# MSE Seminar

Virtual

**Friday, Oct. 22, 2021**

**10:10 AM – 11:30 AM**

Zoom link:  **https://virginiatech.zoom.us/j/84073842583**

## Prof. Huiyuan Zhu

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**Virginia Tech**

## "Well-Defined, Atomically Precise Catalysts for Sustainable Chemistry"

At the core of the pursuit of energy and environmental sustainability is the management of carbon and nitrogen cycles to provide high-value carbon-based fuels and nitrogen-based chemicals through new catalytic processes with high efficiency and minimized environmental impact. Fortunately, the rapid growth of renewable electricity (*e.g.*, solar-, wind-, hydro-electricity) and the development of advanced materials have offered an unprecedented opportunity to advance the clean and sustainable production of chemicals and fuels. For example, electrochemical reactions, driven by solar/wind electricity, allow the conversion of $CO_2$, $N_2$, nitrite, and nitrate, into chemicals and fuels. However, the costs and efficiencies of these reaction schemes have to be substantially improved before the large-scale implementation, which is to a large extent dependent on the understanding and thus optimization of catalysts in these schemes. Nevertheless, the structural complexity of heterogeneous catalysts makes the design rule elusive, limiting our capability of developing high-performance catalysts. Well-defined, atomically precise materials allow us to bridge the knowledge gap between conventional single-crystal bulk materials and powder catalysts to achieve new understandings of structure-catalytic property relationships. In this talk, I will highlight our recent progress of developing well-defined catalysts for sustainable chemistry with a specific focus on electrochemical $CO_2$ conversion and nitrate reduction.



Huiyuan Zhu is an Assistant Professor of Chemical Engineering at Virginia Tech. Her research focuses on tailoring multi-functional nanostructures for catalysis, energy conversion, and chemical transformation. She received her B.S. in Chemistry from the University of Science and Technology in China (2009), and her Ph.D. from Brown University (2014). From 2014 to 2018, she was one of the inaugural Liane B. Russell Fellows and then a staff scientist in the Nanomaterials Chemistry Group, Chemical Sciences Division at the Oak Ridge National Laboratory. She has received the 2021 Class of Influential Researcher from *Industrial and Engineering Chemistry Research* and 2021 *Nanoscale* Emerging Investigator awards. She is also a recipient of the 2020 Jeffress Trust award, 2020 Ralph E. Powe Junior Faculty Enhancement Award, 2020 Doctoral New Investigator Award of the ACS Petroleum Research Foundation, and the 2020 *Journal of Materials Chemistry A* Emerging Investigator award, in addition to recognition for her contributions as a teacher and advisor.  More at:  https://che.vt.edu/People/Faculty/Zhu.html