Seminar

Wednesday, October 11, 2017

11:00 AM – 206 Furnas Hall

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Modelling Selective Catalytic Reduction (SCR) of NOx to N2 over Cu-SSZ-13

Over the last two decades, there have been significant advances in automotive emissions catalysis for lean-burn engines. Catalyst scientists and engineers have designed and developed new oxidation catalysts for lower temperature activity and longer term stability, new particulate matter filters and coatings for particulate oxidation, and NO reduction catalysts that can achieve high conversions in an oxidizing environment. One of the challenges that seems to perpetually trouble new catalyst design and application, especially in automotive catalysis, is sulfur poisoning. Catalysts are often oversized to handle longevity issues, and engine controls are adapted to ensure catalyst performance, sometimes through an active regeneration strategy that might include inducing sulfur release from the system. Here, I will focus on sulfur poisoning of metal-exchanged small pore zeolite selective catalytic reduction (SCR) catalysts. Specifically, Cu-SSZ-13 has become the candidate for NH_3-SCR in vehicle applications. Data clearly show that low temperature (<350 °C) activity of Cu-SSZ-13 can be significantly hindered by sulfur, but that activity can be readily regained. Via several groups' efforts, this reversible poisoning mechanism has become understood, and will be the focus of this presentation. Data to be presented include those from experimental studies of S interactions with Cu^{2+} and $[Cu^{II}OH]^+$ and the associated SCR poisoning mechanisms - and from these experimental data, a kinetic model that describes the experimental behaviour of fresh, sulfated and regenerated catalysts.

Amol Ajinkya Memorial Fund Lecture

Refreshments at 10:45

University at Buffalo
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