced cost, and a finer finish for painting. The thermoformability of the resin now allows the thermoformable property of the cellulose in the panel to be utilized, allowing 3 dimensional shapes to be formed by bending and embossing the panels, at any time after their manufacture.

3:20 p.m.

Cabinetry insights presented by Eastman

Sydney White
Eastman Chemical Company

The U.S. is home to one of the largest cabinetry market with a dynamic and evolving landscape, shaped by ever-changing consumer preferences. Fragmentation in the market coupled with moderate growth make understanding consumer needs and satisfaction gaps important for members of the value chain to grow and protect share. This study conducted in 2023 surveys U.S. consumers on purchase drivers, satisfaction gaps, issues experienced with cabinetry and what consumers would like to see in the cabinetry market. The presentation will educate the audience of these findings and potential opportunities in wood coatings to address satisfaction gaps, performance issues and unmet needs with today's cabinetry offerings.

KEYNOTE ADDRESS

3:50 pm Cone Ballroom C

Sustainable Coatings: Utilizing Lignin for the Development of Biobased Resins

Dr. Mojgan Nejad
Department of Forestry and Chemical Engineering and Materials Science
Michigan State University, East Lansing, MI

Lignin is the most abundant aromatic natural polymer in the world, with the potential to replace petrochemicals in polymeric resin formulations. Lignin is currently produced/isolated from wood and agricultural residues (as a byproduct) during chemical pulping and lignocellulosic ethanol production. The complex polyphenolic structure of lignin makes it a great candidate to substitute fossil-fuel-based raw materials in polymeric resins. This talk is focused on our recent results in replacing 100% of phenol in phenolic resins, 80-100% of polyol in polyurethane resins (both in solvent-based and water-based formulations), and 100% of bisphenol-A in epoxy resins using unmodified lignins. Depending on the biomass source and isolation method, the properties of lignin vary significantly. We characterized a wide range of technical lignins and chose the most suitable ones for each specific application. The properties and performances of developed lignin-based resins (phenolic, PU, and epoxy) were measured and compared with commercially available resins in the market. Using lignin in resin formulation that has inherent compatibility with wood (lignin is a natural glue in wood) immediately improves the coating adhesion to wood.

Friday Sept 21, Cone Ballroom-A

8:30 a.m.

Sustainability With LED Cured Coating Technology

Joe Grefke
Allied Photochemical

UV coatings provide a sustainable solution for manufacturers in all sectors of industrial manufacturing. Arc and microwave lamp technology have provided a reduction in energy use over traditional IR ovens for curing water-based and solvent-

based coatings. However, with LED cured coatings the energy savings are even greater. The 100% solids formulas that UV LED coatings provide mean that there are no volatile organic compound or hazardous air pollutant emissions. That coupled with LED lamps only using 3kW per hour per lamp make it the most sustainable coating solution available today.
Sustainable manufacturing processes are key to drive towards more efficient and optimized manufacturing in the North American Marketplace. Sustainability can be measured a variety of ways, which are outlined below:

- VOC reduction
- Less energy usage
- Optimized Labor workforce
- Faster manufacturing output – more with Less
- More efficient use of capital
- Plus, many combinations of above listed measurements

9:00 a.m.

The Protection of Wood Surfaces by Inventive Polymer Design

George Wang
Alberdingk Boley, USA

Wood is a very versatile substrate that is useful for various interior and exterior market areas, including furniture, building materials and flooring. However, its surface must be adequately protected to prevent degradation and to be more resistant to destructive environmental exposures, including stains, chemicals, water and sunlight. Alberdingk Boley has developed technologically advanced, high quality, and sustainable water-based resins for wood for many years that excel in enhancing wood surfaces across numerous applications. This presentation reviews some of the unique and creative developments for enhancing the natural beauty of wood while preserving its integrity using a diverse range of water-based resin chemistries. Such resins include biobased technology and all acrylic emulsions which meet environmental compliances and are PFAS/APEO free with low VOC capability. The performance attributes of these resins will be discussed and data presented demonstrating high end paint performance.

9:30 a.m.

Improving Manufacture Efficiency through the use of Waterbased UV Curable Polyurethanes in Wood Coatings

Bob Wade* and Mike Jeffries
Covestro

High performance UV Curable coatings have been used in the manufacture of flooring, furniture and cabinets for many years. For most of this time 100% solids and solvent based UV curable coatings have been the dominate technology in this market. In recent years, waterbased UV Curable coatings have become a growing technology in this market. Waterbased UV curable resins have proven to be a useful tool for the manufacturer for a variety of reasons including passing KCMA stain and chemical resistance testing and reducing VOC's. For this technology to continue growing in this market several drivers have been identified as key areas where improvements need to be made. These will take waterbased UV curable resins beyond simply having the "must haves" that most resins possess. They will begin adding valuable properties to the coating bringing value to each position along the value chain from coating formulator through to the installer and owner. Manufacturers today desire a coating which will do more than just pass the specification. There are also other properties which provide them benefits in manufacture, packing and installation. One desired attribute is improvements in plant efficiency. For the waterbased coating this means faster water release, and faster blocking resistance. Another is improving resin stability for capture/reuse of a coating and management of their inventory. For the end user and installer desired attributes are better burnish resistance and no metal marking during installation.
This paper will discuss new developments in waterbased UV curable polyurethanes which offer much improved 50°C paint stability in clear as well as pigmented coatings. It will also discuss how these resins address the desired attributes of the coating applicator in increasing line speed through fast water release, improved block resistance, and solvent resistance off the line which improves speed for stacking and packing operations. This will also improve off the line damage which sometimes occurs. This paper will also discuss improvements demonstrated in stain, chemical, burnish and metal marking resistance important to installers and owners.

10:15 a.m.

Zeta-potential: The higher the better? What does Zeta potential tell about design of wetting and dispersing additives

[1]Gillian Lazarus, [1] Matthew Burge, [2]Robin von Hagen and [2]Anne Vogel
[1]BYK USA Inc. 524 South Cherry Street, Wallingford, CT 06492
[2]BYK-Chemie GmbH Abelstrasse 45, 46483 Wesel, Germany

Wetting and Dispersing additives are used in a wide variety of applications ranging from wood coatings to plastics formulations. These additives work by adsorbing at the surface of a solid particle and then stabilizing it within a liquid media. The mechanisms responsible for this stabilization are electrostatic and/or steric interactions. Zeta-potential measurement is a non-invasive method that allows for the analysis of the interface between the particles and the surrounding medium where the wetting and dispersing additive is adsorbed. To design specific wetting and dispersing additives that generate a durable adsorption and optimized stabilization, zeta potential measurements can be employed. This presentation will cover how different molecular structures influence the zeta potential of particle dispersions (electrostatic vs. steric stabilization) and how the analytical method can be utilized to optimize additive structures. The potential limitations of the method will also be discussed.

10:45 a.m.

On Modeling Spreading and Leveling of Coatings

Ronald Obie and Cameron Anderson
Wood Coatings Research Group

Paint and coatings technicians, chemists, and scientists spend significant laboratory effort to ensure their products apply well and produce finished surfaces with good appearance properties. How the coating wets, spreads, flows, and levels has an important impact on the final finish appearance. Excellent appearance is especially important for wood coatings. Besides application methods and techniques, there are many factors that impact final coating appearance. A few of these factors include coating rheology/viscosity, substrate surface energy, product surface tension, and formation of surface tension gradients within the drying film. There are many additives available to the coatings chemist to assist with developing "the proper flow package," and although much effort has been put into development of these many additives, for the coating's chemist, obtaining the proper flow package is still often a trial-and-error process. Further, in basic product research and development of flow additives, evaluation generally focuses on static and dynamic surface tension of the additive as a function of concentration, generally, in water. Research in the area of flow and leveling of coatings is a very active area and is even more acute as the industry strives to eliminate the use of PFAS additives. In this talk, we briefly demonstrate initial work modeling spreading and leveling of solvent based and water-based coatings.

KEYNOTE ADDRESS

1:00 p.m. Cone Ballroom - BC

Unlocking Surface Secrets:
The Power of Confocal Raman Microscopy in Coating Analysis

Dr. Véronic Landry
Department of Wood and Forest Science, Faculty of Forestry, Geography and Geomatics,
Université Laval, 2405 rue de la terrasse, Québec City, Québec, G1V 0A6, Canada.

Confocal μ-Raman microscopy is a cutting-edge technique that combines traditional optical microscopy and chemical identification through Raman spectroscopy. Its high-resolution capabilities offer the ability to chemically characterize samples in 3D, making it particularly useful for studying coatings and their substrates. This technique helps identify aspects such as gradients of different kinds in coatings (concentration, polymerization, degradation) and the study of phase separation parameters of multiphase finishing systems, including the composition of the phases and their conversion degrees. Furthermore, it can be employed to examine the interactions between coatings and their substrates and the modification of wooden substrates.

During this presentation, we will showcase several case studies highlighting the potential of confocal Raman microscopy to study different coating types and substrates. As examples, we will present a study on how this technique can assess the performance of various additives to counter oxygen inhibition in photopolymerizable coatings. Then, we will present how it was used to study phase-separated free-radical/cationic hybrid systems as self-matting coatings. Raman spectroscopy allowed for a more in-depth evaluation of the impact of photoinitiator concentration and monomer fraction on surface morphologies and gloss. Finally, we will demonstrate how confocal Raman spectroscopy can be used to study the modification of wooden substrates and their interaction with coatings.

Eleventh Wood Coatings and Substrates Conference

Thursday & Friday, September 26 & 27, 2022

Location: The University of North Carolina at Greensboro
Elliott University Center
Cone Ballroom
540 Stirling Street, Greensboro, NC 27412
Directions: https://parking.uncg.edu/
Conference Hotel: Marriott Courtyard Greensboro Airport – Rate $125 by Sept. 2

Registration Form

Online registration at https://www.woodcoatingsresearchgroup.com/wood-coatings--substrates-conference-2024.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 decks are Oakland Avenue Parking Deck, and Walker Avenue Parking Deck.

Lunch: There is a wide range of Restaurants within EUC and within walking distance of the UNCG Campus for lunch Thursday. 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
An Italian lunch will be served Friday. Menu includes Caesar salad, fresh baked cookies and fresh baked garlic bread. Please select your preference for pasta and entrée below (Note, this is not a reservation but a count)

Select your pasta
1. Fettucine alfredo
2. Tortellini primavera

Select your entrée
1. Chicken marsala
2. Chicken parmesan

Add shaved parmesan? YES / NO

Questions: Please direct your questions to: Ron Obie r.obie@woodcoatingsresearchgroup.com

Please Return The Completed Form to:
Ronald Obie
Email: r.obie@woodcoatingsresearchgroup.com

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