

November Section Meeting – **Much Ado About (Almost) Nothing: Understanding Mesoscale Reaction- Diffusion Phenomena Governing Lignin Extraction from Hardwood Biomass for Next-Generation Biorefining**

Biomass is an important renewable feedstock for the sustainable production of liquid transportation fuels and commodity chemicals. Lignin is a complex aromatic heteropolymer comprising roughly 15-25 wt% of biomass, and lignin's recalcitrance has emphasized research into developing holistic, effective chemical and biological strategies for its valorization within next-generation biorefineries. Solvolysis of lignin from the plant cell wall is the critical first step in lignin depolymerization processes involving whole feedstocks, such as hardwood trees, although little is known about the complex transport phenomena governing lignin extraction at the particle scale. This seminar highlights insights into the internal and external microscopic geometries of poplar sawdust particles and their utility for constructing realistic, three-dimensional particle models with resolved microstructures. These well-defined particle models serve as a basis for computational fluid dynamics simulation of biomass

November Section Meeting

Topic: Particle-Scale Reaction Engineering for Biomass Conversion

Speaker: Dr. Nicholas (Nick) Thornburg

Date: Tuesday, November 5
 *** FIRST Tuesday ***

Time: 6:00 – Networking & Dinner
 7:00 – Presentation

Location: Clement Center
 1580 Yarrow St, Lakewood

Cost: \$20 Rocky Mtn. Section Members
 (w RSVP) \$25 Non-members
 \$10 Students / Unemployed

RSVP REQUIRED by Friday, November 1 (early RSVPs are greatly appreciated!) You may RSVP via email at rockyaiche@yahoo.com indicating your name, phone number, and number of attendees and pay at the meeting. Or you may RSVP and pay online using [PayPal on our meeting link](#).

*Add \$5 for attending meeting without RSVP

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pretreatment processes involving parallel chemical reactions and simultaneous heat and mass transfer. Methanol extractions of each lignin, hemicellulose, and cellulose are modeled to fit time-resolved experimental data generated among four representative poplar particle sizes. Intrinsic, transport-independent kinetic rate parameters are determined for the first time, capturing extraction and redeposition behaviors for each major cell wall component as decoupled from their diffusion behaviors. Crucially, lignin fragment diffusion is discovered to exhibit severe mass transfer resistances that dominate solvolysis kinetics in poplar particles exceeding as little as ~2 mm in length. These findings are critical to guiding modern biomass research and development, which largely emphasizes catalyst optimization in lieu of feedstock-specific limitations, offering a predictive platform for improving the design and scale-up of emerging biorefinery strategies.

SPEAKER BIO: Dr. Nicholas (Nick) Thornburg will be presenting his postdoctoral research at the National Renewable Energy Laboratory (NREL) on understanding and decoupling mesoscale reaction-diffusion phenomena for the selective extraction of lignin from hardwood trees, as is relevant to emerging biomass pretreatment techniques for next-generation biorefineries. Nick has a B.S. in Chemical Engineering from Washington University in St. Louis and a Ph.D. in Chemical Engineering from Northwestern University, in addition to industrial R&D experience with the Dow Chemical Company and 3M. He is currently a Chemical Reaction Engineer at NREL.

LOCAL SECTION OFFICERS NEEDED!

If you would like to volunteer for an officer position, please contact Cindy Fischer at 303-988-3611 or cindy.fischer@q.com.

Save the Dates!

Our dedicated program chair has already planned this year's local section meetings so now is a great time to get them on your calendar! Our tentative local section meeting dates and times are listed below.

December 10 - Sean Coyle presenting "Project Management and Creating Clarity in Goals" in Lakewood

January 14 - Keith Neeves presenting "Genetic Bleeding Disorders" in Meadow Hills

February 11 - Kaitlyn Bunker combined SWE-AIChE meeting in Denver Tech Center

March 10 - Doug Hambley presenting "Economic Analyses for Mineral Deposits Held by Publicly Traded Companies" in Lakewood

April 14 - Lindsay Breyer presenting "PSM and Pharmaceuticals" in Boulder

May 12 - Carolyn Koh presenting "Natural Gas Hydrates" in Lakewood

AIChE Meetings

2019

- Oct 20-22 [2nd Cell Therapies and Immunotherapy Conference](#)
San Francisco, CA
- Oct 21-22 [2019 Bioenergy Sustainability Conference](#)
Nashville, TN
- Oct 30-31 [Industry 4.0: Digital Transformation Conference](#)
Baltimore Marriott Waterfront Hotel
- Nov 10-15 [2019 AIChE Annual Meeting](#)
Orland, FL
- Oct 31-Nov 2 [2019 Emerging Meat Alternatives Conference \(EMAC\)](#)
SpringHill Suites by Marriott San Diego Bayfront
- Nov 6-8 [Polymers and Textiles Conference 2019](#)
University of Massachusetts

National AIChE Contact Info

AIChE Customer Service Center:
(US/Canada): 1-800-AIChemE
(1-800-242-4363)

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Address: 120 Wall Street, 23rd floor
New York, NY 10005

Web Page: <http://www.aiche.org>

Rocky Mountain AIChE Officers

Cindy Fischer	Chair	303/988-3611 cindy.fischer@Q.com
Dawn Keeler	Program Chair	Dw980111@dal.cal
Brian Olson	Treasurer	303/353-3563 b.olson1111@gmail.com
Mike Mutnan	Secretary	303/423-1586 michaelmutnan@live.com
Kevin Milliman	Director	303/515-1027 Kmilliman94@gmail.com
Mike Moes	Communication	303/915-1238 mmoes@ekiconsult.com
Patrick Burton	New Mexico Liaison	505/284-1543 pdburto@sandia.gov
Dr. Patrick Johnson	Wyoming/SD Liaison	307/766-6524 pjohns27@uwyo.edu
Jack	Young Professional	
Laura Moes	Editor and Web Admin	303/770-2432 lauramoes@msn.com

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The objectives of AIChE are to advance chemical engineering in theory and practice, to maintain a high professional standard among its members, and to serve society, particularly where chemical, engineering can contribute to the public interest.

AIChE Rocky Mountain is a public non-profit 501(c)(3) organizations and thus any and all donations are tax deductible.

Rocky Mountain AIChE News Publication Schedule

December 2019 Issue

Articles due Wednesday, November 27

Publish on Friday, November 29

Meeting on Tuesday, December 10

MEETING SCHEDULE

The Rocky Mountain District of AIChE generally meets the second or third Tuesday of every month, September through November and January through May.