Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Tuesday, April 5:

• Jon Rager, RISI, Track Keynote – “Global Industry Outlook: A Platform for Innovation?”
• Chris Luettgen, RBI, Track Overview
• Lunch & Networking with Poster Session Part I
• Chris Muhlstein, Professor, MSE – Digital Image Correlation Insights into Paper Deformation and Failure
• Mark Losego, Assistant Professor, MSE – Developing Cellulose Hydrophobicity and Other Functional Properties of Paper
• Preet Singh, Professor, MSE along with students – Corrosion Sciences
• Break
• Interactive Discussion
Jonathan Rager
Senior Vice President - RISI
jrager@risi.com

A 20-plus year veteran of the forest products industry, Jon Rager is a senior vice president at RISI, a leading information provider for the global forest products industry. He is based in the company’s Atlanta office leading the global team of economists, engineers and analysts who provide forecasts and mill intelligence in the Analytics division. Previously, he managed a technical strategy practice area and multiple domestic and international due diligence assignments at Pöyry Management Consulting. He has also served in the corporate lending sector at GE Capital, providing financing to companies in the industry. Earlier in his career Jon held various process engineering and operations roles with several pulp and paper producers. He received his bachelor’s degree in Chemical Engineering with honors from Pennsylvania State University.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

The annual challenge - who to pick?

Accommodate Five Faculty & Two Students
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

- Close ties to AGENDA 2020 Roadmaps:

  2030 Vision

  Encourages the development of advanced manufacturing technologies that promise transformational impact on the paper and forest-based industries.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

- Close ties to AGENDA 2020 Roadmaps:
  - Reuse of Process Effluents
  - Corrosion, white water systems (Singh)
  - Drier Web
    - 3D Modeling (Rosen)
  - BL Concentration
    - Membrane Technologies (Nair)
  - NG Pulping
    - High Yield (Yang)
<table>
<thead>
<tr>
<th>Student</th>
<th>Degree</th>
<th>School</th>
<th>Advisor(s)</th>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang, Songcheng</td>
<td>PhD</td>
<td>ChBE</td>
<td>Behrens/Meridith</td>
<td>Encapsulation of the Liquid Paper Sizing Agent ASA</td>
</tr>
<tr>
<td>Jiang, Lu</td>
<td>PhD</td>
<td>ChBE</td>
<td>Hess/Bredveld</td>
<td>Scalable Technologies to Control Liquid Wetting and Adhesion on Paper Substrates</td>
</tr>
<tr>
<td>Du, Xiaotang</td>
<td>PhD</td>
<td>ChBE</td>
<td>Hsieh/Behrens</td>
<td>Novel Liquid Phase Plasma Technology for Fatty Acids and Microstickes Removal in Waste Water Treatment and Deinking of Inkjet Printed Paper</td>
</tr>
<tr>
<td>Kevlich, Nikita</td>
<td>MS</td>
<td>ChBE</td>
<td>Nair/Shofner</td>
<td>Advanced Membranes for Energy-Efficient Concentration of Spent Pulping Liquors in the Kraft Process</td>
</tr>
<tr>
<td>Dutzer, Michael</td>
<td>PhD</td>
<td>ChBE</td>
<td>Walton</td>
<td>Low-Cost Carbide-Derived Carbons for Absorptive Removal of VOCs from Air Streams</td>
</tr>
<tr>
<td>Lee, Vincent</td>
<td>PhD</td>
<td>ME</td>
<td>Aidun</td>
<td>Analysis of Multiphase Foaming and Flow Characteristics in the Forming Section</td>
</tr>
<tr>
<td>Oztekin, Dennis</td>
<td>PhD</td>
<td>ME</td>
<td>Aidun</td>
<td>Fiber Orientation in Multiphase Forming Technology</td>
</tr>
<tr>
<td>Chilmonczyk, Mason</td>
<td>PhD</td>
<td>ME</td>
<td>Federov</td>
<td>Multimode Micro/Nanoscale Imaging of the Crystal Formation in Black Liquor Evaporators</td>
</tr>
<tr>
<td>Hume, Chad</td>
<td>PhD</td>
<td>ME</td>
<td>Rosen</td>
<td>Hole Design and Manufacture for Press Fabric Layers to Improve Dewatering</td>
</tr>
<tr>
<td>Na, Yoon Joo</td>
<td>PhD</td>
<td>MSE</td>
<td>Muhlstein</td>
<td>Strain Field Mining: the Key to Engineering the Strength and Fracture Toughness of Paper and Packaging Products</td>
</tr>
<tr>
<td>Baykal, Aydin</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Role of Natural Inhibitors and Extractives on Black Liquor Corrosivity</td>
</tr>
<tr>
<td>Hanson, Kasey</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Corrosion Control in Superheaters to Increase Kraft Recovery Boiler Efficiency</td>
</tr>
<tr>
<td>He, Liang</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Corrosion Behavior of New Lean Duplex Stainless Steels in Changing Pulp and Paper Mill Environments</td>
</tr>
<tr>
<td>Wu, Gaoxiang</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Effect of Strain on Repassivation and Corrosion Behavior of Duplex Stainless Steels in Pulp and Paper Mill Environments</td>
</tr>
<tr>
<td>Student</td>
<td>Degree</td>
<td>School</td>
<td>Advisor(s)</td>
<td>Project Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------</td>
<td>--------</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Wang, Songcheng</td>
<td>PhD</td>
<td>ChBE</td>
<td>Behrens/Meredith</td>
<td>Encapsulation of the Liquid Paper Sizing Agent ASA</td>
</tr>
<tr>
<td>Jiang, Lu</td>
<td>PhD</td>
<td>ChBE</td>
<td>Hess/Breedveld</td>
<td>Scalable Technologies to Control Liquid Wetting and Adhesion on Paper Substrates</td>
</tr>
<tr>
<td>Du, Xiaotang (Tony)</td>
<td>PhD</td>
<td>ChBE</td>
<td>Hsieh/Behrens</td>
<td>Novel Liquid Phase Plasma Technology for Fatty Acids and Microstickes Removal in Waste Water Treatment and Deinking of Inkjet Printed Paper</td>
</tr>
<tr>
<td>Kevlich, Nikita</td>
<td>MS</td>
<td>ChBE</td>
<td>Nair/Shofner</td>
<td>Advanced Membranes for Energy-Efficient Concentration of Spent Pulping Liquors in the Kraft Process</td>
</tr>
<tr>
<td>Dutzer, Michael</td>
<td>PhD</td>
<td>ChBE</td>
<td>Walton</td>
<td>Low-Cost Carbide-Derived Carbons for Absorptive Removal of VOCs from Air Streams</td>
</tr>
<tr>
<td>Lee, Vincent</td>
<td>PhD</td>
<td>ME</td>
<td>Aidun</td>
<td>Analysis of Multiphase Foaming and Flow Characteristics in the Forming Section</td>
</tr>
<tr>
<td>Oztekin, Dennis</td>
<td>PhD</td>
<td>ME</td>
<td>Aidun</td>
<td>Fiber Orientation in Multiphase Forming Technology</td>
</tr>
<tr>
<td>Chilmonczyk, Mason</td>
<td>PhD</td>
<td>ME</td>
<td>Federov</td>
<td>Multimode Micro/Nanoscale Imaging of the Crystal Formation in Black Liquor Evaporators</td>
</tr>
<tr>
<td>Hume, Chad</td>
<td>PhD</td>
<td>ME</td>
<td>Rosen</td>
<td>Hole Design and Manufacture for Press Fabric Layers to Improve Dewatering</td>
</tr>
<tr>
<td>Na, Yoon Joo</td>
<td>PhD</td>
<td>MSE</td>
<td>Muhlstein</td>
<td>Strain Field Mining: the Key to Engineering the Strength and Fracture Toughness of Paper and Packaging Products</td>
</tr>
<tr>
<td>Baykal, Aydin</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Role of Natural Inhibitors and Extractives on Black Liquor Corrosivity</td>
</tr>
<tr>
<td>Hanson, Kasey</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Corrosion Control in Superheaters to Increase Kraft Recovery Boiler Efficiency</td>
</tr>
<tr>
<td>He, Liang</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Corrosion Behavior of New Lean Duplex Stainless Steels in Changing Pulp and Paper Mill Environments</td>
</tr>
<tr>
<td>Wu, Gaoxiang</td>
<td>PhD</td>
<td>MSE</td>
<td>Singh</td>
<td>Effect of Strain on Repassivation and Corrosion Behavior of Duplex Stainless Steels in Pulp and Paper Mill Environments</td>
</tr>
</tbody>
</table>
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Six Faculty and Two Students!
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Christopher Muhlstein  
Professor, MSE - Georgia Tech  
404.385.1235  
christopher.muhlstein@mse.gatech.edu

Chris received his bachelor's degree in Materials Science and Engineering from the University of California, Berkeley (1994), his master's in Metallurgy from the Georgia Institute of Technology (1996), and his Ph.D. in Materials Science and Engineering from the University of California, Berkeley (2002). Dr. Muhlstein joined the faculty in the School of Materials Science and Engineering at the Georgia Institute of Technology in 2011 after spending nine years on the faculty at The Pennsylvania State University (2002-2011). Dr. Muhlstein's research establishes fracture and fatigue mechanisms in bulk and thin film materials. Dr. Muhlstein is a member of Alpha Sigma Mu and Keramos honor societies and an NSF CAREER award recipient.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Christopher Muhlstein
Professor, MSE - Georgia Tech
404.385.1235
christopher.muhlstein@mse.gatech.edu

Digital Image Correlation Insights into Paper Deformation and Failure
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Mark D. Losego
Assistant Professor, MSE - Georgia Tech
404.385.3630
losego@gatech.edu

Mark joined the School of Materials Science and Engineering as an assistant professor in 2014. His research group uses advanced nanomaterials synthesis techniques to study transport phenomena in mesostructures and at organic-inorganic interfaces of relevance for solar, thermal, and electrochemical energy systems. His work is primarily experimental and researchers in his group gain expertise in the chemical synthesis of materials (colloids, polymer brushes, SAMs), atomic layer deposition, electrochemistry, physical vapor deposition methods (sputtering, evaporation), and materials characterization. Dr. Losego received his bachelor’s degree in materials science and engineering from Penn State University in 2003, and his master’s (2005) and Ph.D. (2008) degrees in materials science and engineering from North Carolina State University.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Mark D. Losego
Assistant Professor, MSE - Georgia Tech
404.385.3630
losego@gatech.edu

Developing Cellulose Hydrophobicity and Other Functional Properties in Paper
Preet M. Singh is Professor of Materials Science and Engineering at Georgia Institute of Technology (Georgia Tech). His research is focused on the fundamental understanding of the environmental degradation of material properties, especially for metals and alloys, and their protection. His research work is related to the corrosion and SCC problems in the pulp and paper industry, bio-fuels, the energy industry, transportation infrastructure, and nuclear industry. Dr. Singh has published more than 175 papers in refereed journals and conference proceedings. He is an active member of NACE, ASM, TMS, AIST, and ACerS. Dr. Singh is Fellow of NACE International as well as ASM-International.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Panel Presentations and Discussion - Corrosion Sciences and the impact of white water system closure

Aydin Baykal  
Ph.D. Candidate, MSE  
abaykal@gatech.edu

Liang He  
Ph.D. Candidate, MSE  
lianghe@gatech.edu
Krista Walton
Associate Professor, ChBE - Georgia Tech
krista.walton@chbe.gatech.edu

Krista is an Associate Professor and Marvin R. McClatchey and Ruth McClatchey Cline Faculty Fellow with the School of Chemical and Biomolecular Engineering. She received her bachelor’s degree from the University of Alabama-Huntsville and Ph.D. from Vanderbilt University, both in chemical engineering. Dr. Walton was the Tim and Sharon Taylor Assistant Professor of Chemical Engineering at Kansas State University from 2006-2009 and then joined the faculty of the Georgia Institute of Technology in the School of Chemical & Biomolecular Engineering in August 2009. She was recently named director of the Department of Energy-funded Energy Frontier Research Center at Georgia Tech that is investigating how acid gases affect materials used in pollution control. Her areas of interest include selective adsorbents for carbon dioxide capture, novel porous structures for enhanced air purification, metal-organic frameworks as site-specific catalysts, modulation of adsorption properties of MOFs by Post-Synthetic Modification, adsorption separations for biofuels production and synthesis of new organic ligands for novel families of MOFs.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Krista Walton
Associate Professor, ChBE - Georgia Tech
krista.walton@chbe.gatech.edu

Carbide-Derived Carbons for Removal of Toxic Chemicals from Air
Dr. Aidun's research focuses on direct numerical simulation (DNS) of suspension hydrodynamics, including fiber suspension, biotransport, and whole blood flow. Additional research interests include methods for enhancement of convective and boiling heat transfer, multiscale biotransport and fluidics-based automation of sorting and selection of somatic embryogenesis for clonal propagation of plants. He has pioneered the development of the Lattice-Boltzmann (LB) method for suspension hydrodynamics and nonlinear dynamical systems. It is now well established that the LB method, based on the solution of discrete Boltzmann equation, is a superior computational method for hard particles as well as transport of deformable capsules and particle. These methods open the possibility for mechanical, thermal and rheological analyses of a broad class of deformable particle/fiber suspension flows. He received his bachelor’s and master’s degrees from Rensselaer Polytechnic Institute and his Ph.D. from Clarkson University.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Cyrus K. Aidun
Professor, ME - Georgia Tech
404.894.6645
cyrus.aidun@me.gatech.edu

Multi-Scale Computational Modeling to Advance Understanding Papermaking Processes
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Nagi Gebrael
Georgia Power Associate Professor, ISYE - Georgia Tech
404.894.0054
magi.gebraeel@isye.gatech.edu

Nagi is a Georgia Power Associate Professor in the Stewart School of Industrial & Systems Engineering at Georgia Tech. Dr. Gebrael's research interests are in equipment prognostics and diagnostics for improving reliability, maintainability, and availability by leveraging degradation-based sensor data streams; and the integration of these results in subsequent maintenance, operational and logistical decision making. His specific focus is on tackling these problems in Big Data settings involving massive amounts of data streams and large equipment fleets. Dr. Gebrael currently serves as an associate director at Georgia Tech's Strategic Energy Institute with the responsibility of identifying and promoting research activities and thought leadership at the intersection of Data Science and Energy. He is also the director of the Analytics and Prognostics Systems laboratory at Georgia Tech's Manufacturing Institute. He is a member of the Institute of Industrial Engineers (IIE), Institute for Operations Research and the Management Sciences (INFORMS), and The American Institute of Aeronautics and Astronautics (AIAA). He was the former president of the IIE's Quality Control and Reliability Engineering Division. He received his master’s and Ph.D. from Purdue University in 1998 and 2003, respectively.
Track #1: Operational Excellence in Advanced Pulping, Paper and Packaging

Nagi Gebraeel  
Georgia Power Associate Professor, ISYE - Georgia Tech  
404.894.0054  
magi.gebraeel@isye.gatech.edu

IoT and the Interface of Condition Monitoring, Reliability and Maintenance