SOUTH DAKOTA MINES
Department of Mechanical Engineering

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THURSDAY, OCTOBER 22 2:00-2:50 PM

ME Research Seminar

A Mechanical Engineer's Approach to Bacterial Infections

DR. MARTHA E. GRADY & MS. JOREE N. SANDIN
UNIVERSITY OF KENTUCKY

Dr. Marth E. Grady is an Assistant Professor in Mechanical Engineering at University of Kentucky with a joint appointment in Biomedical Engineering. Before starting at UK in 2016, she was a postdoctoral fellow at University of Pennsylvania. Dr. Grady holds a MS and PhD from the University of Illinois at Urbana-Champaign in Theoretical and Applied Mechanics. Her bachelor's degree is in Mechanical Engineering from the University of Central Florida. Dr. Grady's research interests are at the intersection of thin film mechanics and biological interfaces. Her research is supported by NASA and NIH.

Ms. Joree N. Sandin is a current graduate student in Mechanical Engineering at the University of Kentucky in the Grady Lab. She will defend her M.S. Thesis this semester. Her thesis work focuses on biological material characterization through combined atomic force and confocal microscopy. Ms. Sandin earned her BS in Mechanical Engineering at South Dakota Mines in 2018, where she was Team Lead of the Moonrockers NASA Robotic Mining Competition team. She is passionate about mechanobiology and space and determined to pursue a career combining both interests.

THURSDAY 10/22 2-2:50 PM
in-person: CM 266 (capacity 16)
Live *Zoom!* LINK: tiny.cc/MinesF20
Info & past videos : me.sdsmt.edu > seminars

Talk abstract

Biofilm formation is a significant problem within the American healthcare system, accounting for 17 million infections, 550,000 deaths, and an estimated cost in the billions of dollars annually. Infections from biofilm formation are prolific in implantology, accounting for half a million cases annually. While there have been many advancements in the study of biomaterials, device related infections remain a critical problem. To prevent bacterial biofilms from forming it is paramount to study and quantify the adhesion of bacteria onto various surfaces. Our lab leverages experimental thin film mechanics to investigate biological adhesion onto implants. We have adapted the laser spallation technique to determine dominant parameters that promote strong biofilm adhesion and are establishing a novel Adhesion Index – a ratio of mammalian cell adhesion to biofilm adhesion. We have also developed protocols for combined confocal microscopy and atomic force microscopy, to facilitate live, in-solution, data collection (e.g., surface morphology, elastic modulus, pull-off force, and surface roughness) on same-cell samples to couple these mechanical properties with the presence or absence of cell wall components. With these new tools, we investigate the role of biofilm mechanics and contribute a better understanding about how to develop new devices that will be less prone to infections.