

“Heterogeneous Catalyst Design at the Single Atom Limit: A Diverse Reaction Landscape”

Doraiswamy Lecture



171 Durham, December 10th, 2015 at 11:00 a.m.

Identification of the active catalytic site and design of catalysts with 100% atomic efficiency has been a long-standing goal in heterogeneous catalysis. From the point of view of catalytic materials that can be used to optimize fuel processing and hydrogen production, and the production of value-added chemicals from various feedstocks, there is an urgent need for high-performance and stable catalysts that comprise only trace amounts of precious metals. Atomically dispersed supported metal catalysts offer new prospects for low-cost fuel processing and green chemicals production (*Annu. Rev. Chem. Biomol. Eng.* 2012, 3). In this presentation, metal catalysts prepared as single atoms/cations on various supports will be reviewed drawing examples from a variety of reactions, including the low-temperature water-gas shift reactions (*Science* 2014, 346, 1498; *J. Am. Chem. Soc.* 2015, 137, 3470), methanol steam reforming, and several selective hydrogenation and dehydrogenation reactions (*Science* 2012, 335, 1209; *Nat. Commun.* 2015, 6, 8550). We will demonstrate how reaction mechanisms involving single metal atoms/cations, transcend support structure and composition as long as the metal atom-centered active site is allowed to form stably. Novel synthesis methods will be discussed as will be the stability of atomically dispersed catalysts in various reaction environments. Ample scope for novel catalyst design aimed at more efficient and sustainable chemical processes has emerged from these studies.

Dr. Flytzani-Stephanopoulos
Distinguished
Professor
Chemical & Biological
Engineering
Tufts University

**Refreshments
will be provided
in 2061 Sweeney
Hall at 10:30 a.m.**

*If you plan to attend,
email a question to
bellinda@iastate.edu
and the speaker will
answer your question!*

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