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JACOBS SCHOOL OF ENGINEERING
Aiiso Yufeng Li Family Department of
Chemical and Nano Engineering

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DEPARTMENT SEMINAR

Wednesday, March 26th, 2025

11:00 AM - 12:00 PM

SME 248



Dr. Chibueze Amanchukwu, PhD

“Innovating in – and learning from – battery science to address challenges in electrochemistry”

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Abstract: Electrochemical energy storage and conversion technologies are of great importance because they can enable the deployment of renewable energy in numerous applications (transportation, manufacturing, electricity generation, environmental remediation and more). Unfortunately, many of the challenges that prevent the deployment of next generation batteries or earth abundant electrocatalytic systems can be traced to a lack of suitable electrolytes. Electrolytes are the ionically conductive media that is in contact with both electrodes. In this talk, I will discuss (1) my groups’ focus on the design of novel electrolytes for next generation batteries. We deploy data science approaches to navigate wide electrolyte chemical spaces and accelerate electrolyte selection. Furthermore, we develop solvent-free inorganic molten salt electrolytes that eliminate many of the safety hazards that face conventional electrolytes. (2) We use ideas from battery electrolyte design to address challenges in electrocatalysis and environmental remediation. We show that by modulating water activity and subsequent reactivity in ‘designer’ electrolytes, undesired hydrogen evolution reaction can be suppressed to enable waste valorization such as CO₂ conversion to fuels and chemicals. Finally, our focus on developing novel electrolytes and exploring them in electrochemical devices enables the development of earth-abundant batteries and electrocatalytic systems with earth-abundant catalysts.

Bio: Chibueze Amanchukwu is a Neubauer Family Assistant Professor in the Pritzker School of Molecular Engineering at the University of Chicago, a faculty affiliate in the Data Science Institute, and a joint appointee at Argonne National Laboratory. His research is focused on enabling long duration electrical (batteries) and chemical energy storage for a sustainable energy future. His team is especially interested in modifying electrolyte and ion solvation behavior to control electrochemical processes occurring in batteries and the valorization of waste (e.g., CO₂) to valuable fuels and chemicals. He has been named a “Talented Twelve” by Chemical & Engineering News (C&EN) and an Inventor Under 35 by MIT Technology Review (Global). His work has been recognized with the NSF CAREER Award, DOE Early Career Award, Army Research Office Early Career Award, Google Research Scholar Award, Camille-Dreyfus Teacher-Scholar Award, ECS-Toyota Young Investigator Fellowship, CIFAR Azrieli Global Scholar Award, and the 3M Nontenured Faculty Award. He obtained his PhD in chemical engineering as a NDSEG Fellow at MIT and was a TomKat Center Postdoctoral Fellow at Stanford University.