"Understanding and Controlling the Complexity of Catalytic Active Sites"

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Wu and Chen Auditorium
Levine Hall

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Abstract

Heterogeneous catalysis is of central importance to the global economy today, facilitating the conversion of raw materials into valuable fuels and chemicals, and the abatement of chemical pollutants in an efficient way. As environmental concerns associated with the use of fossil fuels and increased viability of alternative technologies motivate a transition away from traditional chemical processes, continued development and understanding of catalytic reactions will be of vital importance. At the atomic level, catalytic reactions involve the making and breaking of chemical bonds between reacting molecules and active sites. As our understanding of catalytic reactions advances, it has become apparent that the environment in which active sites operate can significantly impact reactivity, both by influencing the structure of these active sites, and by directly affecting reaction energetics. Appreciation of the dynamic behavior of active sites and the influence of the reaction environment on catalysis is therefore required for a full description of a catalytic process, and once understood, can provide additional tools for designing catalysts. Control over both the binding site and the non-reactive components in its vicinity can lead to optimal activity, as elegantly demonstrated by nature's catalysts, enzymes. In this talk, two illustrative examples are provided that demonstrate the consequences of the reaction environment surrounding an active site on catalyst structure and reactivity.

Bio

Joaquin Resasco completed his B.S in Chemical Engineering at the University of Oklahoma, and his Ph.D. in Chemical Engineering at the University of California, Berkeley under the guidance of Professor Alexis Bell. His doctoral research elucidated the effects of electrolyte ions on the kinetics of electrochemical CO_2 reduction. Joaquin was the recipient of the UC Berkeley Chancellor's Fellowship and NSF GRFP. He was also selected to the Forbes 30 under 30 list in Science. Joaquin is currently a postdoctoral scholar in the Department of Chemical Engineering at the University of California, Santa Barbara working with Professor Phillip Christopher. His postdoctoral work focuses on developing relationships between the dynamically evolving structure of atomically dispersed catalysts and their reactivity.

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