

SANTANU KUNDU

Dave C. Swalm School of Chemical Engineering
Mississippi State University, MS 39762
Ph: 662-325-7323
E-mail: santanukundu@che.msstate.edu
Web: <http://kundu.che.msstate.edu/>

Education

2001- 2006: Ph.D. in Chemical Engineering, Clemson University, SC, USA
Dissertation Title: *Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch.*

1993-1997: B.E. in Chemical Engineering, Jadavpur University, Kolkata, India

Citizenship

Permanent Resident of the United States, Citizen of India.

Affiliation

2012 (Jan)- 2009-2011 Assistant Professor, Dave C. Swalm School of Chemical Engineering, Mississippi State, USA
Postdoctoral Guest Researcher, Polymers Division, National Institute of Standards and Technology (NIST), Gaithersburg, USA
Virginia Polytechnic Institute and State University, Chemistry Department
2007-2009 Postdoctoral Researcher, Department of Polymer Science and Engineering, University of Massachusetts-Amherst, Amherst, USA
2001-2006 Graduate Research Assistant, Department of Chemical and Biomolecular Engineering, NSF-Clemson-MIT Engineering Research Center for Advanced Engineering Fibers and Films (CAEFF), Clemson University, Clemson, USA
1999-2001 Engineer, Indian Oil Corporation Limited, India
1997-1999 Engineer, TCG Refineries Limited, India

Honors and Awards

NSF Early Career Award, 2014
Sigma Xi National Scientific Research Honor Society, 2010.
Awarded 1st prize, *Elsevier Carbon Journal award, 2007* for the best Ph.D. dissertation in Carbon Science.
Awarded 2nd prize, *Science as Art exhibit, Clemson University, 2006.*
Finalist, *Prof. H. L. Roy Memorial Award, Alumni Association, N.C.E. Bengal & Jadavpur University, 1996.*
Awarded National Merit Scholarship (India) for higher education, 1991.

Research Interest

My research interest is investigating the *processing-structure-property* relationships for various soft materials towards different applications ranging from bioimplants to energy storage to water purification to structural composites. The emphasis will be identifying and synthesizing suitable materials systems, developing novel synthesis/processing/fabrication strategies for these materials, characterizing these materials using a combination of established and new experimental tools, and studying the engineering aspects needed to facilitate the transition from scientific discovery to practical implementation.

Teaching Interest

My teaching interests are transport phenomena, materials science, polymer science, and soft materials. I believe that teaching is not limited to the classroom and it involves formal and informal discussions with the students outside the classroom.

Students Achievement

Mahla Zabet, Best Presentation, *Structure and Properties in Polymers* session, AIChE Annual Meeting, Atlanta, November 2014.

Igor Kevin, Bagley College of Engineering Undergraduate Research Scholarship (Spring 2015)

Kinsey Naas, Bagley College of Engineering Undergraduate Research Scholarship (Fall 2014, Spring 2015)

Dennis Omari, 2nd Prize, Poster Competition, Physical Sciences and Engineering category, Undergraduate Research Symposium. Summer, 2014 (REU student, Ohio State University)

Research Experience

Postdoctoral Research:

Sustainable Polymers Group, Polymers Division, National Institute of Standards and Technology (NIST), Advisor: Dr. Kathryn L. Beers. (2009-2011)

Virginia Polytechnic Institute and State University, Chemistry Department, Advisor: Prof. Timothy E Long

- Investigated surface, near surface, and viscoelastic properties of thin films, biofilms, elastomers, and hydrogels over multiple length scales.
- Developed a microfluidics/microreactor based platform (Lab-on-a-Chip) to study enzyme catalyzed polymerization and copolymerization of biodegradable polymers.
- Applied Raman spectroscopy to investigate formation of polyhydroxyalkynoates within different strains of bacteria as a function of various growth conditions.

University of Massachusetts-Amherst, Department of Polymer Science and Engineering,

Advisor: Prof. Alfred J. Crosby. (2007-2009)

- Developed cavitation rheology technique to investigate the link between mechanical properties and fracture strength of hydrogels on small length scales, e.g. 1 -1000 μm , at any arbitrary location in the gels.
- Investigated adhesion and mechanical properties of commercially available hydrogels at various environmental conditions. Planned, designed, and developed a custom built setup to measure low adhesion forces (0.1-100 mN).
- Used elastic instabilities such as wrinkling to obtain self forming microstructure at surfaces and studied the effect of these microstructures on the adhesion properties.
- In collaboration with an industrial sponsor, developed a technology to incorporate novel structures on the contact lens surface for performance improvement.

Doctoral Research:

NSF-Clemson-MIT Engineering Research Center for Advanced Engineering Fibers and Films (CAEFF), Clemson University, Advisor: Prof. Amod A. Ogale. (2001-2006)

- Established a unique *flow-3D microstructural* relationship for liquid crystalline carbonaceous oligomers using *polarized optical microscopy* and *X-ray diffraction* in steady shear flow, dynamic flow, and processing flow conditions.

- Performed extrusion and fiber spinning of various polymers and carbon precursors to obtain high performance fibers.
- Determined model parameters from experimental data towards a collaborative CAEFF team effort of developing an advanced constitutive model for liquid crystalline materials.
- Simulated fiber spinning and polymer extrusion process using finite element software (POLYFLOW, FISIM).

Industrial Experience

Engineer, Indian Oil Corporation, India (1999-2001)

- Commissioned a new crude oil distillation unit for petroleum products.
- Designed and implemented various modifications in petroleum distillation unit for enhanced productivity with the assistance of a group of skilled operators.

Engineer, TCG Refineries Limited, India (1997-1999)

- Optimized the configuration of a new petroleum refining unit for improved economy.

Research Expertise

- Rheology and microstructural characterization of structured soft materials
- Characterization of surface and near surface properties of patterned gels, elastomers, and thin films
- Fabrication of patterned surfaces using elastic instabilities, lithography
- Microfluidics/lab-on-a-chip
- Enzymatic catalysis, green chemistry, microbial polymers
- Finite element modeling of polymer processing
- Carbon fibers, High temperature treatment: carbonization and graphitization
- New instrument design. Proficient in LabVIEW
- Quartz Crystal Microbalance (QCM)

Book Chapter

Kundu S and Chan EP, Adhesion *Behavior of Soft Materials in Engineering Biomaterials for Regenerative Medicine*, Springer, Sujata K Bhatia(Editor), Springer, 2012. DOI 10.1007/978-1-4614-1080-5_4.

Publications (refereed) (* indicates corresponding author)

20. Vasquez ES, Duggan ES, Metcalf JP, Walters KB*, **Kundu S***. Human Pulmonary Mucus: a Mechanical and Nanomechanics study, to be submitted.
19. Zabet M, **Kundu S***. Self-Assembly and Mechanical Properties of Graphene/Acrylic Triblock Copolymer Gels, to be submitted.
18. Warren J, **Kundu S***, Pittman CU, Lacy TE, Toghiani H, and Offenberger S. Temperature Effect on Shear Thickening Responses, to be submitted.
17. Hashemnejad SM, **Kundu S***. Nonlinear Viscoelasticity and Cavitation of a Triblock Copolymer Gel, accepted to *Soft Matter*.
16. Vasquez ES, Bowser J, Swiderski C, Walters KB*, **Kundu S***. Rheological Characterization of Mammalian Lung Mucus, *RSC Advances*, 4 (66), 34780 – 34783 (2014).
15. Waters MS, **Kundu S***, Lin NJ, Gibson SL*. Microstructure and mechanical properties of in situ biofilms, *ACS Applied Materials & Interfaces*, 6(1), 327-332 (2014).
14. Orski SV, **Kundu S**, Gross RA, Beers KL. Design and Implementation of Two-Dimensional Polymer Adsorption Models: Evaluating the Stability of *Candida antarctica* Lipase B/Solid-Support Interfaces by QCM-D, in press, *BioMacromolecules*, 14 (2), 377–386 (2013).

13. **Kundu S**, Johnson PM, Beers KL. Increasing molecular mass in enzymatic lactone polymerizations, *ACS Macro Letters*, 1, 347–351 (2012).
12. Kratz K, Narasimhan A, Tangirala R, Moon SC, Revanur R, **Kundu S**, Kim HS, Crosby AJ, Russell TP, Emrick T, Kolmakov G, and Balazs AC. Probing and repairing damaged surfaces with nanoparticle-containing microcapsules, *Nature Nanotechnology*, 7, 87-90 (2012). (**Highlighted in sciencedaily, physorg**)
11. Hunley MT, Bhangale AS, **Kundu S**, Johnson PM, Gross RA, Beers KL, In situ monitoring of enzyme-catalyzed polymerizations by Raman spectroscopy, *Polymer Chemistry* 3 (2), 314-318(2012).
10. Johnson PM, **Kundu S**, Beers KL. Modeling Enzymatic Kinetic Pathways for Ring-Opening Lactone Polymerization, *Biomacromolecules*, 12 (9), 3337–3343(2011).
9. **Kundu S**, Bhangale AS, William WE, Flynn KM, Guttman CM, Gross RA, Beers KL. Continuous flow enzyme-catalyzed polymerization in a microreactor, *Journal of the American Chemical Society*, 133(15):6006-6011 (2011). (**Highlighted in NIST newsletter, sciencedaily, physorg**)
8. Chan EP, **Kundu S**, Lin Q, Beers KL, Stafford CM. Thickness effect on the viscoelastic properties of polystyrene thin films as measured by thermal wrinkling, *ACS Applied Materials & Interfaces*, 3 (2): 331–338 (2011).
7. **Kundu S**, Davis CS, Long T, Sharma R, Crosby AJ. Adhesion of non-planar wrinkled surfaces, *Journal of Polymer Science Part B: Polymer Physics*, 49(3):179-185, 2011 (**Cover Art**).
6. **Kundu S**, Ogale AA. Rheostructural studies of a discotic mesophase pitch at processing flow conditions, *Rheologica Acta* 49(8): 845-854 (2010).
5. **Kundu S**, Crosby AJ. Cavitation and fracture behavior of polyacrylamide hydrogels, *Soft Matter* 5(20), 3963-3968 (2009).
4. **Kundu S**, Grecov D, Rey AD, Ogale AA. Shear flow induced microstructure of a synthetic mesophase pitch, *Journal of Rheology* 53(1):85-113(2009).
3. **Kundu S**, Naskar AK, Ogale AA, Anderson D, Arnold JR. Observations on a low-angle x-ray diffraction peak for AR-HP mesophase pitch, *Carbon* 46(8):1166-1169 (2008).
2. **Kundu S**, Ogale AA. Microstructural effects on the dynamic rheology of a discotic mesophase pitch, *Rheologica Acta* 46(9):1211-1222 (2007).
1. **Kundu S**, Ogale AA. Rheostructural studies on a synthetic mesophase pitch during transient shear flow, *Carbon* 44(11): 2224-2235 (2006).

Conference Proceedings

- Warren J, Offenberger S, Lacy TE, Toghiani H, **Kundu S**, Pittman CU. Effect of Temperature on Shear Thickening Fluid Rheology. *Proc. 29th Technical Conference of the American Society for Composites, La Jolla, California* (2014).
- Warren J, Offenberger S, Lacy TE, Toghiani H, **Kundu S**, Pittman CU. Hypervelocity Impacts on Metallic Foam Core Sandwich Panels Filled with Shear Thickening Fluid. *Proc. 29th Technical Conference of the American Society for Composites, La Jolla, California* (2014).
- Warren J, Cole M, Offenberger S, Lacy TE, Toghiani H., Burchell M, **Kundu S**, Pittman CU. Hypervelocity Impact of Honeycomb Core Sandwich Panels Filled with Shear Thickening Fluid. *Proc. 28th Technical Conference of the American Society for Composites, State College, Pennsylvania* (2013).
- Kundu S**, Kleiderer AC. High Strain Deformation of a Strain Stiffening Gel. *PMSE Preprints* (2013).
- Orski SV, **Kundu S**, Gross RA, Beers KL. Stability of Solid-supported Enzyme Catalysts for Ring-opening Polymerization. *Polymer Preprints*, 53(2), 316-317 (2012).
- Waters MS, **Kundu S**, Gibson SL. Structure-mechanical characterization of extracellular polymeric substance from biofilms. *Polymer Preprints*, 53(1), 662-663 (2012).
- Hunley MT, Bhangale AS, **Kundu S**, Johnson PM, Gross RA, Beers KL. In situ Raman monitoring of ring-opening copolymerizations. *PMSE Preprints* (2012)
- Johnson PM, **Kundu S**, Beers KL. Molecular mass and kinetic modeling of poly(ϵ -caprolactone) from enzyme catalysis. *Polymer Preprints* 52(1) (2011).

- Kundu S**, Bhangale A, William WE, Flynn KM, Gross RA, Beers KL. Immobilized enzyme catalyzed polymerization reactions in microreactors. *Polymer Preprints* 51(1):745-746 (2010).
- Bhangale A, **Kundu S**, Xie W, William WE, Flynn KM, Beers KL, Gross RA. Impact of immobilization supports for polyesters synthesis activity of *Candida Antarctica* Lipase B. *Polymer Preprints* 51(1):760-761 (2010).
- Kundu S**, Zimmerlin J, Crosby AJ. Cavitation rheology and fracture behavior of soft polymeric materials. Proceedings of the 14th International Conference on Deformation, Yield, and Fracture of Polymers. Rolduc Abbey, Kerkrade, Netherlands. April 2009, 91-92.
- Kundu S**, Anderson DP, Ogale AA. Rheostructural studies of mesophase pitch using WAXD and OM. "Carbon 2007" Proceedings of International Carbon Conference, Japan (2008).
- Rey AD, von Oehsen JB, EDuffy EB, **Kundu S**, Cox CL, Ogale AA. Flow-microstructure of mesophase pitch-based discotic liquid crystalline fluids. Proceedings of the Polymer Processing Society- 23rd annual meeting, Salvador, Brazil (2007).
- Kundu S**, Ogale AA. Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch, "Carbon 2007" Proceedings of International Carbon Conference, USA (2007).
- Greco D, **Kundu S**, Ogale AA, Rey AD. Flow-induced microstructure of a synthetic mesophase pitch, "Carbon 2007" Proceedings of International Carbon Conference, USA (2007).
- Ogale AA, Naskar AK, Walker Robert, **Kundu S**, Sweeney D. Carbon fibers from melt-spun PAN and pitch precursors: composition and process-based control of microstructure, Invited Lecture, International Workshop on Carbon Materials for Energy Applications, Proceedings of Indian Carbon Society, New Delhi, India (2004).
- Kundu S**, Ogale AA. Rheostructural evolution of AR-HP mesophase pitch in shear flow, "Carbon 2004" Proceedings of International Carbon Conference, USA (2004).
- Kundu S**, Edie DD, Ogale AA. Rheostructural study of pure and modified mesophase pitches, "Carbon 2003" Proceedings of International Carbon Conference, Spain (2003).
- Cho T, **Kundu S**, Lee YS, Rao R, Rao AM, Edie DD, Ogale AA. Processing and structure of nanotube-reinforced mesophase pitch, "Carbon 2002" Proceedings of International Carbon Conference, China (2002).

Selected Presentations/Posters

- Kundu S***. Large Strain Deformation Behavior of Swollen Polymers Gels. *Invited talk*, Columbia University, March, 2015.
- Kundu S***, Hashemnejad SM, Zabet M, Mishra S. Nonlinear Elasticity and Cavitation of a Triblock Copolymer Gel. APS march Meeting, San Antonio, Texas, 2015
- Hashemnejad SM*, Zabet M, **Kundu S***. Nonlinear Behavior of Ionically and Covalently Cross-Linked Alginate Hydrogels. APS march Meeting, San Antonio, Texas, 2015.
- Zabet M, Hashemnejad SM*, **Kundu S***. Self-Assembly and Relaxation Behavior of Graphene Containing Acrylic Triblock Copolymer Gels. Poster Presentation, APS march Meeting, San Antonio, Texas, 2015
- Kundu S***. Large Strain Deformation Behavior of Swollen Polymers Gels. *Invited talk*, Indian Institute of Technology-Bombay, December, 2014.
- Kundu S***. Large Strain Deformation Behavior of Swollen Polymers Gels. *Invited talk*, National Chemical Laboratory, Pune (India), December, 2014.
- Vasquez ES*, Bowser J, Swiderski C, Walters KB, **Kundu S**. Rheological and Microstructural Characterization of Native Lung Mucus. AIChE Annual Meeting, Atlanta, November 2014.
- Kundu S**, Warren J*, Pittman CU, Lacy TE, Toghiani H, and Offenberger S. Temperature Effect on Shear Thickening Responses. AIChE Annual Meeting, Atlanta, November 2014.
- Zabet M*, **Kundu S**. Self-Assembly and Mechanical Properties of Graphene/Acrylic Triblock Copolymer Gels. AIChE Annual Meeting, Atlanta, November 2014.
- Hashemnejad SM*, **Kundu S**. Investigation of Mechanical Properties of a Triblock Copolymer Gel Using Cavitation Rheology and LAOS. AIChE Annual Meeting, Atlanta, November 2014.

- Kundu S***. Large Strain Deformation Behavior of Swollen Polymers Gels. *Invited talk*, Advanced Polymer Series, 3M, St Paul, November, 2014.
- Kundu S***. Soft Materials: Non-linearity, Elastic Instability, and Fracture. *Invited talk*, Chemistry Department, Mississippi State University, October, 2014.
- Kundu S**. Large-Strain Deformation of Polymer Gels. *Invited talk*, SMAT-C Soft Matter Research and Technology Center, University of Santiago, May, 2014.
- Kundu S**. Deformation Behavior of a Strain Stiffening Gel. *Invited talk*, American Chemical Society, Spring Meeting, Dallas, March, 2014.
- Kundu S**. Large-Strain Deformation of Polymer Gels. *Invited talk*, Department of Chemical and Biomolecular Engineering, Tulane University, January, 2014.
- Kundu S**. Large-Strain Deformation of Polymer Gels. *Invited talk*, Department of Chemical Engineering, The City College of New York, November, 2013.
- Kundu S**, Kleiderer A. High Strain Deformation of a Strain Stiffening Gel. American Chemical Society, Spring Meeting, New Orleans, April 2013.
- Kundu S**. Elastic Instabilities in Soft Materials. *Invited talk*, Chemical Engineering Department, University of Alabama, February, 2013.
- Kundu S**, Waters MS, Calizo I, Hight Walker AR, Beers KL. In Situ Characterization of Polyhydroxyalkanoates Using Surface-Enhanced Raman Spectroscopy. AIChE Annual Meeting. Pittsburg, October-November 2012.
- Kundu S**, Waters MS, Lin-Gibson S. Microstructure and Mechanical Properties of Bacterial Biofilms. AIChE Annual Meeting. Pittsburg, October-November 2012.
- Kundu S**, Bhangale AS, Johnson PM, William WE, Gross RA, Beers KL. Continuous flow enzyme-catalyzed polymerization in a microreactor: Reactivity and stability of enzymes. 15th Annual Green Chemistry & Engineering Conference, Washington DC, Jun 2011.
- Kundu S**, Waters MS, Calizo I, Hight Walker AR, Beers KL. Characterization of bacterial polymer formation using vibrational spectroscopy. Poster presentation, 15th Annual Green Chemistry & Engineering Conference, Washington DC, Jun 2011.
- Kundu S**. Soft Materials Mechanics: Developing Multi-Scale Structure-Property-Performance Relationships. *Invited talk*, Department of Mechanical Engineering, Stevens Institute of Technology, April 2011.
- Kundu S**. Engineering Sustainable Polymers through Biology. Dave C. Swalm School of Chemical Engineering. Mississippi State University, Mississippi State, March 2011.
- Kundu S**. Mechanics of Soft Materials: Developing Multi-Scale Structure-Property-Performance Relationships. Department of Chemical Engineering, Louisiana Tech University, Ruston, February, 2011.
- Kundu S**. Mechanics of Soft Materials: Developing Multi-Scale Structure-Property-Performance Relationships. *Invited talk*, Cabot Corporation Limited, Billerica, February, 2011.
- Kundu S**, Bhangale A, William WE, Gross RA, Beers KL. Lab-On-a-Chip: a Novel Platform for Enzyme Catalyzed Polymerization Reactions. AIChE Annual Meeting. Salt Lake City, November 2010.
- Kundu S**, Bhangale A, William WE, Flynn KM, Gross RA, Beers KL. Immobilized enzyme catalyzed polymerization reactions in microreactors. American Chemical Society, Spring Meeting, San Francisco, March 2010.
- Kundu S**, Sharma R, Crosby AJ. Adhesion Behavior of Non-planar Wrinkled Surfaces. AIChE Annual Meeting. Nashville, November 2009.
- Kundu S**, Crosby AJ. Cavitation rheology and fracture behavior of polyacrylamide hydrogels, AIChE Annual Meeting. Nashville, November 2009.
- Kundu S**, Crosby AJ. Cavitation rheology and fracture behavior of polyacrylamide hydrogels, American Physical Society -March meeting, Pittsburgh, USA, March, 2009.
- Kundu S**, Sharma R, Crosby AJ. Adhesion Behavior of Non-planar Wrinkled Surfaces. Poster presentation, American Physical Society -March meeting, Pittsburgh, USA, March, 2009.
- Kundu S**. Soft Materials Mechanics: Developing Multi-Scale Structure – Property Relationships. *Invited talk*, American Chemical Society, Delaware Section, December meeting. Newark, December 2008.

- Kundu S**, Crosby AJ. Cavitation rheology and fracture behavior of polyacrylamide hydrogels. AIChE Annual Meeting. Philadelphia, November 2008.
- Kundu S**, Zimberlin JA, Crosby AJ. Cavitation rheology and fracture mechanics of polyacrylamide hydrogels. Poster presentation, American Physical Society -March meeting, New Orleans, USA, March, 2008.
- Kundu S**, Ogale AA. Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch. *Elsevier Carbon Journal award* presentation, International Carbon Conference “Carbon 2007”, Seattle, July, 2007.
- Kundu S**. Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch. *Invited talk*, Department of Polymer Science and Engineering, University of Massachusetts-Amherst, January, 2007.
- Kundu S**. Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch. *Invited talk*, Prof. Gareth Mckinley’s group, Hatsopoulos Microfluidics Laboratory, Department of Mechanical Engineering, Massachusetts Institute of Technology, January, 2007
- Kundu S**. Investigation of flow and microstructure in rheometric and processing flow conditions for liquid crystalline pitch. *Invited talk*, The Institute for Advanced Learning and Research, The Advanced and Applied Polymer Processing Institute, Virginia, December, 2006.
- Kundu S**, Ogale AA. Rheostructural Studies of Discotic Liquid Crystalline Materials. Poster presentation, NSF-CAEFF site visit, October, 2006.
- Kundu S**, Ogale AA. Rheo-structural study of a discotic thermotropic mesophase pitch. AIChE Annual Meeting. Cincinnati, November 2005.
- Kundu S**, Kone A, Ogale AA. Rheostructural Studies of Discotic Liquid Crystalline Materials. Poster presentation, NSF-CAEFF site visit, October, 2005.
- Kundu S**, Ogale AA. Rheology and microstructure of mesophase pitch. *3rd Prize*, Student Presentation Competition, CAEFF Student Retreat, Asheville, August, 2005.
- Kundu S**, Sweeney D, Naskar A, Ogale AA. Carbon fibers from pitch precursors: rheo-structural characterization of mesophase pitch. Carbons for a Greener Planet Research Frontiers Workshop, Pennsylvania State University, May 2005.
- Kundu S**, Ogale AA. Rheostructural evolution of AR-HP mesophase pitch in shear flow. Invited presentation in *Jack White Honorary Session*, International Carbon Conference “Carbon 2004”, Providence, July, 2004.
- Kundu S**, Cho T, Edie DD, Ogale AA, Rao R, Parker A, Rao AM. Rheology and microstructure of modified mesophase pitch. Poster presentation, NSF-CAEFF site visit, October, 2003.

Media Coverage

- News articles on *Probing and repairing damaged surfaces with nanoparticle*, **Sciencedaily**, **Physorg**, and many others, January 2012.
- News articles on *Enzyme catalyzed polymerization in microreactors*, **Techbeat (NIST newsletter)**, **Sciencedaily**, **Physorg**, and many others, March 2011.
- Cover art, *Journal of Polymer Science Part B: Polymer Physics*, February, 2011

Professional Affiliations

- Member, American Chemical Society
 Member, American Institute of Chemical Engineers
 Member, American Carbon Society

Teaching and Supervisory Experience

Course Instructor

- CHE 8523: Advanced Transport Phenomena [Spring, 2012; Spring, 2013; Spring, 2014; Spring, 2015]
 CHE 3413: Engineering Materials [Fall, 2012; Fall, 2013; Fall 2014]

Additional Instructions

Guest Lecturer, ME 4990/6990: Smart Materials, Spring 2014

Guest Lecturer, ABE/ChE/ME 4624/6624: Experimental Methods in Materials Research, Fall 2013

Postdoctoral Research Advisor

Erick Vasquez – co-advised with Prof. Keisha Walters, major advisor (Chemical Engineering, MSU)

Graduate Research Advisor

Seyed Meysam Hashemnejad (PhD)

Mahla Zabet (PhD)

Satish Mishra (PhD)

Justin Warren (PhD) – co-advised with Prof. Tom Lacy, major advisor (Aerospace Engineering, MSU)

Undergraduate Research Advisor

Igor Kevin (MSU), Spring, 2015 - Present

Jasmine Ross (MSU), Fall, 2014- Present

Dennis Omari (Ohio State), Summer, 2014 –REU student

David Mooney (MSU), Summer, 2014 -Present

Kinsey Naas (MSU), Summer, 2014 - Present

Brian Dyess (MSU), Summer, 2014 -Present

Isaiah Darden (MSU), Fall, 2013 – Spring, 2014

Deirdre Brokwell (MSU), Fall, 2013

Bruce Strong (MSU), Summer, 2013

Arthur Kleiderer (MSU), Spring 2012 – Summer, 2013

Jeremy Walker (MSU), Spring 2012

Thomas Long (UMass-Amherst), Fall 2007 – Fall 2008

Vukasin Denic (UMass-Amherst), REU student, Summer 2008

Olga Morozova (UMass-Amherst), Summer 2008

Aminata Kone (Clemson University), 2004 – 2006

Graduate Student Mentor

Atul Bhangale (NIST), March 2009 – April 2010

Dissertation/Thesis Committee Member

Xianchun Zhu, Ph.D. Student, Chemical Engineering

Marta Amirsadeghi, Ph.D. Student, Chemical Engineering

Professional Service

Manuscript, Conference Proceedings, and Book Reviewer

Journal of the American Chemical Society (JACS)

Advanced Materials

Advanced Energy Materials

Advanced Engineering Materials

Soft Matter

Langmuir

ACS Applied Materials and Interface

Macromolecular Chemistry & Physics

Polymer Engineering & Science

Journal of Applied Polymer Science

Process Biochemistry

Journal of Chemical Physics

Journal of Colloid and Interface Science

Journal of Inorganic and Organometallic Polymers and Materials

Acta Biomaterialia

Journal of Rheology

ANTEC conference

Textbook: Analysis of Transport Phenomena, William M. Deen (MIT), 2nd Edition, Oxford University Press

Proposal Reviewer

NSF Panelist: 2013, 2014

EPA Panelist: 2013

Ad hoc Reviewer: NSF-DMR (Polymers), ACS-PRF

External WERB manuscript reviewer for NIST

Number of articles reviewed: 3

Conference Session Chair

- Polymer Networks and Gels, AIChE Annual Meeting, Atlanta, November, 2014
- PMSE symposium on Supramolecular Assembly and Gelation in Organic Media, American Chemical Society, Spring Meeting, Dallas, March, 2014.
- Polymer Processing and Rheology session, AIChE Annual Meeting, San Francisco, November, 2013

University, College, and Departmental Committees

Chemical Engineering Graduate Affairs Committee, 2012 –Present

University Working Groups

Materials, 2012-present

Biomechanics and Bio-Inspired Design, 2013-present

Other Services

Judge, Materials Poster Competition, AIChE Annual Meeting, Atlanta, November 2014.

Judge, ACS Meeting POLY Poster Award, American Chemical Society, Spring Meeting, Dallas, March, 2014.

Judge, Graduate Research Poster Competition, Bagley College of Engineering, Bagley College of Engineering, Mississippi State University, March 24th -25th, 2014.

Graduate Students Recruitment Seminar, Tulane University, January 17th, 2014.

Graduate Students Recruitment Seminar, Louisiana State University, April 10th, 2013.

Oral Presentation Judge, 10th Annual Graduate Student Association Research Symposium, Mississippi State University, April 14th, 2012.

Professional Development

Workshops

2012 ASEE Chemical Engineering Summer School, July 20th – 26th, Orono, Maine, 2012.

2nd Annual Neutron Scattering For Novices Workshop, Oak Ridge National Laboratory, Tennessee, May 16th, 2012.

Faculty Development Workshop, Mississippi State University, April 1st, 2012.

Career Planning for Prospective Faculty, AIChE Annual Meeting, Salt Lake City, November 7th, 2010.

Funded/Approved Proposals

Title: CAREER: Large-Strain Deformation of Polymeric Gels: Non-Linearity, Instability, and Fracture
Sponsor: NSF
Investigator (s): Santanu Kundu
Role on Project: Principal Investigator
Period of Performance: 05/01/14-04/30/19
Amount: \$533,200

Title: The Smart MATerial Design, Analysis, and Processing (SMATDAP) Consortium: Building Next-Generation Polymers and the Tools to Accelerate Cost-Effective Commercial Production
Sponsor: NSF
Investigator(s): Drew Hamilton, Sara Morgan, Keisha B Walters, Daniel Savin, Santanu Kundu
Role on Project: co-Principal Investigator
Period of Performance: 08/01/14-07/31/17
Amount: \$ 2,699,753 (my share \$347,123)

Title: Planning Grant: I/UCRC for Advanced Composites in Transportation Vehicles
Sponsor: NSF
Investigators: Ratneshwar Jha, Santanu Kundu, Thomas Lacy, Judy Schneider, Masoud Rais-Rohani
Role on Project: co-Principal Investigator
Period of Performance: 04/01/14-03/31/15
Amount: \$15,423

Title: Topical Products and Their Critical Quality Attributes
Sponsor: FDA
Investigator(s): Narasimha Murthy (University of Mississippi), Santanu Kundu
Role on Project: co-Principal Investigator
Period of Performance: 10/01/14-9/30/15
Amount: \$26,533 (my share for year 1 and similar level of funding is expected for the next 5 years)

Title: Integrated Virtual Prototyping for Product Engineering and Design
Sponsor: US Army Engineering Research and Development Center (ERDC)
Investigator(s): Roger King
Role on Project: Senior Investigator
Period of Performance: 09/16/14-09/15/15
Amount: \$104,720

Title: Microstructure and Nanomechanics of Native and Simulant Lung Mucus Doped with Nanoparticles
Sponsor: NSF Mississippi Experimental Program to Stimulate Competitive Research (EPSCoR)
Investigator(s): Erick S. Vasquez, Santanu Kundu, Keisha B Walters
Role on Project: co-Principal Investigator
Period of Performance: 09/01/14-08/31/15
Amount: \$36,000

Title: Microstructural of a Physical Gel
Sponsor: CNMS, Oak Ridge National Laboratory
Investigator(s): Santanu Kundu
Role on Project: Principal Investigator
Period of Performance: 3 days (August, 2014 – September, 2015)
Amount: N/A

Title: Effect of temperature and shear on the evolution of microstructure of shear-thickening fumed-silica suspensions

Sponsor: National Institute of Standards and Technology (NIST)

Investigator(s): Santanu Kundu

Role on Project: Principal Investigator

Period of Performance: 3 days (May, 2014 – October, 2014)

Amount: N/A

Title: Structural investigation of a physically associating gel using Small Angle Neutron Scattering

Sponsor: National Institute of Standards and Technology (NIST)

Investigator(s): Santanu Kundu

Role on Project: Principal Investigator

Period of Performance: 2 days (January, 2015 – June, 2015)

Amount: N/A

Title: Evolution of Microstructure of Shear-Thickening Fumed-Silica Suspensions

Sponsor: National Institute of Standards and Technology (NIST)

Investigator(s): Santanu Kundu, Justin Warren

Role on Project: Principal Investigator

Period of Performance: 4 days (January, 2015 – June, 2015)

Amount: N/A

Title: Vehicular Fluids

Sponsor: Computational Research for Engineering and Science./ERS: Engineering Resilient Systems/ Center for Advanced Vehicular Systems (CAVS)

Investigator(s): Santanu Kundu

Role on Project: Principal Investigator

Period of Performance: 02/14/14-09/18/14

Amount: \$44,581

Title: Mechanical Properties of Pulmonary Mucus

Sponsor: NSF Mississippi Experimental Program to Stimulate Competitive Research (EPSCoR)

Investigator(s): Santanu Kundu

Role on Project: Principal Investigator

Period of Performance: 09/01/12-08/31/14

Amount: \$36,000

Title: Organic/Inorganic Composites for EMI Shielding: A Molecular Design Approach

Sponsor: RASPET, MSU

Investigator(s): Santanu Kundu, Hossein Toghiani, Tom Lacy, Charles U. Pittman, Jr., Ratneshwar Jha

Role on Project: Principal Investigator

Period of Performance: 03/01/2013- 09/30/2014

Amount: 10,000

Title: Lignin-Derived Materials: Ecofriendly Nano-reinforcements for Automotive, Aerospace and Wind Turbine Applications

Sponsor: RASPET, MSU

Investigator(s): Hossein Toghiani, Santanu Kundu, Tom Lacy, Charles U. Pittman, Jr., Ratneshwar Jha

Role on Project: co-Principal Investigator

Period of Performance: 03/01/2013- 09/30/2014

Amount: 22,000

