Tuesday, February 7, 2017, 12:30 pm in Seaver Science Library, Room 150

SSL next to the library

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Exploring Molybdenum Carbide Catalysts for Biomass Upgrading - From Bulk to Nanoscale

Abstract:

Ex situ catalytic fast pyrolysis (CFP) of biomass is a promising route for the production of renewable liquid hydrocarbon fuels that are infrastructure compatible and cost competitive. By immediately upgrading the pyrolysis vapors prior to condensation, this process aims to simultaneously stabilize the bio-oil product, while enhancing its fuel properties with hydrogenation, deoxygenation, and C-C coupling reactions. The realization of these goals will require new catalysts that possess bifunctional properties - that is, a balance of acidic and metallic sites - such that they can activate H_2 under low pressure, high temperature conditions, and favor cleavage of C-O bonds over C-C bonds. Early transition-metal carbides are one class of materials that possess these bifunctional properties, and in particular, beta-Mo_2C has received attention from our laboratory and others as an effective hydrodeoxygenation (HDO) catalyst for a variety of biomass oxygenate intermediates. In this seminar, our research into the bulk-Mo_2C surface chemistry, identity of the active sites, and deoxygenation pathways will be presented. Further, our recent results that build upon this knowledge to design and synthesize nanocrystalline alpha-MoC_{1-x}/SiO_2 materials with a tuned acid-site/metallic-site ratio will be discussed, along with changes to the surface chemistry and the resulting deoxygenation performance.

The scientific community is invited to attend.