

Diana R. Haidar

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Education:

- University of Delaware Aug 2013 – Present
Ph.D. Mechanical Engineering Anticipated Graduation Aug 2017
- University of Wisconsin-Madison Graduated May 2011
B.S. Mechanical Engineering

Research Experience:

- Materials Tribology Lab Newark, DE Aug 2013 – Present
PI Dr. David L. Burris, University of Delaware
NSF Graduate Research Fellow
 - Investigate the tribological mechanisms of polymeric solid lubricant bearings, specifically the formation of a sacrificial transfer film onto steel that protects the polymer from direct contact to the hard counterface, which promotes low wear and low friction in extreme environmental conditions.
 - Design aluminum metal matrix nanocomposites to resist scuffing, a severe form of wear involving large debris formation and extensive subsurface deformation, by dispersing nanoparticles in the matrix that encourage small-sized debris formation and damage compartmentalization.
- Nano-Engineered Materials Processing Center Madison, WI Jan 2010 – Jan 2012
PI Dr. Xiaochun Li, University of Wisconsin-Madison
Undergraduate Researcher & Activities Coordinator
 - Created Transmission Electron Microscopy (TEM) samples of unique aluminum nanocomposites and characterized both the dispersion of nanoparticle clumps and the distribution of all nanoparticles throughout those TEM samples. Results were used to correlate processing variables with material properties in order to establish reliable methods for the mass production of these nanocomposites.
 - Planned the weekly seminars and participated in the discussions directing the center's future work.

Industry Experience:

- Chart Energy & Chemicals La Crosse, WI March 2012 – Aug 2013
Manufacturing Engineer
 - Managed a tooling machine shop and production area where steel dies were fabricated and then used to shape aluminum heat transfer layers for heat exchangers. Responsible for assessing the quality of layers, and then troubleshooting production issues where imperfections originated.
 - Completed capital investment projects for new cost-saving equipment, investigated the replacement of hand-measured inspections with automated technology for quality improvements, and co-led 5S events for increased production efficiency.
- General Electric Healthcare Madison, WI May 2009 – Jan 2010
Research & Development Co-Op
 - Worked with engineers to design new Engstrom Carestation Ventilator parts, and model them in ProEngineer CAD software. These cost-saving projects investigated the quality and safety factors affecting new part designs before implementing them into the production line.

- Cargill Corn Milling Wahpeton, ND May 2008 – Aug 2008
Engineering Maintenance Intern
 - Contacted, hired, and supervised contractors in the production plant to complete maintenance and long-term savings projects. Observed, documented, and improved the facilities for OSHA VPP audit.

Refereed Publications:

- *Interrelated Effects of Temperature and Environment on Wear and Tribochemistry of an Ultralow Wear PTFE Composite*
H.S. Khare, A.C. Moore, D.R. Haidar, L. Gong, J. Ye, J.F. Rabolt, and D.L. Burris,
Journal of Physical Chemistry C, 2015, 119 (29), pp 16518-16527.
- *Transfer Film Properties and their Role in Polymer Tribology*
J. Ye, D. R. Haidar, and D. L. Burris, The Handbook of Polymer Tribology, in progress
- *Relating wear of polymers and polymer composites to quantitative metrics of transfer film topology*
D. R. Haidar, J. Ye, A. C. Moore, and D. L. Burris, in progress
- *A Novel Approach to Impeding Sever Wear of Aluminum using Metal Matrix Nanocomposites: Al6061-Al₂O₃*
D. R. Haidar, E. T. Rezich and D. L. Burris, in progress
- *Implications of Environmental Constituents on Characterization of Polymeric Solid Lubricant Transfer Films*
D. R. Haidar, J. Ye, A. C. Moore, and D. L. Burris, in progress

Oral Presentations:

- *Quantitative Characterization of Polymeric Solid Lubricant Transfer Films*
D. R. Haidar, J. Ye, A. C. Moore, and D. L. Burris, STLE Annual Meeting,
Las Vegas, NV, May 2016
- *Interrelated Effects of Temperature and Environment on Wear and Tribochemistry of an Ultralow Wear PTFE Composite*
H.S. Khare, A.C. Moore, D.R. Haidar, L. Gong, J. Ye, J.F. Rabolt, and D.L. Burris,
STLE Tribology Frontiers Conference, Denver, CO, October 2015
- *Wear Study of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃*
D.R. Haidar and D.L. Burris, STLE Annual Meeting, Dallas, TX, May 2015
- *Effects of Processing Conditions on Wear of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃*
D.R. Haidar and D.L. Burris, STLE Tribology Frontiers Conference,
Chicago-Rosemont, IL, October 2014
- *Wear of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃*
D.R. Haidar and D.L. Burris, STLE Annual Meeting, Orlando, FL, May 2014

Poster Presentations:

- *Wear Study of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃*
D.R. Haidar and D.L. Burris, STLE Annual Meeting, Las Vegas, NV, May 2016
- *Wear Study of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃*
D.R. Haidar and D.L. Burris, STLE Tribology Frontiers Conference, Denver, CO, October 2015

Awards:

- *Women In Engineering Grant, 2016*
 - Awarded funding for an undergraduate to conduct research and receive mentoring under my supervision during the spring semester of 2016.
- *Graduate Student Teaching Assistant Award from the Department of Mechanical Engineering, 2015*
 - Awarded in recognition of excellent scholarship and creativity in engineering as a teaching assistant.
- *National Science Foundation Graduate Research Fellowship, 2014*
 - Awarded for demonstrating the potential for significant research achievements to STEM fields.
- *University of Delaware Professional Development Award for Conference Attendance, 2014*
 - Awarded funds for travel to give an oral presentation on the *Wear of Aluminum Matrix Nanocomposites: Al6061-Al₂O₃* at the 2014 STLE Annual Meeting.
- *Pilot Project Funding from the Department of Mechanical Engineering, 2014*
 - Awarded to initiate a new and impactful research project for creating scuffing resistant aluminum metal matrix nanocomposites.

Engineering Outreach and University Involvement:

- Women In Engineering Newark, DE May 2014 – Present
Steering Committee Member
 - The goal of this program is to promote, mentor, and enable participation of women students and faculty within engineering studies and the workplace.
 - Steering Committee members organize activities and host events that bring together female and male engineering students, faculty, and administrators – as well as external representatives from industry, government agencies, and other academic institutions – in an effort to provide an engaging and supportive climate for all members of the engineering community at the University of Delaware.
- Perry Initiative Newark, DE Aug 2013 – Present
Program Specialist & Volunteer
 - This program aims to inspire young women to be leaders in the fields of engineering and orthopaedic surgery. This mission is advanced by running outreach programs across the country for women students in high school, college, and medical school.
 - Volunteers work directly with female high school students to encourage their interest in the engineering applications of designing various orthopaedic surgeries. Students are trained to use power drills, many for the first time, and complete hands-on modules that practice modern surgeries – external fixation, intramedullary nailing, scoliosis – with plastic bones and real medical kits.
- Delaware Department of Education Newark, DE Summer 2016
STEM Summer Workshop Facilitator & Volunteer
 - University of Delaware personnel simultaneously collaborated with and trained high school teachers to run STEM workshops for high school students. Facilitators used a variety of hands-on laboratory activities to engage students in learning scientific principles and the usefulness of their applications.
- STLE Annual Meeting Outreach Orlando, FL May 2014
Volunteer
 - Set up and facilitated the Leonardo da Vinci experiment for a local high school. Students conducted tests that confirmed Leonardo da Vinci's original results, the apparent area of contact does not influence the frictional response between two materials.

Mentoring and Teaching Experience:

- Materials Tribology Lab Newark, DE 2014 – Present
Laboratory Research Supervisor
 - Trained three undergraduate engineers (Erin Rezich, Ryan Tocker and Taylor Jacobs) and two high school seniors (Arshia Faghri and Sophia Marianiello) in the field of tribology. Supervised each student in developing their own independent project that complemented active research projects, in order to promote an understanding of the mechanisms involved in the wear performance of polymeric solid lubricants and aluminum metal matrix nanocomposites.
 - Taylor, Arshia and Sophia excelled at sample fabrication, machining and surface polishing as preparation for running experiments.
 - Ryan gathered pilot data for measuring the adhesion energy of multiple polymeric solid lubricants and assisted in building a new tribometer for the lab.
 - Erin tested the wear rate and friction coefficient of aluminum metal matrix nanocomposites in dry sliding against a steel counterface, in order to test the scuffing resistance of these unique materials.

- UD course Heat Transfer Newark, DE Spring 2013
Teaching Assistant
 - Facilitated student learning in discussion sessions, office hours, and exam reviews. Helped students overcome the complexity of problems by breaking down the situation into manageable components and reinforcing key concepts. Subsequently, students independently rebuilt the problem with confidence in how each element contributed to the whole.

- UD course Senior Design Newark, DE Fall 2013
Teaching Assistant
 - In a hands-on design course, applied manufacturing experience to assist students throughout the design cycle of brainstorming, design selection, machine shop safety training, part fabrication, prototype testing and project review.

Training in Teaching and Learning:

- Center for Teaching and Learning Newark, DE Fall 2016
Student in UD course – Pedagogy
 - Learned about research-based teaching principles and innovative teaching methodologies. Provided practical techniques for enhancing pedagogical effectiveness and an opportunity to observe exemplary UD faculty instructional practices using modern information technologies.

- UD Faculty Institute Newark, DE Summer 2016
Registered Participant
 - Informed of the latest research and technological advances in classroom and online instruction. Attended presentations given by UD faculty and invited guests that demonstrated the themes of maker thinking for active learning, information literacy and computational reasoning.

- Center for Teaching and Learning Newark, DE Spring 2016
Student in UD course – Learning
 - Explored cognitive, affective and social aspects of the learning process by researching and reflecting on learning and teaching literature in higher education. Conducted an independent experiment that tested students' response to feedback, which exemplified the importance of topic targeted practice.