

Dr. Dan Fleming

Professor, Chemical & Paper Engineering

Graduate Advisor, Paper and Printing

Density and Dot area Determination for Extended Gamut and Spot Colors.

- Because of RGB & Visual filters, existing densitometry is limited to CMYK process colors.
- However, the process color gamut is now being extended by adding Orange, Green & Violet as extended process colors.
- A new method has been developed to calculate density of OGV inks and spot colors.
- This enables pressmen to reproducibly set up the press for extended gamut and spot colors to consistently satisfy customers expectations.

New Single Fluid Based Bounds on Surface Energy of Solids

- The current method of solid surface energy determination is the Owens/Wendt method.
- It is inspired by the Good/Girafalco equation, which can be shown to be rigorous, but otherwise has no physical or mathematical basis.
- In a 3 phase system, any interfacial tension between any pair of phases cannot exceed the sum of the tensions between the other 2 pairs.
- Owens/Wendt often violates this.
- Our method satisfies the condition by construction.

Dr. Andrew Kline
Professor, Chemical & Paper Engineering
Associate Dean for Research and Graduate
Education

- Student retention and diversity
- MI-LSAMP pre-first year program and academic year undergraduate research and mentoring work
- Engineering Education
- Past work: STEM Service-learning with K-12 schools



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Dr. Kecheng Li, P.E., F.RSC (UK)

Professor and Chair, Chemical & Paper Engineering

Lignocellulose Biomass for Biofuels and Biomaterials

- Advanced cellulose bioethanol
 - Pretreatment technologies
 - Lignin for value-added products
- Nanocellulose fiber production
 - Energy savings via enzyme-aided process
 - Scalable technologies for commercial production
 - Film forming technologies
- Nanocellulose applications
 - Solid battery
 - Solar panel
 - Barrier packing



Li et al, Holzforschung; Phy Chem; Bioresources

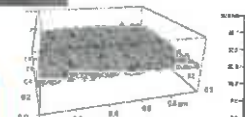
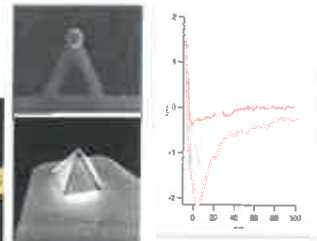


Li et al, Energy Enviro Sci; Adv Energy Materials

Green Technologies for pulp and paper & Advanced surface and nanoscale analysis

- Enzyme-aided process for “stickies” removal in paper recycling
- Enzyme-aided pulp refining for high strength
- Peroxide-based bleaching for high-yield pulp

- XPS, SIMS
- CLSM, FE-SEM,
- AFM

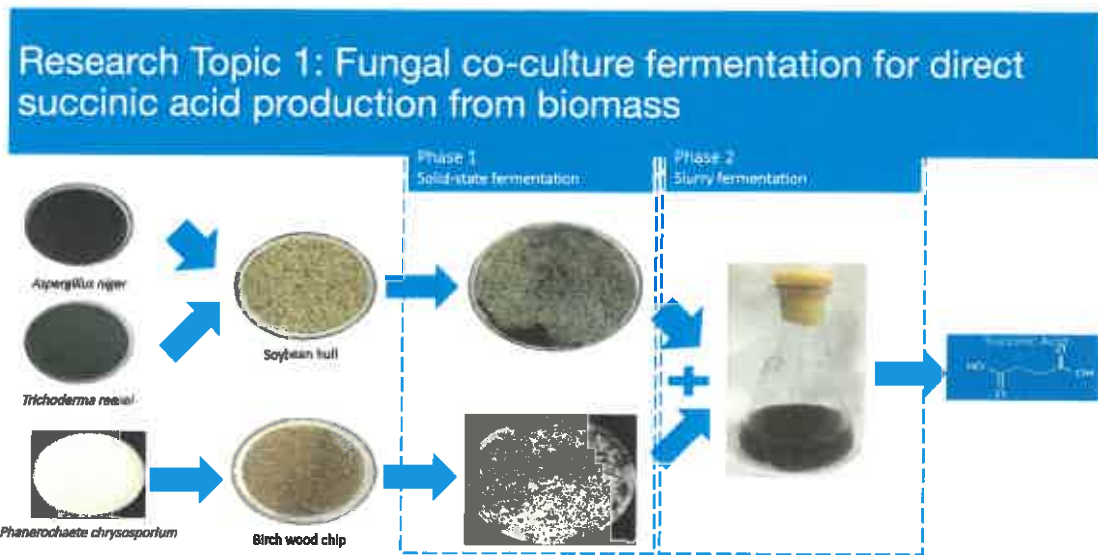


$$P_{\text{measured}} = f(C_{\text{core}}, RMS, E, \sigma, \theta, \gamma, \sigma_{\text{th}})$$

Li et al, J. MSci; Biotech Biofuels; Surf Interface A.

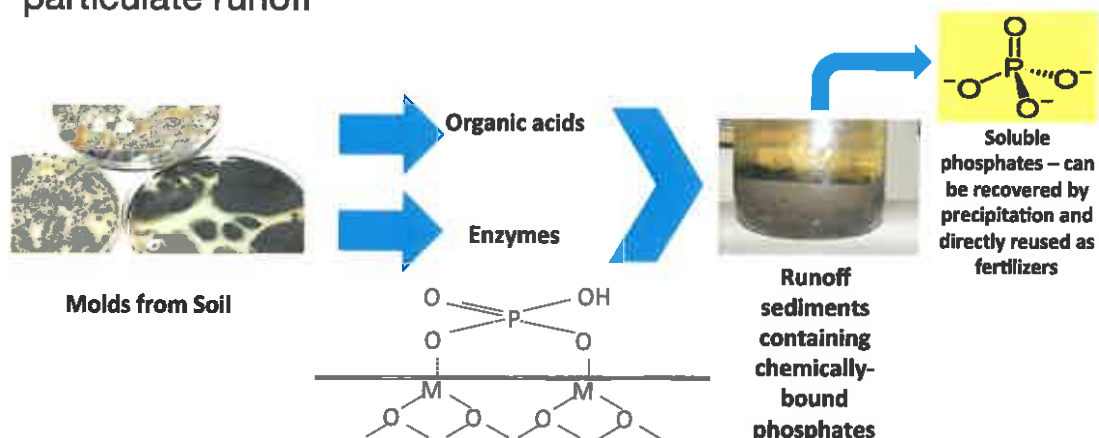
Dr. Andro Mondala

Assistant Professor, Chemical & Paper Engineering



Biosystems & Environmental Engineering Laboratory. PI: Andro Mondala

Research Topic 2: Fungal extraction of phosphorus from particulate runoff



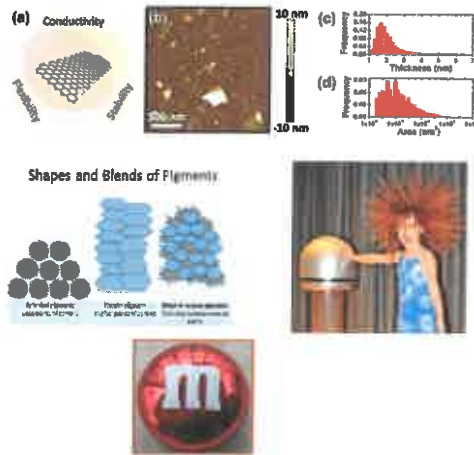
Biosystems & Environmental Engineering Laboratory. PI: Andro Mondala

Dr. Sasha Pekarovicova

Professor, Chemical & Paper Engineering

Graphic, functional, edible inks, and inks for 3D printing

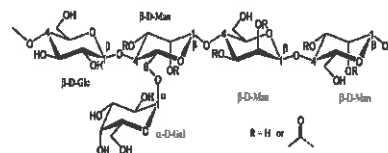
- Graphic inks – focus mostly on biodegradable, sustainable resins
- Functional inks- formulation of inks for printed electronics
- 3D printing- focus on formulation of biocompatible inks
- Edible inks- formulation and testing



Barrier coatings based on lignocellulose raw materials

Formulating barrier packaging films and coatings for packaging boards, weather proof constructing materials

- Stand alone films
- Functional coatings for barrier packaging, and construction
- Aimed properties:
 - Low oxygen, moisture, and grease permeability,
 - Good Printability,
 - Strength properties



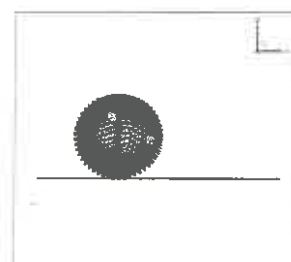
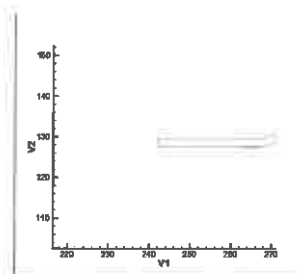
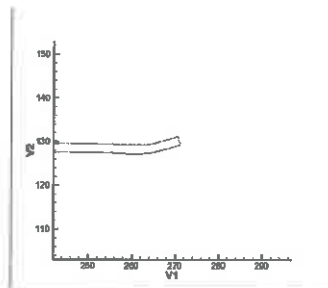
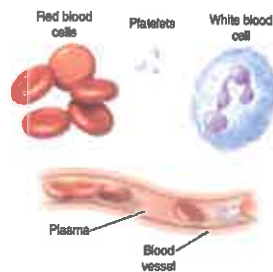
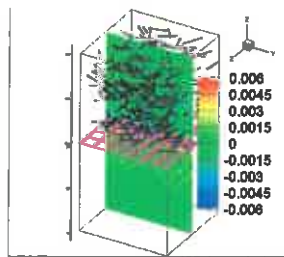
of the...
 ion of other...
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Dr. Dewei Qi

Professor, Chemical & Paper Engineering

- Lattice Boltzmann and lattice spring simulations of deformable fiber suspensions, red blood cells, and self-propelled flexible bodies.
- Solve Navier-Stokes equations using lattice Boltzmann equations $f = \rho \left(\frac{m}{2\pi k_b T} \right)^{3/2} e^{-mv^2 / 2k_b T}$
- Fiber mat formation, water removal of paper, nanopaper and recycling paper
- Adhesion dynamics of red blood cells in vessel walls (MC)
- Birds flight, fishes bacteria swimming



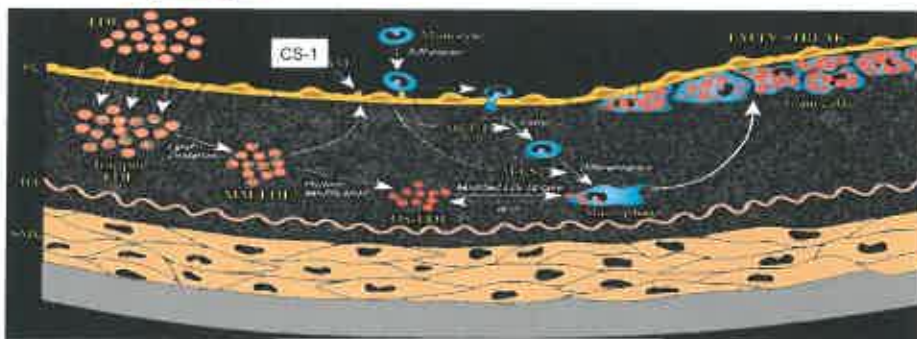
Dr. James Springstead

Assistant Professor, Chemical & Paper Engineering

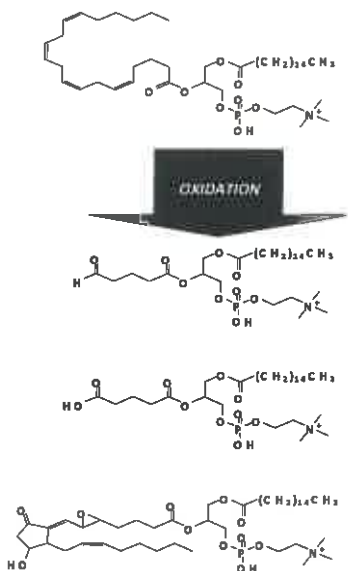
Springstead Laboratory of Biomolecular Engineering



- Main laboratory focus is to elucidate underlying mechanisms of chronic inflammation, most notably, heart disease
- Development of new diagnostic methods for estimation of risk for heart disease



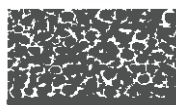
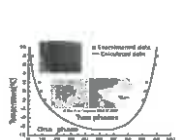
Springstead lab focus, methods and instrumentation



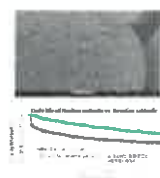
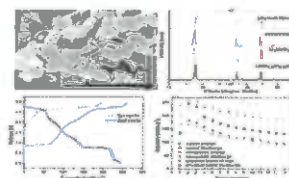
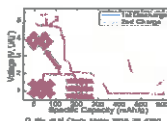
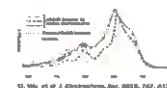
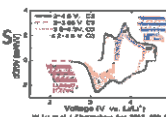
- Oxidation products of the endogenous phospholipid, PAPC, are involved in several physiological and pathological processes
- Several Springstead lab experiments measure the effects of these lipids on inflammation and other biological pathways, including metabolism and innate immunity
- Main instrumentation/ methodology used:
 - Mass spectrometry
 - Tissue culture
 - Gel electrophoresis/Western blotting
 - RT-PCR

Dr. Qingliu Wu

Assistant Professor, Chemical & Paper Engineering



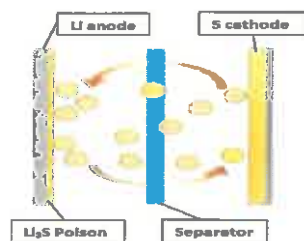
- > 10 years in material synthesis, characterizations, applications in Li-Ion, Na-Ion, solid-state batteries
- Mix of fundamental and applied science: > 30 publications (>1000 citations); > \$1.5 M grants as PI and \$130K as co-PI
- Open mind to collaborate on material synthesis, characterizations, batteries...



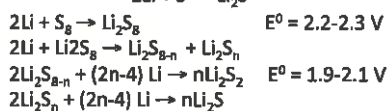
Research Areas-Qingliu Wu

Nanostructured Materials for Energy Applications

Schematic illustration of Li-S battery

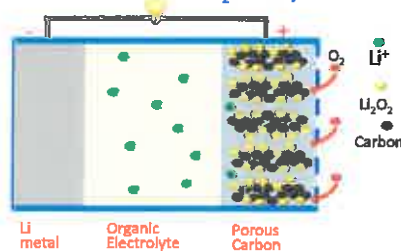


Reaction chemistry
 $2\text{Li} + \text{S} \rightleftharpoons \text{Li}_2\text{S}$

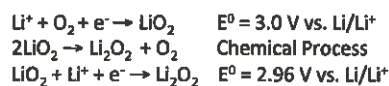


Research goals:
 Improve cycle life

Schematic illustration of Li-O₂ battery



Reaction chemistry
 $\text{Li} + \text{O}_2 \rightleftharpoons \text{Li}_2\text{O}_2$

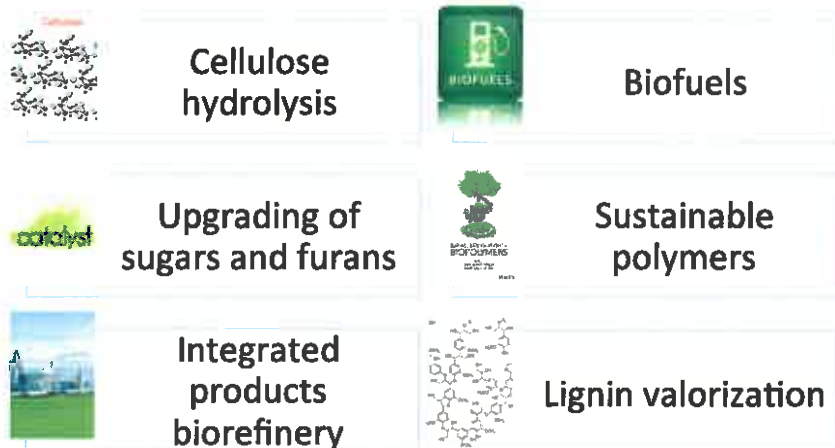


Improve cycle life
Improve round-trip efficiency

Dr. Qiang Yang

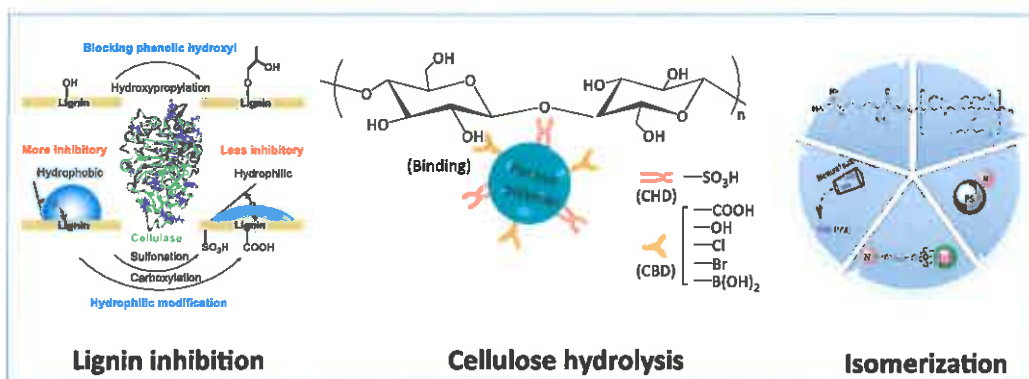
Assistant Professor, Chemical & Paper Engineering

Bioenergy and Biomaterials Lab



Recent Research Activities

- Investigate lignin inhibition to enzymatic hydrolysis of cellulose
- Develop solid acid catalysts for cellulose hydrolysis
- Develop solid base catalysts for isomerization of glucose to fructose



Dr. Brian Young

Assistant Professor, Chemical & Paper Engineering

Dr. Brian R. Young
WMU

- Assistant Professor , Chemical and Paper Engineering
- Ph.D. in Chemical Engineering from University of Wisconsin-Madison
 - *dissertation on protein adsorption on polymeric biomaterials and its effect on surface induced thrombosis*
- BS in ChE and BS Biochemistry from University of California-Davis
- 22+ Years of Biopharmaceutical, Vaccine, and Immunodiagnostic R&D Experience
- Leadership Positions in Bioprocess R&D and Manufacturing
 - Upjohn/Pharmacia,
 - Abbott Labs,
 - Pfizer ,
 - Emergent Biosystems

- Courses taught:
 - Bioprocess Engineering
 - Advanced Bioprocessing
 - Reaction Engineering
 - Fluid Mechanics/Operations
 - Unit Operations Lab (Heat/Mass/Fluid)
 - Computation Methods for ChE's

Research Interests

- Paper-based Immunodiagnostics
- Carbon Nanotube Scaffold-Antibody/Antigen Interactions
- Printed Immunodiagnostic biosensors
 - bio-nanoinks on paper or film
- Biologics
- Bioprocessing Technology
- Fermentation/Biotransformations
- Protein Purification
- Protein Adsorption/Coating Phenomena
- Protein/Blood/Polymer-Biomaterial Interactions
- Forest Products, Paper and Paper Additives
 - Embedded Enzymes for Improved Recycling