The CATALYSIS SOCIETY of Metropolitan New York
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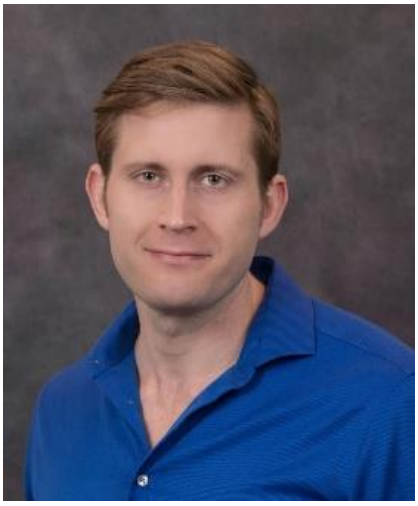
Wednesday, February 22nd, 2023 at 4:00pm EST
Virtual Meeting: Zoom

Prof. Coleman Kronawitter



Department of Chemical Engineering
University of California, Davis, CA

Understanding the Local Environments of Supported Atomically Dispersed Metal Cations: Impacts on Metal Cluster Formation and Catalysis

Recent efforts in heterogeneous catalysis research have emphasized the goal of more efficient utilization of the precious metal components of supported catalysts. When supported metals exist at or near atomic dispersion, the support surface largely controls the properties of the highly dispersed metal species: the local chemical bonding environment critically influences the electronic structure, and therefore catalytic activity, of metal sites. In this presentation, I will describe our recent efforts to examine the local environments of highly dispersed metals, and discuss how this influences outcomes that are relevant to their use as catalysts.

The framework structures of zeolites afford unique bonding environments for supported metals. In the first portion of this presentation, I will discuss the advantages of using zeolites as supports for catalysts containing chromium or platinum – two industrially applied catalyst metals whose intra-

zeolite chemistries are not fully resolved in the literature. In our work, consideration of the aluminum and/or silanol sites available for bonding with supported metals in zeolites has led to a greater understanding of the impact of local environment of zeolite-supported chromium or platinum on catalytically relevant outcomes. Specifically, I will show results primarily from the combined use of probe molecular FTIR spectroscopy, X-ray absorption spectroscopy, and reactor studies to understand (1) the use of supported chromium cations for the direct and carbon dioxide-assisted dehydrogenation of ethane, and (2) the nature of the structure, bonding, and local environment of cationic platinum species in zeolites. These species are key intermediates in the reversible formation of platinum clusters and isolated atoms within the pore structure of the supports (as occurs during cycles of reaction and oxidative regeneration). Finally, I will show how this knowledge can be used to tailor treatment condition to control platinum cluster location within the zeolite structure, and the dramatic impact of this siting on function as catalysts.

Speaker Bio

The Kronawitter Lab explores the fundamental chemistry, physics, and engineering principles underlying technologies for chemical transformations and energy conversion. A central goal of the Lab is to study thermal catalytic and electrocatalytic routes for the efficient, sustainable synthesis of value-added chemicals from new and alternative feedstocks. Prof. Kronawitter is an Assistant Professor of Chemical Engineering at University of California, Davis. He received a B.S. from Rutgers University, M.S and Ph.D. from University of California, Berkeley, and worked as postdoctoral researcher at Princeton University prior to returning to the University of California.

Please refer to email announcement for login details.

Presentation	**4:00 PM**	**Annual Membership Dues**	**$35 (*Students* = $15)**

Deadline for reservations is **4:00PM Monday, February 20th, 2023**

To make your reservation, fill out the online form.