Chemical Engineering Seminar

Michigan Tech
Chemical Engineering

CHEMICAL ENGINEERING
Proudly Presents:

Dr. Chelsea Monty-Bromer
Associate Professor
Cleveland State University

BIOGRAPHY:

Chelsea Monty, PhD, is an Associate Professor of Chemical and Biomedical Engineering at Cleveland State University. She is also the CTO and founder of RooSense Inc., a wearable health tech startup, and a co-founder of Corrolytics Inc., focused on microbial corrosion monitoring. Previously, she was an associate professor at The University of Akron (2009-2020). She earned her PhD in Chemical and Biomolecular Engineering from the University of Illinois Urbana-Champaign in 2009.

Named a notable woman in STEM by Crain's Cleveland in 2019, she was an Air Force Summer Faculty Fellow in 2017-2018. Her research uses electrochemical techniques and nanocomposite biomaterials to study biological processes. She has previously received funding from the Wright Center for Systems Engineering, the National Science Foundation, Ohio Department of Transportation, the Department of Defense, and the Air Force Research Lab, and the Federal Department of Transportation.

Friday, January 24th at 10:00 AM
GLRC 202 or Via Zoom

Wearable Fabric Sensors for Sweat Biomarkers

Recent advancements in sweat biomarker sensors have not addressed long-term detection in constricted or load-bearing applications, where flexible plastic sensors can cause discomfort. This study presents a carbon nanotube-based fabric sensor for real-time sweat biomarker detection. The sensor uses electrospun nylon-6 functionalized with multi-walled carbon nanotubes for enhanced conductivity and selective detection. Sweat, rich in physiological and metabolic data, provides insights into hydration and health. For instance, sodium concentration correlates with fluid balance and can detect dehydration or overhydration.

Traditional sweat monitoring methods involve separate sampling and analysis, leading to issues like sample evaporation and analyte degradation. Wearable sensors that perform in-situ sampling and analysis offer a solution by continuously measuring freshly generated sweat. These sensors use functional absorbent materials (e.g., paper or hydrogels) to remove old sweat and maintain breathability, allowing for longer physiological monitoring.

This work details a functional absorbent material sensor made from a multi-walled carbon nanotube-functionalized nylon-6 nanocomposite. The sensor, capable of real-time biomarker detection (e.g., sodium, potassium, lactate) with high accuracy, transmits data via Bluetooth. This carbon nanotube-based fabric sensor can be integrated into "smarter" clothing for applications in health monitoring, disease diagnosis, and performance tracking.