

Wood C&S

2006

2nd Annual Wood Coatings and Substrates Conference

When and Where:

Friday, September 29, 2006
The University of North Carolina at
Greensboro
Department of Chemistry & Biochemistry
New Science Building
Greensboro, NC

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:

Mechanical Properties of Coatings
Fundamentals of Property Determinations in Coatings; Test Methods and
Property/Property Relationships in Coatings
Dr. Loren Hill
FSCT Distinguished Lecturer; Coatings Consultant

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>

<http://communities.msn.com/PiedmontSocietyforCoatingsTechnology>

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

Nada Jovanovich

njovanovich@triad.rr.com

Phone: 336-869-5634

Wood C&S 2006

Program Overview

| | | |
|----------------------|--|---|
| | Room 201 Chemistry of Substrates; Chemistry and Physical Chemistry of Coatings Moderator: Ronald Obie | |
| 8:00-8:40 a.m. | The Effects of Wood Properties on Coatings Performance Dr. Sam Williams USDA Forest Products Laboratory | |
| 8:50-9:30 a.m. | Photoprotection of Wood Tapan DebRoy Ciba Specialty Chemicals | |
| 9:40 a.m.-10:50 a.m. | <p>KEYNOTE ADDRESS</p> <p>Mechanical Properties of Coatings Fundamentals of Property Determinations in Coatings; Test Methods and Property/Property Relationships in Coatings Dr. Loren Hill</p> <p>FSCT Distinguished Lecturer; Coatings Consultant</p> <p>Dr. Hill received his B.S. in chemistry from North Dakota State University in 1961 and his Ph.D. from the Pennsylvania State University in 1965. He was a faculty member at NDSU where he taught physical chemistry from 1965 to 1971 and coatings chemistry from 1971 to 1980. Dr. Hill left academia in 1980 to join Monsanto as a Science Fellow. He was promoted to Senior Fellow in 1987 and continued in this position at Solutia Inc., a spin-off from Monsanto, from 1997 to November, 1999. Dr. Hill is currently a consultant in the areas of structure/property relationships of coatings and determination and control of crosslink density in thermoset coatings. Dr. Hill has received two awards for outstanding research in coatings, the Mattiello Lecture Award in 1991 and the Roy W. Tess Award in 1998.</p> | |
| | Room 201 Chemistry and Physical Chemistry of Coatings Moderator: Ed West | Room 200 UV Curing of Coatings – Science and Technology Moderator: Millie Powell |
| 11:00-11:40 a.m. | Performance-property-structure relationship study on coatings Tim Klots, Sunil Jayasuriya and Bodan Ma Johnson Polymer | UV Curing Technology for Wood Coatings Richard W. Stowe Fusion UV Systems, Inc. |
| 11:40 – 1:00 | Lunch-Walk to Area Restaurants | |
| 1:00 – 1:40 p.m. | Waterborne Oil Modified Urethane Technology for Wood Floor and Wood Care Glenn Petschke, Shi Yang, Carl J. Sullivan Kristy Magyar Reichhold | An overview of UV cure technology as applied to wood coatings – Maximizing performance by selecting the best photoinitiators Kurt Davidson Ciba Specialty Chemicals |
| 2:00 – 2:40 p.m. | Additives containing Nanomaterials - Paradigm Shift in Parquet Coatings Formulations John Du BYK Chemie | Exterior Wood Coatings based on New Waterborne One-Component UV-Curable Polyurethane Dispersions Bob Wade, Mike Dvorchack Bayer MaterialScience LLC |
| 3:00 – 3:40 p.m. | The Use of Precipitated and Fumed Silica to Formulate Low Gloss Wood Coatings Thomas M. Papasso Degussa Corporation | New Radiation Curable Polyester Acrylate Oligomers Exhibiting Superior Abrasion Resistant Properties While Offering a Cost Effective Alternative to Urethane Acrylate Oligomers Bill Schaeffer Sartomer |
| 4:00 – 4:40 p.m. | Case Study – Finishing Kitchen Cabinets Mark Trexler Evans Cabinet Inc. | Alternative Mineral Extenders to Lower Cost and Improve Scratch, Hardness and Blocking Properties in Clear Wood Coatings. Scott P. Van Remortel Unimin Specialty Minerals |

8:00 a.m. Room #201
The Effects of Wood Properties on Coatings Performance
Dr. Sam Williams

USDA Forest Products Laboratory

There are countless examples of wood structures, both painted and unpainted that are in excellent condition after many centuries. Wood and wood-based composites continue to be used in many places in modern construction and continue to perform quite well. Modern finishes are far superior to linseed oil/lead-based paint used previously. However finishes sometimes fail prematurely on wood and wood-based composites. To avoid premature failure of wood/paint systems, it is necessary to understand the widely different properties of wood and finishes used on wood. The properties of wood and wood-based composites depend on the wood species, growth rate, the way the lumber was processed, and the properties of materials used in conjunction with wood to manufacture composites. Cellulose, hemicellulose, lignin, and extractives are distinctly different components of wood and all affect surface coatings in different ways. Understanding the nature of these components, their surfaces, and degradation paths is necessary for obtaining long service life from paints and other finishes used on wood and wood-based composites.

8:50 a.m. Room #201
Photoprotection of Wood
Tapan DebRoy
Ciba Specialty Chemicals

Wood is a substrate which is sensitive to UV light degradation. Exposure, even in indoor diffuse light conditions with the most sensitive woods, can lead to discoloration over time. More intense exposure, such as outdoors, can accelerate this discoloration and even lead to breakdown of a wood coating. A proper photoprotection package can reduce the effects of UV light by stabilizing the color of the wood and improving the durability of the wood coating.

This course will review the types of UV absorbers and hindered amine light stabilizers (HALS) being used in the industry today. It will discuss the chemical structures and the mechanism of UV protection provided by the UVAs and HALS. Also a general review about the formulations of 2K urethane, solvent based and water based wood coatings with UVAs, HALS and Lignostab for better permanency of wood coatings, color retention and protection of celluloses of woods will be presented. Finally, new types of UVA additives being introduced into water based wood coatings to improve VOC will be highlighted.

KEYNOTE ADDRESS

9:40 a.m. Room #201
Mechanical Properties of Coatings
Fundamentals of Property Determinations in Coatings;
Test Methods and Property/Property Relationships in Coatings
Dr. Loren Hill

FSCT Distinguished Lecturer; Coatings Consultant
Fundamentals of Property Determinations in Coatings

Organic coatings are used to improve the appearance of substrates and to protect substrates while in use. To perform these functions well the polymeric binder of the coating must have certain mechanical or physical properties. Designing the structures of binder components so that they deliver the required properties is one of the interesting parts of a paint chemist's job. Fundamental concepts used in all branches of polymer science apply to coatings as well. Critical concepts will be reviewed including viscoelasticity, glass transition temperature, brittle/ductile transition temperature, creep and recovery, stress relaxation, crosslinking and network formation. Structure/property relationships will be reviewed for various coatings binders. Examples will be discussed for end uses such as wood coatings, automotive topcoats, beverage can coatings, and coil coated metal that must be post formed.

Test Methods and Property/Property Relationships in Coatings

A variety of mechanical tests specific to coatings have been developed to determine properties such as hardness, flexibility, toughness, impact resistance, abrasion resistance, and scratch and mar resistance. Standard test methods approved by ASTM for many of these performance properties are described. Needs for improved performance for various end uses are discussed. Relationships between binder structure and basic physical properties, as determined by stress-strain determinations and dynamic mechanical analysis, are pretty much already known. The challenge now is to clarify the relationships between basic physical properties, such as modulus, and the performance properties of coatings from ASTM tests. The current state of knowledge of some these critical property/property relationships will be presented.

11:00 a.m. Room #201
Performance-property-structure relationship study on coatings
Tim Klots, Sunil Jayasuriya and Bodan Ma
Johnson Polymer

In the past decade, with the fast changing dynamic of the wood industry, increasing challenges are presented to the coating scientists to deliver coating systems with higher and higher performances. To meet the technical challenges, the understanding of the relationship between the performance and molecular structure of the components of a coating system is even more critical than ever. The paper will present the study of a few important performance tests, such as Koenig hardness and hot-cold check. The relationship between the test data and the basic material properties, such as modulus and

expansion coefficient, is illustrated. The impact of the molecular structure of the coating system on the basic properties will be discussed.

11:00 a.m. Room #200

UV Curing Technology for Wood Coatings

Richard W. Stowe

Fusion UV Systems, Inc.

Ultraviolet Curing, is an energy-efficient and relatively low-temperature technology with many applications in wood products manufacturing. It is used on flat wood products, flooring, cabinetry, vacuum-coated profiles, case goods, composites and engineered woods. UV Curing provides improved overall physical and chemical properties, surface finish and durability. A number of factors of UV Exposure can be managed to improve the efficiency of a UV curing process. While the desired properties of a cured material are essentially designed into the formulation, the development of the target properties of UV curable materials themselves depends on how well these lamp factors are designed and managed. Variables that are controlled are: total UV power, UV spectral distribution, irradiance and irradiance profile, and infrared energy. The ability to match all of these lamp characteristics to the optical and physical properties of a UV curable coating widens the range of tools available to the process designer, and yields more efficient and stable UV curing processes in production. How to specify UV exposure, terminology in this technology, UV measurement and quality control methods are also presented.

1:00 p.m. Room #201

Waterborne Oil Modified Urethane Technology for Wood Floor and Wood Care

Glenn Petschke, Shi Yang,

Carl J. Sullivan

Kristy Magyar

Reichhold

Waterborne Oil Modified Urethanes (WBOMU) are incrementally gaining ground as VOC compliant alternatives to conventional solvent borne urethane resins designed for wood floor and wood care. WBOMU's mimic their solvent borne predecessors – uralkyds and oil modified urethanes – in that they are designed to undergo oxidative crosslinking after application. The basic chemistry of WBOMUs and the oxidative cure mechanisms that occur after application are reviewed. The overall performance of the one component, WBOMU technology is described. Specific performance characteristics such as cure time, hardness, abrasion resistance and chemical resistance are compared to conventional solvent borne technologies, high solids solvent borne OMUs and alternate water based technologies. More recent technology advances including lower color systems, NMP free WBOMUs and acrylic/WBOMU hybrids will also be described.

1:00 p.m. Room #200

An overview of UV cure technology as applied to wood coatings – Maximizing performance by selecting the best photoinitiators

Kurt Davidson

Ciba Specialty Chemicals

Light curing of coatings is an important technology for the wood coating industry. In our talk we will cover the fundamental aspects of UV curing and show how it is used in wood coating applications. Photoinitiators are used to capture light and trigger photopolymerization. We will show how the proper selection of the photoinitiator is critical for optimal performance. Such a selection is needed to get the maximum benefit of UV curing. The effects of lamp type and resin type will also be reviewed. Examples will be given highlighting newly commercialized systems that lead to better overall performance.

2:00 p.m. Room #201

Additives containing Nanomaterials - Paradigm Shift in Parquet Coatings Formulations

John Du

BYK Chemie

Recently introduced additives containing alumina nanoparticles can provide improved scratch resistance for parquet coatings. These new nano alumina particles of 30 - 35 nm diameter are dispersed in different media and are easily incorporated by low shear into aqueous, solventbased, or solvent free UV- curing systems. Typically, low dosages of 0.5 – 2.0% provide significant and long-term scratch, mar and/or abrasion resistance without adversely affecting gloss, color, clarity or other physical properties of the parquet coatings.

The inclusion of surface active modified poly dimethyl siloxanes by its orientation and crosslinking at the coatings surface, enhances the performance of the nanoparticles. Where high gloss is not desirable, combinations of the nano alumina particles with waxes and matting agents allow the formulation of semi-gloss and flat varnishes.

2:00 p.m. Room #200

Exterior Wood Coatings based on New Waterborne One-Component UV-Curable Polyurethane Dispersions

Bob Wade, Mike Dvorchack
Bayer MaterialScience LLC

New Waterborne UV-Curing cosolvent free Polyurethane Dispersions were recently developed that provide excellent exterior weathering properties, high flexibility, and improved adhesion to difficult substrates such as wood and plastic. This paper will describe the attributes and performance properties of such systems.

3:00 p.m. Room #201

The Use of Precipitated and Fumed Silica to Formulate Low Gloss Wood Coatings

Thomas M. Papasso
Degussa Corporation

Today's wood finishes are often available in gloss, semi-gloss and satin finishes. Low gloss finishes are a popular choice among wood workers and flooring professionals because they are effective in covering up blemishes, scratches and defects on wood surfaces. To produce a low gloss finish, various options are available to wood coating formulators. The use of precipitated or fumed silica is an efficient way to produce low gloss coatings. As with any coating additive, proper loading, incorporation and optimization is needed to ensure a quality product. A general overview of precipitated and fumed silica matting technology will be presented as well as basic formulation guidelines.

3:00 p.m. Room #200

New Radiation Curable Polyester Acrylate Oligomers Exhibiting Superior Abrasion Resistant Properties While Offering a Cost Effective Alternative to Urethane Acrylate Oligomers

Bill Schaeffer
Sartomer

Polyester acrylate oligomers have gained wide acceptance within the coating industry and are used where superior physical properties are required. They offer enhanced performance when compared to epoxy acrylate oligomers and are cost effective alternatives to urethane acrylates if a high degree of yellowing resistance is not essential. This work will investigate the performance properties of several unique polyester-based oligomers, comparing and contrasting each to commonly used urethane and epoxy acrylates in terms of abrasion resistance, physical properties and ease of handling. Adhesion characteristics on wood substrate (maple) will also be reported.

4:00 p.m. Room #201

Case Study – Finishing Kitchen Cabinets

Mark Trexler
Evans Cabinet Inc.

This talk will cover finishing standards for cabinets supplied for government contracts, including A) Military Bases, B) HUD Projects, and C) Privatized Military Bases; The talk will also discuss single kitchen finishing (home owners) versus Multi-family kitchens (renters). The talk will discuss typical problems encountered in the daily finishing process, what to watch for in the manufacturing process to reduce potential problems in the field and discuss Cabinet Finishing versus Residential and Office Furniture Finishing.

4:00 p.m. Room #200

Alternative Mineral Extenders to Lower Cost and Improve Scratch, Hardness and Blocking Properties in Clear Wood Coatings

Scott P. Van Remortel
Unimin Specialty Minerals

This talk is based on new research with controlled particle size distributions of nepheline syenite in wood coatings. Nepheline syenite possesses a unique refractive index matching several of the binders used for decorative and protective wood finishes. Benefits in a range of clear coating systems, where standard mineral fillers are unacceptable, are discussed.

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

Second Annual Wood Coatings and Substrates Conference

Friday, September 29, 2006

Location: The University of North Carolina at Greensboro
Department of Chemistry & Biochemistry
New Science Building
Greensboro, NC

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
WCRGS@AOL.COM
Ph 336-841-0264

Please Return The Completed Form to:
Joseph Powell
Fax: 803-548-6623
Email: joseph_powell@vanhornmetz.com

Wood C&S 2006 Conference Committee

Ron Obie-----Wood Coatings Research Group
Scott Van Remortel-----Unimin Corp.
Nada Jovanovich-----Akzo Nobel
Norm Demers-----Konica Minolta
Dr. Terry Nile-----The University of North Carolina-Greensboro
Dr. Jerry Walsh-----The University of North Carolina-Geensboro
Dirk DiSantis----- Eastman
Millie Powell-----Clariant Corp.
Russ Leopard-----LinTech.
Ed West-----General Steel Drum
Anthony Davis-----Sherwin-Williams
Jeff Depalmo-----Ribelin
Joseph Powell-----Van Horn Metz
Ron Matthews-----Ultra Additives