Differentiation of metal chloride catalysts in glucose conversion in [BMIM]Cl ionic liquid and improved process feasibility for the production of 5-HMF and derivatives

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Frontiers in Catalysis Science and Engineering

Seminar Series

Presented by…

Prof. Z Conrad Zhang

- Industrial Catalysis
- Dalian Institute of Chemical Physics
- Dalian, China

Abstract

One of the most notable advances toward biorefinery in recent years is the discovery of new catalytic systems enabling the conversion of glucose to a number of potential platform chemicals. Catalytic isomerization of aldoses to ketones is an important fundamental step for the transformation of cellulosic biomass to biobased chemicals and liquid fuels. Chromium [II,III] chlorides were discovered to be the most effective catalysts for the isomerization of glucose to fructose, which is readily dehydrated in [AMIM]Cl ionic liquids to form 5-hydromethylfurfural (5-HMF) in high yield. The 5-HMF is a versatile platform chemical for sustainable production of alternative chemicals based on biomass feedstock.

This talk covers the recent progress in three areas of research in my laboratory at the Dalian Institute of Chemical Physics: (1) new mechanistic insights on the correlation between the distinctive coordination chemistry features of four classes of metal chlorides and their drastically different catalytic performances in the conversion of glucose in [BMIM]Cl; (2) new understanding of the strong bonding between 5-HMF and the ionic liquid that resulted in largely improved efficiency of separating 5-HMF from the ionic liquid; and (3) very high value new chemicals derived from 5-HMF via catalytic systems.

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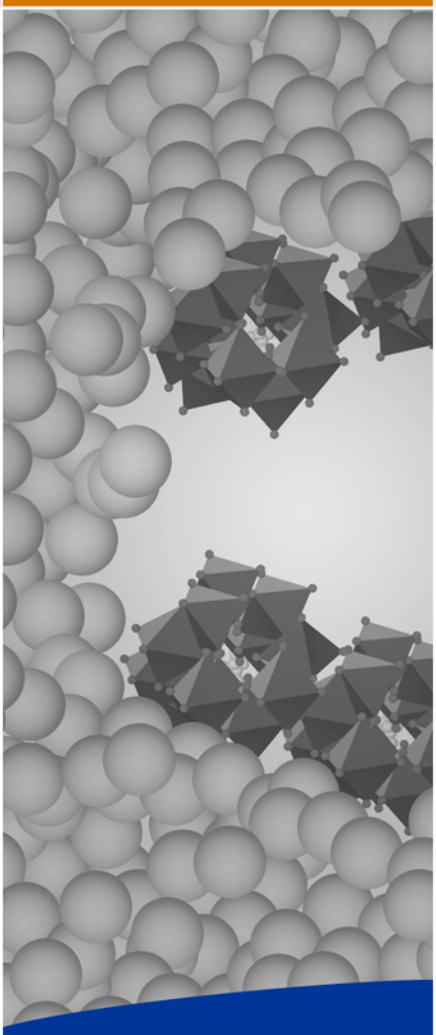

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EMSL Boardroom

1:00 pm