"Architecture at the nanoscale: Design principles for next-generation catalysts in energy application"

Richard Seagrave Lecture

171 Durham - March 30th, 2017 at 11:00 a.m.

In an increasingly carbon-constrained world, lignocellulosic biomass, natural gas, water, and carbon dioxide have emerged as attractive options to supply energy, fuels, and chemicals at scale in a cleaner and more sustainable manner. However, the unique chemical makeup of these alternative energy sources has created daunting conversion challenges, requiring the development a new generation of catalysts to promote selective bond-breaking events.

In this lecture, I will show how advanced synthesis techniques can be coupled with rigorous reactivity and characterization studies to unearth unique synergies in nanostructured catalysts. More specifically, I will discuss the use of molecular engineering tools to design nanostructured earth-abundant heterometallic early transition metal carbide (TMC) nanoparticles as a novel platform to replace (or at least drastically reduce) noble metal utilization in electro- and thermo-catalytic applications.

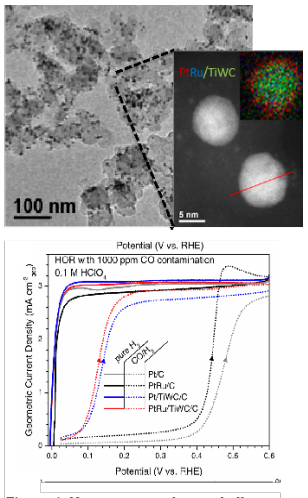

Figure 1. Nanostructured core-shell catalysts with enhanced tolerance to CO poisoning during the hydrogen oxidation reaction.

I will present a new method to synthesize TMCs and core-shell TMC-noble metal structures with exquisite control over composition, size, crystal phase, and purity. Next, the application of these materials will be demonstrated in the context of selective hydrodeoxygenation of lignocellulosic biomass and for CO-tolerant electro-oxidation reactions (Figure 1).

Dr. Yuriy Román-Leskov

Associate Professor, Department of Chemical Engineering, Massachusetts Institute of Technology

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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