

## AYMAN KARIM

# "Dynamics and Reactivity of Supported Catalysts in the Subnanometer Regime"

Wednesday

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3:30 PM

Wu and Chen Auditorium

Levine Hall



Professor  
Chemical Engineering  
Virginia Tech

**ABSTRACT**

Supported noble metal catalysts are extensively used in industry and their catalytic performance is strongly affected by particle size and shape. In the last decade, supported single atoms and subnanometer clusters have attracted a lot of interest since they maximize the metal utilization and have shown extraordinary catalytic properties for many reactions. In this talk, I will present my group's work using detailed kinetics, *in-situ* and *in-operando* infrared and x-ray absorption spectroscopies to understand the dynamics, both structural and ligand, of supported metal single atoms and small clusters which result in complex reaction mechanisms. The differences between supported single atoms, small clusters and extended metal surfaces as well as their potential advantages and limitations will be discussed.

**BIO**

Dr. Karim is a Full Professor in the Department of Chemical Engineering at Virginia Tech. Prior to Virginia Tech in 2014, he worked as a senior research scientist (2008-2014) at the Pacific Northwest National Laboratory (PNNL). Dr. Karim earned his BSc in Biomedical Engineering from Cairo University in Egypt (2000) then moved to the U.S. and received his PhD in Chemical Engineering from the University of New Mexico working with Prof. Abhaya Datye (2001-2006) followed by a postdoctoral fellowship at the University of Delaware in the Chemical Engineering Department with Prof. Dionisios Vlachos (2007-2008). His research is focused on the synthesis and characterization of nanomaterials, and the design of heterogeneous catalysts for energy and environmental applications using controlled synthesis, detailed kinetics and a combination of advanced *in-situ* and *in-operando* characterization techniques (electron microscopy, microcalorimetry, SAXS, XAFS, FTIR). Dr. Karim has co-authored over 70 peer reviewed publications, one patent and delivered over 40 invited lectures and presentations.