

# Rahul Misra

---

## Education

- Ph.D. Candidate, The University of Southern Mississippi (Jan-04)  
Advisor: Dr. Sarah Morgan CGPA: 3.9/4.0
- Graduate student, Chemical Engineering. & Material Science (July 03-Dec 03)  
The Michigan State University, East Lansing, Michigan CGPA: 3.9/4.0
- M.Tech, Polymer Science and Engineering (2001-2002)  
The Indian Institute of Technology (IIT), Delhi CGPA: 9.2/10.0  
**Thesis:** Studies on Polybutylene Terephthalate- Titanium Dioxide Nanocomposites  
Advisor: Dr. S. N. Maiti
- B.Tech, Chemical Technology (Specialization in Plastic Technology) (1995-1999)  
Harcourt Butler Technological Institute (H.B.T.I.), Kanpur, India Percentage: 83 %  
**Department rank:** First

## Research Interests

- Understanding Macro to Nanoscale Tribological and Mechanical Performance of Hybrid Polymeric Nanocomposites and High Performance Materials Utilizing Advance Nanoprobe Techniques
- Nanoparticle Dispersion and Assembly
- Self-Assembly, Surface Modification, Solution Dynamics, and Chemical Force Microscopic Investigations of Adhesive Interactions of Self Assembled Amphipathic Fungal Proteins

## Current Research Activities

My doctoral work encompasses preparation and macro- to nano level characterization of low friction polymer nanocomposites, for biomedical and other engineering device applications. Materials of interest are novel rigid rod materials, thermoplastics as well as engineering plastics. Major area of emphasis in my research work is to optimize the use of inorganic compounds as nanostructured additives for generating novel inorganic-organic hybrid polymer nanocomposites with controlled dispersion of nanoparticles. A different nanocomposite system based on polyhedral oligomeric silsesquioxane (POSS) molecules as the inorganic fillers is of interest in my research. The resulting hybrid nanocomposites, which bear the unique properties from both inorganic and organic components, provide a versatile route to control the structure and properties of polymers at nanoscale level.

## Publications

- **Rahul Misra**, Bruce X. Fu, Sarah E. Morgan, "**Nanoscale Low Friction Hybrid Nanocomposites: Interplay of Surface Energetics, Structure and Nanomechanical Properties**", *Manuscript in Progress*
- Alp H. Alidedeoglu, Sandipan Dutta, **Rahul Misra**, James W. Rawlins, and Sarah E. Morgan, "**Copolymerization of Sec-Butenyl Acetate with Styrene Via Emulsion Polymerization**", Manuscript Submitted
- Sarah E. Morgan, **Rahul Misra**, Paul Jones, "**Nanomechanical and Surface Frictional Characteristics of a Copolymer based on Benzoyl-1,4-Phenylene and 1,3-Phenylene**", *Polymer*, 47(8), 2865-2873 [2006]

- **Rahul Misra**, Jun Li, Gordon C. Cannon, Sarah E. Morgan, "**Nanoscale reduction in surface friction of polymer surfaces modified with Sc<sub>3</sub> hydrophobin from Schizophyllum commune**", *Biomacromolecules*, 7, 1463-1470 [2006]
- **Rahul Misra**, Sarah E. Morgan, "**Nanoscale surface topography and friction of polypropylene/polyhedral oligomeric silsesquioxane (POSS<sup>®</sup>) hybrid nanocomposites**", *ACS Polymer Preprint* [2006]
- Kristin Hamilton, **Rahul Misra**, and Sarah E. Morgan, "**Thermal properties of Octaisobutyl polyhedral oligomeric silsesquioxane/polypropylene hybrid nanocomposites**", *ACS Polymer Preprint* [2006]
- Alp H. Alidedeoglu, **Rahul Misra**, Jun Li and Sarah E. Morgan, "**Surface friction study of Hyaluronic acid thin films through lateral force microscopy**", *ACS Polymer Preprint* [2006]
- J. Paige Phillips, Ryan Stephen, Erin Fortenberry, **Rahul Misra**, and Sarah E. Morgan, "**Nanotack properties of polystyrene-block-polybutadiene-block-polystyrene and polystyrene-block-polyisoprene-block-polystyrene/C60 fullerene light-responsive adhesive nanocomposites**", *ACS Polymer Preprint* [2006]
- **Rahul Misra**, Jun Li, Sonya D. Benson, Nick Malkovich, Sarah E. Morgan, "**Nanotribology of Protein Modified Surfaces**", ANTEC Preprint [2005]
- Sarah E. Morgan, Jun Li, Sonya D. Benson, **Rahul Misra**, Gordon C. Cannon, "**Nanoprobe evaluations of hydrophobin-modified hair**", *ACS Polymer Preprint* [2005]

## Patent

- "**POSS Nanostructured Chemicals as Dispersion Aids and Friction Reducing Agents**" U.S. Provisional Patent Application Serial No. 60/751,362

## Presentations

- "Nanoscale Surface Topography and Tribomechanical Investigation of Polypropylene/Polyhedral Oligomeric Silsesquioxane Hybrid Nanocomposites", Gordon Research Conference on Tribology- **2006**
- "Nanotribology of Protein Modified Surfaces", Eastman Focus School Program on Polymer Science and Technology - **2005**
- "Nanoscale Surface Friction Behavior of Rigid Rod Polymers", Mississippi Academy of Sciences Annual Conference-**2005**
- "Surface Characterization and Friction Studies of Polymers via Atomic Force Microscopy", Veeco-UCSB summer workshop on Advanced Nanotechnology-**2004**

## Work Experience

- Research Assistant, The University of Southern Mississippi, USA (Jan 05 --- till date)
- Mentor, Materials research science and engineering center (MRSEC) research experience for undergraduates (REU) summer research project (Summer 05, 06)
- Teaching Assistant, The University of Southern Mississippi, USA (Jan 04-Dec 04)
- Teaching Assistant, The Michigan State University, Michigan, USA (Aug 03-Dec 03)
  - Course Taught: Introduction to Materials Science
- Project Engineer, Samsung Heavy Industries Ltd. South Korea (Feb 03-July 03)

- Project planning, documentation, implementation and monitoring.
- Assistant Engineer, D.S.C.L (Plastic Business Group), Kota, India (July99- July 01)
  - Development and upgradation of P.V.C. Compound grades.
  - Planning & executing business development strategies.
  - Medical grade P.V.C. Compound development.
  - Technical support to customers.
  - ISO-14000 team member

## Academic Award/Honors

- Eastman chemical company graduate student fellowship, 2005
- Research Assistantship at the University of Southern Mississippi
- Graduate student fellowship at the Michigan State University
- Institute merit scholarship through out B.Tech and M.Tech
- Gold medal for achieving the highest cumulative academic score, Chemical Technology
- Silver medal for the second cumulative academic total score in the university
- National high school merit scholarship

## Industrial Internships

- Product Application & Research Center, Reliance Industries, India (5/2002 - 6/2002)  
**Project:** Study on active packaging of fruits & vegetables to increase the shelf life of fruits & vegetables during storage.
- V.I.P. Industries Limited, Nashik, India (5/1998 - 7/1998)  
**Project:** To control the stress whitening in polypropylene for increasing luggage aesthetics.
- Central Institute of Plastics Engineering & Technology (C.I.P.E.T.) Lucknow, India (5/1997 - 6/1997)  
**Project:** Study of various polymer processing & testing machines

## Professional Affiliations

- Member of Society of Plastics Engineers (SPE).
- President of Society of Plastics Engineers (SPE), student chapter at Michigan State University (July 03- Dec 03).
- Member of American Chemical Society (ACS).
- Member of Mississippi Academy of Sciences (MAS), Chemistry and Chemical Engineering Division.

## Collaborators

- Dr. Joe Lichtenhan, Hybrid Plastics Incorporation, Hattiesburg, MS

## Contact

Email: [rahul.misra@usm.edu](mailto:rahul.misra@usm.edu)  
[misra.rahul@gmail.com](mailto:misra.rahul@gmail.com)