



# Frontiers in Biorefining

*Chemicals and Products  
from Renewable Carbon*

# 2014 International Conference

St. Simons Island, Georgia, USA

October 21 - October 24

## Steering Committee Members

### Joseph Bozell

Center for Renewable Carbon  
The University of Tennessee

### Steve Chmely

Center for Renewable Carbon  
The University of Tennessee

### Nicole Labbé

Center for Renewable Carbon  
The University of Tennessee

### Timothy Rials

Center for Renewable Carbon  
The University of Tennessee

## Program Committee Members

### Gregg Beckham

National Renewable Energy Laboratory

### Nicole Brown

Pennsylvania State University

### Douglas Elliott

Pacific Northwest National Laboratory

### Claus Felby

University of Copenhagen

### Steve Kelley

North Carolina State University

### Blake Simmons

Joint BioEnergy Institute

Hosted by:



# CONFERENCE SCHEDULE

TUESDAY OCTOBER 21, 2014

5:00 - 8:00pm Registration/Social Hour

WEDNESDAY OCTOBER 22, 2014

7:00-7:45am Breakfast and Welcome

Plenary Session Moderated by Wolfgang Glasser

Biorefinery Concepts

- 7:45-8:00 **Welcome and Opening Remarks – Timothy Rials** (University of Tennessee)
- 8:00-8:40 **Nick Carpita** (Purdue University – Redesigning the Plant Cell Wall for Conversion of Biomass to Biofuels and High-Value Products)
- 8:40-9:20 **Charles Wyman** (University of California, Riverside – Co-Solvent Enhanced Lignocellulosic Fractionation (CELf) for High Yields of Precursors for Biological and Catalytic Conversion to Fuels and Chemicals)
- 9:20-10:00 **James Dumesic** (University of Wisconsin-Madison – Liquid-Phase Catalytic Conversion of Lignocellulosic Biomass to Fuels and Chemicals)

10:00-10:30am Coffee Break

- 10:30-11:10 **Dean Toste** (University of California, Berkeley – Integrating Chemistry and Biology to Expand the Biomass Portfolio)
- 11:10-11:50 **Robert Brown** (Iowa State University – PY Refinery: Thermal Fractionation of Lignocellulosic Biomass into Diverse Biobased Products)
- 11:50-12:30 **Sabrina Spatari** (Drexel University – Life Cycle Evaluation of Pyrolysis Fuel Pathways)

12:30-1:30pm Lunch **Martin Keller** (Oak Ridge National Laboratory– Biofuels and Biomaterials: The Road Ahead )

WEDNESDAY OCTOBER 22, 2014

Session 2A Moderated by Shawn Mansfield

Cell Wall Deconstruction & Biomass Fractionation

- 1:30-1:55 **Nathan Mosier** (Purdue University - Catalysts for Selective Conversion of Plant Cell Wall Polysaccharides to Fuels and Chemicals)
- 1:55-2:20 **Eric Hegg** (Michigan State University - Effective Metal Catalyzed Oxidative Pretreatment of Woody Biomass)
- 2:20-2:45 **Seema Singh** (Joint BioEnergy Institute - Development and Demonstration of an Integrated Biomass Sugar Production Platform based on Ionic Liquids)
- 2:45-3:10 **Jason Hallett** (Imperial University - Low-Cost Ionic Liquids for Lignocellulose Deconstruction)

3:10-3:30pm Coffee Break

- 3:30-3:55 **Leo Sousa** (Michigan State University - Can Ammonia and Its Unique Properties Resolve Major Bottlenecks of Lignocellulosic Biofuels?)
- 3:55-4:20 **Agnes Stepan** (Aalto University - Ioncell-P: A Selective Extraction and Fractionation Method with Ionic Liquids)
- 4:20-4:45 **Xuejun Pan** (University of Wisconsin-Madison - One-Pot Saccharification and Fractionation of Lignocellulosic Biomass in Inorganic Molten Salt Hydrate Medium to Produce High-Concentration Sugar and High-Quality Lignin)
- 4:45-5:10 **Ramakrishnan Parthasarathi** (Joint BioEnergy Institute - Biomass Pretreatment Using Designer Ionic Liquids)

Session 2B Moderated by Gregg Beckham

Catalytic Conversion of Lignin and Carbohydrates

- 1:30-1:55 **Stephen Miller** (University of Florida - Transforming Agricultural Waste into Polyethylene Terephthalate (PET) Mimics)
- 1:55-2:20 **Paula Castilho** (Universidade da Madeira - Solid Acid Catalysts for the Hydrolysis of Olygosaccharides)
- 2:20-2:45 **Wei Fan** (University of Massachusetts Amherst - Base Free, One-Pot Synthesis of Lactic Acid From Glycerol Using a Bifunctional Pt/Sn-MFI Catalyst)
- 2:45-3:10 **Katarina Fabicovicova** (Technische Universität Darmstadt - Production of Valuable Liquid Products from Cellulose Over Ruthenium-Tungsten Catalysts on Activated Carbon)

3:10-3:30pm Coffee Break

- 3:30-3:55 **Jeremy Luterbacher** (École Polytechnique Fédérale de Lausanne - Complete Conversion of Biomass to Sugars and Lignin Monomers Using Gamma-Valerolactone as a Solvent)
- 3:55-4:20 **Kenneth Moloy** (DuPont - Lysinol: A Renewably Resourced Alternative to Petrochemical Ethylene Amines and Aminoalcohols)
- 4:20-4:45 **Yoshinjo Nakagawa** (Tohoku University - Production of Cyclohexanol from Methoxyphenols Over Ruthenium Catalyst Combined with Base)
- 4:45-5:10 **Zhaohui Tong** (University of Florida - Biomimetic Fenton Catalyzed Lignin Depolymerization to Aromatics and Low Molecular Weight Chemicals)

WEDNESDAY OCTOBER 22, 2014

6:30 - 8:30pm - Poster Session

THURSDAY OCTOBER 23, 2014

7:30-8:30am Breakfast

### Session 3A Moderated by Agnes Stepan Engineering Feedstocks for the Biorefinery

- 8:30-8:55 **Shawn Mansfield** (University of British Columbia - Emerging Genomic Strategies for Improving Poplar as a Bioenergy Crop)
- 8:55-9:20 **Mark Driscoll** (SUNY-ESF - Reducing the Recalcitrance of Woody Biomass Using Electron Beam Irradiation)
- 9:20-9:45 **Timothy Tschaplinski** (Oak Ridge National Laboratory- Coupling Metabolomics, mQTL and Association Genetics Analyses to Identify Genes Regulating the Production of Metabolites)
- 9:45-10:10 **Joshua Yuan** (Texas A&M - Systems Biology – Guided Biodesign of Lignin to Bioplastics Conversion)

10:10-10:30am Coffee Break

- 10:30-10:55 **Scott Lenaghan** (University of Tennessee - Development of an Automated Platform for Rapid Screening of Genetically Modified Switchgrass)
- 10:55-11:20 **Alena Kubátová** (University of North Dakota - Comprehensive Characterization of Lignin Hydrotreatment Products Using a Carbon Analyzer and Thermal Desorption/Pyrolysis Coupled with Gas Chromatography)
- 11:20-11:45 **Brad Cox** (Dow AgroSciences - Industrialization of Biopropionic Acid)
- 11:45-12:10 **Wolfgang Glasser** (cycleWood Solutions - Prize Question: You Can Make Anything From Lignin, But...?)

### Session 3B Moderated by Paula Castilho Selective Transformations of Lignin

- 8:30-8:55 **Pete Silks** (Los Alamos National Laboratory - Conversion of Biomass Oligosaccharides to Hydrocarbons and Aerobic Oxidation of Lignin Model Complexes to Platform Chemicals)
- 8:55-9:20 **Alison Buchan** (University of Tennessee - Bacterial Conversion of Lignin and Lignin Derivatives)
- 9:20-9:45 **Corey Stephenson** (University of Michigan - A Photochemical Strategy for Room Temperature Degradation of Lignin)
- 9:45-10:10 **Wouter Schutyser** (KU Leuven - 2-Step Catalytic Procession of Lignocellulose Providing a Separate Lignin and Carbohydrate Product Stream)

10:10-10:30am Coffee Break

- 10:30-10:55 **Gregg Beckham** (National Renewable Energy Laboratory - Lignin Valorization Via Biological Funneling and Chemical Catalysis)
- 10:55-11:20 **Heiko Lange** (University of Rome Tor Vergata - Recent Advances in the Targeted Functionalization of Lignins)
- 11:20-11:45 **Xiao Zhang** (Washington State University - Catalytic Oxidation of Biorefinery Lignin to Value-Added Chemicals to Support Sustainable Biofuel Production From Lignocellulosic Biomass)

THURSDAY OCTOBER 23, 2014

Free Time

THURSDAY OCTOBER 23, 2014

Social Hour / Conference Dinner and Keynote Speaker

6:00-7:00pm - Social Hour

7:00-9:00pm - Dinner

**Nhiem Cao** - cycleWood Solutions - You Can Make Anything From Lignin, Including Money

## 7:30-8:30am Breakfast

## Session 4A Moderated by Joe Bozell

## The Interface of Biomass and Petrochemicals

- 8:30-8:55 **Roberto Rinaldi** (Max-Planck Institute - Upstream and Downstream of Lignin Through Catalysis)
- 8:55-9:20 **Jesse Hensley** (National Renewable Energy Laboratory - Heuristics for Producing Ethanol from Biomass Syngas Over Metal Sulfide-Type Catalysts)
- 9:20-9:45 **Thomas Elder** (USDA-Forest Service - Concerted Reaction Mechanisms in Lignin Pyrolysis)
- 9:45-10:10 **Arthur Ragauskas** (University of Tennessee / Oak Ridge National Laboratory - Research Investigations on Reducing Recalcitrance)

## 10:10-10:30am Coffee Break

- 10:30-10:55 **Bin Yang** (Washington State University - Catalytic Transformation of Biomass-Derived Lignin into Jet Fuel)
- 10:55-11:20 **David Johnson** (National Renewable Energy Laboratory - Conversion of Furfural into Hydrocarbons for Blending into Jet and Diesel Fuels)
- 11:20-11:45 **Ajay Kumar** (Oklahoma State - Novel Biochar-Based Catalysts for Conditioning Biomass-Generated Syngas)
- 11:45-12:10 **Bert Sels** (KU Leuven - A Lignocellulosic Biorefinery Concept in Leuven: A Chemist's View)

## Session 4B Moderated by Timothy Rials

## Understanding Biomass Architecture for Function

- 8:30-8:55 **Claus Felby** (University of Copenhagen - Water - A Different Approach to Biomass Recalcitrance)
- 8:55-9:20 **Peter Ciesielski** (National Renewable Energy Laboratory - 3D Biomass Particle Models with Realistic Morphology and Resolved Microstructure for Finite Element Simulations of Intra-Particle Transport Phenomena)
- 9:20-9:45 **Paul Langan** (Oak Ridge National Laboratory - What Happens During Cell Wall Deconstructions – Insights from Experimental and Computational Studies)
- 9:45-10:10 **Bryon Donohoe** (National Renewable Energy Laboratory - Multi-Scale Imaging of Changing Biomass Cell Wall Architecture to Elucidate Mechanisms of Deconstruction)

## 10:10-10:30am Coffee Break

- 10:30-10:55 **Sivakumar Pattathil** (University of Georgia - Analysis of Changes in Composition and Extractability of Cell Wall Glycans in Plant Biomass Subjected to Leading Pretreatment Methods)
- 10:55-11:20 **Amit Naskar** (Oak Ridge National Laboratory - Higher-Performance Lignin Macromolecular Derivatives)
- 11:20-11:45 **Amanda Quaranta** (Arizona Chemical - Creating a Profitable Biorefinery - The Toolbox for Success)
- 11:45-12:10 **Michael Lake** (Liquid Lignin Company - What Are We Going To Do With All This Lignin?)

6:30-8:30pm

**Bill Anderson** - ARS-USDA - Conversion Quality of Napiergrass Under Different Production Practices

**Cezar Catrinescu** - Universidade da Madeira, Portugal - Methoxylation of  $\alpha$ -Pinene Over Ion-Exchanged Clays

**Blair Cox** - cycleWood Solutions Inc. - cycleWood Solutions: Producing Lignin-Based Compostable Plastics

**Angele Djioleu** - University of Arkansas - Towards Understanding the Role of Bark Within the Context of a Biorefinery

**Jenny Doerfer** - Technische Universität Darmstadt - One-Pot Hydrogenolysis of Cellulose and Real Biomass with Ruthenium Containing Catalysts

**Barron Hewetson** - Purdue University - Concentrated Phosphoric Acid for Enhanced Conversion of Cellulose to HMF

**Omid Hosseinaei** - University of Tennessee - Characterization of Organosolv Lignin and its Conversion to Carbon Fiber

**Yuan Jiang** - Purdue University - Kinetic and Mechanism Study of Glucose Conversion Utilizing Different Iron Salts

**Eric Karp** - National Renewable Energy Laboratory - Alkaline Pretreatment of Corn Stover; Optimal Pretreatment Conditions for the Generation of Lignin Rich Liquors and the Development of New Analytical Methods for the Quantification of Chemical Components within these Liquors

**Ian Klein** - Purdue University - Selective Hydrodeoxygenation of Lignin

**Muyang Li** - Michigan State University - Cell Wall Properties Contributing to Improved Alkaline Pretreatment and Enzymatic Hydrolysis in Diverse Maize (*Zea Mays* L.) Lines

**Bryan Matsuura** - University of Michigan - Ann Arbor - Photoredox Catalysis - A novel Strategy Towards the Catalytic Depolymerization of Lignin

**Timothy Monos** - University of Michigan - Ann Arbor - A Photochemical Approach for the Breakdown of Natural Biopolymers

**Costyl Njiojob** - University of Tennessee - Synthesis of Enantiomerically Pure Lignin Dimer Models for Catalytic Selectivity Studies

**Davinia Salvachua** - National Renewable Energy Laboratory - Optimizing Biological Funneling of Lignin and Carbohydrate-Derived Species: Substrate Depolymerization, Organism Selection, and Co-Product Generation

**Noppadon Sathitsuksanoh** - Joint BioEnergy Institute - Tuning Lignin and Carbohydrate Characteristics Through Pretreatment Chemistry

**Jingming Tao** - University of Tennessee - Effects of Fractionation Time on Thermal and Chemical Properties of Organosolv Lignins

**Mohammad Tasooji** - Virginia Tech - Copolymerization of Urushiol Into Phenol-Formaldehyde Resole

**Guigui Wan** - Virginia Tech - Heat-treated Virginia Pine: Biogenic Formaldehyde and Rheology

**Jing Wang** - University of Tennessee - Impacts of Autohydrolysis on Solubility of Biomass in Ionic Liquid

**Shangxian Xie** - Texas A&M - Systematic Biology Based Synthetic Design of *Rhocococcus Opacus* for Lignin Conversion to Biofuel