THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT SPRING COLLOQUIUM SERIES PRESENTS:

Professor Juana Mendenhall

Vice Provost of Academic Innovation and Walter E. Massey Professor of Physical Sciences **Morehouse College**



Using Additive Manufacturing to Engineer Synthetic Tissues with Functional Chemical Gradients at Various Length Scales

The development of inks for engineered tissues using additive manufacturing requires comparable mimicking of chemical and mechanical properties to recapitulate structure and properties at varies length scales. Hence, there is a need to create synthetic tissues that provide heterogeneous and complex organization that can facilitate cell structure and patterning by designing chemical structure that can facilitate cellular organization and chemotaxis. Towards this end, the development of composite inks that can facilitate biological molecules to guide cell orientation, proliferation, and tissue formation in 3D printed constructs is essential. Recent advances in 3D bioprinting in the Mendenhall laboratory at Morehouse college has enabled the spatial patterning of both cells and materials to achieve functional gradients. This presentation will discuss the spatial and temporal patterning of biomaterials doped with nanomaterials such as cerium oxide to guide cellular orientation in 3D printed constructs while influencing biological markers that regulate cellular metabolism. Further, we will discuss the effect of functional stratification in 3D printed constructs using a combination of FTIR (Fourier Transform Infrared) microscopy and microrheology to identify functional groups that effect mechanical properties.

Dr. Juana Mendenhall is the Vice Provost of Academic Innovation and Learning and Walter E. Massey Professor of Physical Sciences at Morehouse College at Morehouse College in Atlanta, GA. Professor Mendenhall is a results-oriented administrator at Morehouse where she is the Director and Principal Investigator of the Smart Biomaterials Lab, President and Founder of TheraViscTM, LLC, a company specializing in developing viscosupplement injectable gels to help with knee injuries, the TEDx licensee for TEDx Morehouse College, an educator, and scholar. Her ground-breaking patentpending medical technology is one of the first medical technologies to show real potential in regenerating articular cartilage to mitigate joint diseases. Mendenhall is a champion for diversity, inclusion, equity, and belonging in the classroom and research lab. She believes in innovative pedagogy, training, and scholarship for all students! Dr. Mendenhall received her Bachelor of Science degree from North Carolina A&T State University. After graduating from N.C. A&T, she worked in the polymer industrial field until she decided to pursue her doctorate in polymer chemistry at Clark Atlanta University, where she completed her program in 2006. This graduate experience led to her receiving numerous awards in polymer chemistry from organizations such as the American Chemical Society (ACS) and the NSF. In recognition of her graduate work, Dr. Mendenhall received a Diversity Postdoctoral Fellowship to work at Cornell University. Following this fellowship, she was accepted into Emory University's Fellowships in Research and Science Teaching (FIRST) fellowship. The FIRST fellowship teaches scientists how to become better science teachers while doing research. She has received several awards throughout her career from organizations such as the American Chemical Society, National Science Foundation, Massachusetts Institute of Technology, Cornell University, and the American Society of Cell Biology. She is a reviewer for several scientific journals and guest editor of the Bioengineering Journal. Mendenhall also serves on the board of non-profit companies such as the Black Bayou social justice organization. She has given numerous research talks domestically and internationally on her smart biomaterials research and published many articles in high-impact peer-reviewed journals. Her TEDx talk on the Future of Knee Repair is already changing the narrative for treating patients with knee problems such as Osteoarthritis!

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In person only; no Zoom Questions? Contact <u>allison.macknick@northwestern.edu</u>

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