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Message from the Chair

Welcome to February! I want to thank Dr. Abhirath Parikh for bringing us up to date on Cell and Gene Therapies in our January meeting. It's fascinating how far biotechnology has come. It is an exciting field and it's great that chemical engineering can contribute to it. It's enough to make me wish I was a newly minted chemical engineer so I could contribute to better health for all of us. Thanks again for pulling back the curtain for us, Dr. Parikh. Also, I'd like to thank Devon Clymer and Jacobs for making the meeting go so smoothly.

Now, let's look ahead. Our next meeting is at Earle Hall, the home of Clemson University's chemical engineering department. The last time I was there it was an incredible feeling to think back to how much I thought I knew and how little I actually did. My first mentor tossed my know-it-all self out of his office telling me that I wasn't an engineer yet, but if I'd learn to listen I could be. I've had a varied and fascinating career, far better than I expected. It took off when Eric taught me to listen first and talk second. I've learned so much from the men and women I've worked with that I could never be grateful enough. Another opportunity to listen and learn is at hand. Dr. Mark Thies is going to share his research into new uses for lignin. He's working on uses in carbon fibers, polyurethane foams, and activated carbon. It's an abundant renewable resource that doesn't tie up farmland to produce. That is green chemistry at its best.

This is a great opportunity to build ties to Clemson's chemical engineering department and the students and hear a very interesting presentation. I don't want anyone to miss out due to concerns about driving to Clemson; so, I can organize car pools if anyone is interested. I can easily take 3 people. Let me know you're interested and I'll figure out somewhere convenient to meet.

Best Regards,

Bill Thompson, Chair, WSC AIChE

NEXT MEETING - February 21, 2023

Using Aqueous Renewable Solvents to Valorize Lignin: Conversion to Carbon Fibers, PU Foams, and Activated Carbons

Although lignin is second in abundance only to cellulose, its conversion to higher-value materials, vs. just being burned as fuel, continues to be a significant challenge. In particular, the impurities inherent in lignin (polysaccharides and metal salts), along with the wide range of functionalities and molecular weights in lignin, can create numerous problems when unpurified and unfractionated lignin is substituted directly into a process or formulation. Furthermore, today it is imperative that lignin-refining strategies also include sustainability as a core principle.

We have discovered that hot renewable organic solvents that form homogeneous solutions with water, including lower molecular weight (MW) alcohols and acetic acid, can be used to simultaneously fractionate and purify lignin, both batchwise and continuously. The key to this so-called ALPHA (Aqueous Lignin Purification using Hot Agents) process is the formation of two liquid phases in equilibrium, one *liquefied* lignin and the other solvent, when solid lignin is contacted with a hot, one-phase aqueous solvent. With the lignin partitioning between the two phases, control of both molecular weight and purity becomes possible.

ALPHA-processed lignins are being investigated for three large and growing markets: (1) high-performance carbon fibers for automotive applications, (2) rigid polyurethane foams for spray insulation for buildings, and (3) activated carbon for food and pharmaceutical use. Here, we demonstrate how control of molecular weight, and even the concentration of specific impurities, leads to improvements in the properties of the final commercial products.

Dr. Thies is the Dow Chemical Professor of Chemical and Biomolecular Engineering at Clemson University. He received his Bachelor of Chemical Engineering from Georgia Tech, worked a couple years for P&G developing Jif peanut butter and Duncan Hines cake mixes, and then returned to academia for his Ph.D. at the University of Delaware before joining the ChBE faculty at Clemson. Mark was a Humboldt Fellow at TUHH in Hamburg, Germany, a Marie Curie Fellow at NTUA in Athens, Greece, and is also an AIChE Fellow.

His research interests are focused on materials and energy research where thermodynamics, phase behavior, and equilibrium-based separations play key roles. Today his emphasis is on developing higher-value applications from poorly defined, oligomeric systems, including both “prehistoric” lignin and lignin from today’s plants and trees.

Dr. Thies is the author of 100+ archival publications, including 4 patents and 5 book chapters, and has directed research funding from PRF, NSF, DOE, ARO, ARL, AFRL, AFOSR, and multiple global companies and small businesses, as well as an NSF ERC on Fibers and Films. Finally, Mark is on the Editorial Advisory Board for the journal Carbon, and organized and chaired the World Conference on Carbon in 2010.

February Meeting Information

TITLE:	Using Aqueous Renewable Solvents to Valorize Lignin: Conversion to Carbon Fibers, PU Foams, and Activated Carbons
DATE:	Tuesday, February 21, 2023
Event timing:	6:00 PM Social 6:30 PM Dinner 7:00 PM Presentation
LOCATION (in-person event):	Clemson University, Earle Hall, Room 100 -We will follow Covid protocols as required -RSVP to facilitate distribution of parking passes -To participate in a carpool, contact Bill Thompson by text at 864-423-9978 (include your name and location)
COST	No charge
RSVP by 2/17/23	RSVP from WSC Section website if you plan to join us for dinner

Scholarship Information

The Western South Carolina Section of the American Institute of Chemical Engineers is pleased to support the Chemical Engineering program at Clemson University by offering two scholarships, one of \$1500 and one of \$1000. The scholarships will be awarded to returning Chemical Engineering students with a projected graduation date between August 2023 and May 2024.

The recipients will be announced at the joint meeting between the Clemson Student Chapter and the Western South Carolina AIChE Section on February 21, 2023.

Completed applications were due by 11:59pm, Tuesday, January 31, 2023.

Opportunities to Assist

We welcome your participation on any level in this organization. Several committee positions are open, and this year's officers will gladly mentor members who would consider holding officer positions next year.

2022-2023 Officers and Executive Committee

POSITION	NAME	COMPANY	E-MAIL
Chair	Bill Thompson	Ortec	bthompson@ortecinc.com chair@wscaiche.org
Vice-Chair	James Young	Fluor	James.H.Young@fluor.com vchair@wscaiche.org
Secretary	Conny Walker	Independent	sec@wscaiche.org
Treasurer	Jacob Lindler	aeSolutions	jllindler@yahoo.com treasurer@wscaiche.org
Former Chair	Conny Walker	Independent	connyw@earthlink.net
Newsletter	Bonnie McCourtie	Retired	brim502@charter.net
Webmaster	(open)		
Historian	(open)		
Executive Committee	Karl McCaleb	Mitsubishi	kmccaleb2@bellsouth.net
	Anastase Ghionis	Omega Chemicals	
	Donald P Gurney, Jr., ScD, P.E.	Consultant	degurney@charter.net
	Anil Wagle	Retired	Anilwagle123@gmail.com
	Devon Clymer	Jacobs	Devon.clymer@jacobs.com
	Ann Marie Jones	Retired	annmjones@aol.com

2022-2023 Calendar of Events

DATE	LOCATION	TOPIC
February 21, 2023	Clemson	Using Aqueous Renewable Solvents to Valorize Lignin Dr. Mark Thies
March 14, 2023	Jacobs office	Plant-based and Cultured Meat Products
April 2023	TBD	Plant Tour
May 2023	TBD	WSCAICHe May Social and Election of Officers