



MECHANICAL & MATERIAL COLLOQUIUM

Development and Characterization of Metal-Chitosan Composites as Sustainable Alternative Materials

by Sihe Zhang

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Synthetic plastics and polyelectrolyte membranes, while essential in many industrial applications, pose significant environmental challenges due to their non-biodegradability and dependence on petroleum-based resources. This project seeks to address these issues by developing metal-chitosan composites in the form of membranes and thin films, offering sustainable alternatives. Chitosan was selected as a start of the matrix material for its economic viability, abundance, and biodegradability. However, its practical use is limited by poor mechanical strength, brittleness, and high-water sensitivity. To overcome these limitations, various metal ions (Zn^{2+} , Cu^{2+} , Ca^{2+} , etc.) and gold (Au) nanoparticles were incorporated into chitosan hydrogels to enhance tensile strength, toughness, stability, and beyond. The resulting composites were characterized using techniques such as DMA, SEM, and DSC to evaluate their mechanical, thermal, and other properties.

The Talk will also briefly discuss previous work on alternative fuel production via CO hydrogenation and upgrading reactions, as well as continuous flow technology.

Dr. Sihe Zhang is an Assistant Professor in the Department of Chemical Engineering and Materials Science at Kettering University. Her current research involves Metal-Organic-Compounds development, continuous flow technology for chemicals, and CO_2 utilization via catalysis and battery application. Her broader research interests also include pollution treatment, sustainability enabling technology in the field of chemical and energy production. She earned her Bachelor Degree in Chemical Engineering from Tianjin University and her Doctor degree in Chemical Engineering from Auburn University. She worked as postdoctoral fellow at Auburn University Bioenergy and Biomass Center, and at Georgia Institute of Technology, before she started her position as assistant professor at West Virginia University Institute of Technology. Her research has been funded by National Science Foundation, Department of Energy, Department of Defense, Department of Agriculture, West Virginia Higher Education Policy Commission, and Michigan Economic Development Corporation.



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<https://mme.fiu.edu/seminar-schedule>

For questions or suggestions, contact Colloquium Organizers Dr. Jiuhua Chen (chenj@fiu.edu) or Dr. Pezhman Mardanpour (pmardanp@fiu.edu)