

WOOD C&S

2008

3rd Wood Coatings and Substrates Conference

When and Where:

Friday, September 12, 2008
The University of North Carolina at
Greensboro
Department of Chemistry & Biochemistry
Sullivan Science Building
301 McIver Street, Greensboro, NC 27412

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:

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

Keynote Speaker:

Wood/Composite Structure
Chemistry and Biology
Dr. Alex C. Wiedenhoef, Botanist
United States Department of Agriculture
Forest Service

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:

www.woodcoatingsresearchgroup.com

<http://www.uncg.edu>

www.piedmontsociety.org

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

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WOOD C&S 2008

Program Overview

	Room 201 Chemistry of Substrates; Chemistry and Physical Chemistry of Coatings Moderator: Scott Van Remortel	
8:00-8:40 a.m.	Meeting the Needs of a Changing Wood Product's Market Dr. Robert Smith Virginia Tech University	
8:50-9:30 a.m.	Coatings Rheology and Coating Flows Dr. Richard Ely Senior Scientist, ICI Paints North America, Strongsville OH	
9:40 a.m.-10:50 a.m.	<p style="text-align: center;">KEYNOTE ADDRESS</p> <p style="text-align: center;">A review of wood biology in the context of wood-coatings interactions and wood coatings failures</p> <p style="text-align: center;">Dr. Alex C. Wiedenhoef, Botanist Center for Wood Anatomy Research, Forest Products Laboratory</p> <p>Alex C. Wiedenhoef is a botanist with over 12 years of experience identifying wood in the Center for Wood Anatomy Research at the Forest Products Laboratory and has identified over 15,000 specimens. He has authored or co-authored scientific papers in the fields of botany, wood anatomy, and wood technology as well as a field wood identification manual for CITES (Convention on the International Trade in Endangered Species) that has been distributed to agents and customs officials in over 100 countries around the world. He co-authored the wood structure chapter in the 2006 CHOICE Award winning textbook, <i>Handbook of Wood Chemistry and Composites</i>. He was a member of an international committee that organized <i>IAWA List of microscopic features for softwood identification</i> and has been an Associate Editor for the International Association of Wood Anatomists Journal since 2003. He has taught wood identification courses for a variety of US Government agencies and appears as an annual guest lecturer in UW-Madison's Wood Identification, Dendrology, and Plant Anatomy courses, and has taught CITES wood identification workshops in Nicaragua, Honduras, and in Southeast Asia.</p>	
	Room 201 Physical Properties/Appearance/Performance Moderator: Ed West	Room 200 UV Technology/Nanotechnology/Experimentation Methodology Moderator: Millie Powell
11:00-11:40 a.m.	Characterization of the Surface Mechanical Properties of Paints and Polymeric Surface Coatings Dr. Nicholas X. Randall CSM Instruments	New Nano Technology for the Elimination of Knot Discoloration and Tannin Bleeding from Wooden Structures Coated with Waterborne Coatings Kelly Smith Nuplex Resins LLC
11:40 – 1:00	Lunch-Walk to Area Restaurants	
1:00 – 1:40 p.m.	Utilization of polyurethane-acrylic blends to achieve optimum performance in a 1K water-based wood floor coating C. Ivan Tyre Alberdingk Boley, Inc.	The Use of Nanosized Functionally Dispersed Additives to Enhance Scratch and UV Protection in Today's Paint and Coatings John Du BYK USA
2:00 – 2:40 p.m.	A New Performance Additive in High Solids Wood Coating Formulations for Furniture Jennifer Coger Eastman Chemical	A New Generation of Waterborne UV Resins Gail Pollano DSM Resins
3:00 – 3:40 p.m.	Pigment-Dispersions and their use for wood-coatings Andreas Harz Clariant Corporation	The Use of Combinatorial High-throughput Experimentation in Coatings Research Bob Wade, Nancy Hessler, Cliff Bridges, Carol Kinney, and Abdullah Ekin Bayer Material Science
4:00 – 4:40 p.m.	An Overview of Finishing Wood Office Furniture: Market Needs Driving Process and Coating Development Aaron Smith Kimball International	Overcoming the Challenges of Formulating Pigmented Waterborne UV Coatings Laurie Morris Alberdingk-Boley, Inc.

8:00 a.m. Room #201
Meeting the Needs of a Changing Wood Product's Market
Dr. Robert Smith
Virginia Tech University

This presentation will provide an overview of the changing use of wood and wood substitutes in traditional applications. As new products compete with traditional wood in a changing market, materials that are designed to enhance wood performance may also be forced to change. From changes in housing design to prefabrication, wood is still the major structural building material for homes and secondary products. This presentation will illustrate increasing trends of engineered wood in home construction, wood/plastic composites and imported species for outdoor markets, and project new opportunities that may exist for wood coatings for wood based materials.

8:50 a.m. Room #201
Coatings Rheology and Coating Flows
Dr. Richard Ely

Senior Scientist, ICI Paints North America, Strongsville OH

Applied rheology endeavors to connect fundamental properties and real processes. Industrial and architectural coatings are materials whose commercial success depends on having the "right" rheology. In turn, the necessary rheological properties must be defined with due regard to the stresses and resulting flow rates that prevail during processing and end use. Rheology provides understanding of the relationship between operational stresses and resulting flows, particularly for materials showing complex flow behavior, as do the majority of liquid coatings. This talk introduces rheological principles and discusses how to interpret flow curve data in the analysis of coatings performance. It is shown that viscosity is best understood as a function of shear stress, not shear rate. This perspective leads to improved understanding of the governing role of rheology in key application and film formation processes. We also touch on the potential for more detailed understanding offered by computer modeling of coating flows, in particular the roles of rheology and substrate geometry in the development of coating flow defects.

KEYNOTE ADDRESS

9:40 a.m. Room #201

**A review of wood biology in the context of wood-coatings interactions
and wood coatings failures**

Dr. Alex C. Wiedenhoef, Botanist

Center for Wood Anatomy Research, Forest Products Laboratory

Wood is a structurally, physically, and mechanically anisotropic material of biological origin. To understand the interaction between a coating system and wood, one must have a basic understanding of the structure and composition of wood, as well as knowledge of the chemistry of the coating itself. Furthermore, as a biological material, wood exhibits a range of properties, some desirable, and some less so, but all of which are derived from and predicted by its biological origin. As a substrate for coatings, then, wood biology is a central component of understanding the overall wood-coating system, particularly in cases where the coating system delivers suboptimal performance. Topics relating the structure and biological nature, both strengths and weaknesses, of wood to wood coatings in general, and to coatings failures specifically, will be presented in the context of establishing a more holistic concept of the wood-coating interaction.

11:00 a.m. Room #201
Characterization of the Surface Mechanical Properties of Paints and Polymeric Surface Coatings

Dr. Nicholas X. Randall
CSM Instruments

The mechanical properties of polymeric coatings are often overlooked because researchers are not aware of how modern instrumentation can now aid them in understanding how a particular product may survive in service conditions. In many applications the two main considerations are aesthetics and durability, both of which can be directly related to the mechanical properties of the base material. For example, the durability of a paint will depend on its hardness, elastic modulus, scratch resistance, abrasion resistance and on how well it adheres to its substrate. The aesthetic quality of the paint surface will depend on its ability to resist surface scratches and deformations which will diffract light and cause it to lose its glossy appearance. This paper presents the instrumentation methods required to measure accurate mechanical properties of soft polymeric coating materials which are commonly used in paints, varnishes, lacquers, etc. A range of examples of typical results is also included to give the reader some ideas of the information which can be obtained from some of these simple tests.

11:00 a.m. Rom #200

New Nano Technology for the Elimination of Knot Discoloration and Tannin Bleeding from Wooden Structures Coated with Waterborne Coatings

Kelly Smith

Nuplex Resins LLC

The use inorganic nano particles were investigated in waterborne one component coatings. Main application area for these coatings is on wood. Cationic layered double hydroxides have been found to be very effective in stopping the bleeding of tannins or other staining substances from wood. This prevents the discoloration of the coating often observed when the coated article is exposed to humidity and UV-light. The modification (exfoliation, intercalation) of the layered double hydroxide and its application for knot discoloration on Pine as well as Tannin bleeding from difficult wood types such as Merbau, Western and Red Cedar are discussed, with comparisons made to existing technology based on zinc containing and zinc free primer systems.

1:00 p.m. Room #201

Utilization of polyurethane-acrylic blends to achieve optimum performance in a 1K water-based wood floor coating

C. Ivan Tyre

Alberdingk Boley, Inc.

With the advent of an environmentally conscious consumer and increased regulatory pressure, the coatings formulator is faced with developing products within the constraints of lower emission of volatile organic compounds while still achieving specific performance targets. Although new resins are being developed which will meet or exceed the expectations of the formulator, a blend approach using already familiar resins is still a viable option given known performance attributes of each. This paper discusses the utilization of various water-based polyurethane-acrylic blends in developing a one-component wood floor coating which achieves a VOC target of 275 g/L, a balance of hardness development with very good abrasion resistance, and excellent chemical resistance in comparison with commercially formulated water- and oil-based products in the consumer and contractor applied markets.

1:00 p.m. Room #200

The Use of Nanosized Functionally Dispersed Additives to Enhance Scratch and UV Protection in Today's Paint and Coatings

John Du

BYK USA

Recently introduced liquid additives containing alumina and/or silica Nanoparticles can provide improved scratch resistance for general industrial, wood, coil and architectural coatings. These new nano silica and alumina particles range from 10 nm in diameter to 80 nm in diameter. They are dispersed with boundary phase technology in different media and are very easily incorporated by low shear into aqueous, solvent based, solvent free and UV- curing systems. Typically, dosages of 0.5 – 3.0% provide significant and long-term scratch and/or abrasion resistance without adversely affecting gloss, color, clarity or other physical properties of the high gloss, semi-gloss, and satin clear coatings.

These new nano silica and alumina particles can also be incorporated into pigmented coatings. The nano silica and alumina particles not only offer scratch resistance but can assist in wear resistance, better adhesion, staining, and corrosion resistance because the nano particles create a denser film structure.

The inclusion of surface-active modified poly dimethyl siloxanes by its orientation and crosslinking at the nanoparticle surface enhances the performance of the Nanoparticles. Where high gloss is not issue, combinations of the larger 60 to 80 nm alumina particles that are dispersed with boundary phase technology in different media and are very easily incorporated by low shear into aqueous, solvent based, solvent free and UV- curing systems. Typically, dosages of 1.0 – 6.0% provide significant and long-term scratch with waxes and matting agents to allow the formulation of semi-gloss, semi-transparent to opaque scratch resistant coatings. .

Amongst inorganic UV absorbers, zinc oxide and cerium oxide stand out with its almost complete adsorption of UV-A, B, and C. Reduction of particle size from micron to nano enables the formulator to formulate clear coatings that can both enhance the appearance of wood substrates as well as provide long-term protection for the wood metal and plastic substrates against UV degradation. Comparisons between the typical organic UV absorbers will be made with available inorganic UV absorbers.

2:00 p.m. Room #201

A New Performance Additive in High Solids Wood Coating Formulations for Furniture

Jennifer Cogar

Eastman Chemical

The implementation of EU regulations with respect to reducing the emission of volatile organic compounds (VOCs) in the coatings industry is having different levels of impact in the various market segments. This paper will focus on wood coating systems where there is a continuing development of compliant technologies such as UV cure and waterborne.

In contrast to the automotive and general industrial industry segments, the high solids approach to industrial wood coatings has not been of great interest. However, for certain applications high solids solventborne coating systems can offer excellent attributes long valued by the coatings applicator. New performance additive Solus 2100™ is an example of one of Eastman's coatings additives which can provide performance enhancements such as improved flow & levelling, dry to touch time and polishability whilst maintaining excellent non-yellowing characteristics with minimal effect on the level of volatile organic content in the coatings formulations.

2:00 p.m. Room #200

A New Generation of Waterborne UV Resins

Gail Pollano

DSM Resins

Conventional aqueous UV curable urethanes usually contain 2-hydroxyl ethyl acrylate (2-HEA) as the main source for the unsaturation. Therefore, the concentration of unsaturated groups and inherently, the crosslink density, is relatively low when based on 2-HEA only. This can be increased by the use of so called reactive diluents or multifunctional acrylics (MFA) as widely used in the industry, but this generally results in drawbacks like skin irritancy, tackiness before cure and loss of performance when alkoxyated MFAs are used. A more environmentally benign way to increase crosslink density is the use of highly branched polyester polyols that are partially acrylated in the synthesis of aqueous polyurethanes. In this way, the unsaturated groups are incorporated into the urethane backbone and no additional reactive diluents need to be added. A number of acrylated polyester polyols have been synthesized differing in the degree of acrylation leading to a variation in crosslink density of the corresponding urethane dispersions and an overview of the properties of these urethanes will be described in this paper.

3:00 p.m. Room #201

Pigment-Dispersions and their use for wood-coatings

Andreas Harz

Clariant Corporation

Pigment-dispersions are important raw-materials for wood-applications. We will cover the advantages of pigment-dispersions versus dyes and the advantages of pigment- dispersions versus powder-pigment. We will also focus on the right selection of pigment dispersions for all kind of wood application systems since there are many different carriers available.

3:00 p.m. Room #200

The Use of Combinatorial High-throughput Experimentation in Coatings Research

Bob Wade, Nancy Hessler, Cliff Bridges, Carol Kinney, and Abdullah Ekin

Bayer Material Science

A typical coating formulation is composed of many ingredients such as resins, solvents, pigments, and additives. Screening and optimization of all the ingredients in a coating formulation for the best performance is a time consuming process. Nowadays, there is an urge in the chemical industry to evaluate higher number of samples in a short period of time. With the use of combinatorial high-throughput experimentation large number of samples can be evaluated in minimal time.

This presentation will focus on some of the new technologies available for the coating chemists and high-throughput methodologies used at Bayer MaterialScience for screening new materials. In addition, a few high-throughput experiments that were used in wood coating development will be presented covering experiment design, execution of experiments, and analysis of the data.

4:00 p.m. Room #201

An Overview of Finishing Wood Office Furniture: Market Needs Driving Process and Coating Development

Aaron Smith

Kimball International

Many different types of stains and clear coat finishes are used to achieve the depth and clarity users of fine office furniture have grown to appreciate and expect. Technologies ranging from pre-catalyzed lacquers to UV-curable coatings allow one to choose certain characteristics and green solutions for a project without sacrificing aesthetic quality. Physical property requirements include water and solvent resistance, scratch resistance, and pen imprint, among others. There is a delicate balance between durability, ease-of-application, and final appearance, and those coating attributes must come together to meet the needs of the customer. Beginning with thorough market research and a well documented archive of technical data, a specific set of future state coating performance targets may be established. Ever mindful that the furniture's "close to the wood" look is one of the first selling points, it may be necessary to have the flexibility in one's process to apply a couple different coating chemistries to the same colored up wood substrate. For the best chance of success, new finishes to meet the performance targets must be co-developed with the raw material suppliers, coating companies, and equipment solution providers.

4:00 p.m. Room #200

Overcoming the Challenges of Formulating Pigmented Waterborne UV Coatings

Laurie Morris

The use of waterborne (WB) UV chemistry is growing in the factory finished wood market because the technology provides high performance capability while satisfying increasing environmental requirements. Kitchen cabinet and furniture manufacturers are using WB UV clear topcoats because they give a look similar to solvent based products but can be formulated with nearly zero VOCs. These manufacturers are starting to look to WB UV for their pigmented coatings as well. This paper will describe the advantages and challenges of formulating pigmented coatings with WB UV resins. An overview of the various types of WB UV chemistries will be discussed as well as the coating performance associated with the differing chemistries. Performance contrasts between clear and pigmented coatings will be explored and formulating considerations will be discussed.

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Third Wood Coatings and Substrates Conference

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Department of Chemistry & Biochemistry
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301 McIver Street
Greensboro, NC 27412

Directions: http://www.uncg.edu/online_map/

Registration Form

Due to Limit Seating in the Auditorium Rooms, Registration is limited to the first 100 Applicants

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 \$1.00/hr or \$5.00/day.
The most convenient parking deck to the New Science Building is the McIver Street Parking Deck. See <http://parking.uncg.edu/map.html> for other locations

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

Questions: Please direct your questions to: Ron Obie
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WOOD C&S 2008 CONFERENCE COMMITTEE

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