HAJIM SCHOOL OF ENGINEERING AND APPLIED SCIENCES
UNIVERSITY of ROCHESTER

The Department of Chemical Engineering
Presents:

WILLIAM EPLING

Chair, Department of Chemical Engineering,
University of Virginia

Reversible Sulfur Poisoning of Selective Catalytic Reduction (SCR) Automotive Emissions Catalysts

ABSTRACT: Sulfur dioxide is a common poison in automotive catalysis, and thus the catalyst design must take into account changes with time, or controls developed for catalyst regeneration to mitigate sulfur impacts. The sulfur compounds originate from oil and fuel, are combusted in the engine, which mainly leads to SO_2 as the sulfur species. In this talk, sulfur poisoning of metal-exchanged small pore zeolite selective catalytic reduction (SCR) catalysts will be highlighted. Specifically, the SO_2 poisoning effects on the SCR reaction over Cu-SAPO-34 and Cu-SSZ13 catalysts were investigated. Surface species formed during exposure of the catalysts to sulfur, NO_x and NH_3 were characterized with in-situ DRIFTS. Temperature programmed desorption (TPD) was also used to characterize the samples after exposure to sulfur. Results clearly demonstrate that ammonium sulfate forms and tends to be the key low-temperature degradation mode. Furthermore, Cu sulfate species that form can be recovered via exposure to NH_3, as the NH_3 will lead to ammonium sulfate, which decomposes at significantly lower temperatures that Cu sulfates. Finally, the results also show that different Cu species lead to different sulfur species on the catalyst, each with different ease of regeneration, suggesting synthesis methods can further reduce SO_2 poisoning impacts.

BIO:. Bill Epling is a Professor in, and Chair of, the Department of Chemical Engineering at the University of Virginia. He joined UVa as Chair in August 2016. Bill Epling received his PhD from the University of Florida in 1997 and his BS from Virginia Tech in 1992, both in Chemical Engineering. Prior to joining academia, he followed a relatively unique path that has given him a broad perspective in the field of environmental catalysis, including catalyst design, manufacture, characterization and application. This was accomplished working across a spectrum of locations; a national lab (Pacific Northwest National Lab), in academia (University of Waterloo, University of Houston and University of Virginia), a catalyst manufacturing company (EmeraChem) and an engine manufacturer (Cummins Inc). His research has most recently focused on diesel and natural gas engine emissions reduction and utilization of natural gas in the production of value-added chemicals.

https://rochester.zoom.us/j/98875611576?pwd=RHY3bmhrRFZEMGhiUW5wZ0VIaDNuUT09