

CORE-CM SEMINAR

Michigan State University

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“The ‘Who’s the Catalyst?’ Problem: Distinguishing Homogeneous from Heterogeneous Catalysis”

Identification of the true catalyst—that is, the kinetically dominant catalyst under operating conditions (i.e., *in operando*)—is a problem of broad and general importance in catalysis. This statement follows since all catalytic properties of interest derive from the identity of the actual catalyst, including the catalytic selectivity, activity, stability, lifetime, poisoning, as well as catalyst isolation, recovery, and regeneration. Additionally, the optimization of these key catalytic properties cannot proceed rationally until and unless the identity of the true catalyst is known. An important subtopic in the “Who’s the True Catalyst?” problem is distinguishing between *homogeneous* vs *heterogeneous* catalysts. The talk will (i) first cover diagnostic nucleation, growth, and agglomeration kinetics and mechanisms, then (ii) focus on examining the true benzene and cyclohexene reduction catalysts for the classic case of a $[\text{RhCp}^*\text{Cl}_2]_2$ precatalyst. Next, the talk will (iii) look at the even more challenging task of identifying the true water-oxidation catalyst when starting with cobalt-polyoxometalate precatalysts such as $\text{Co}_4\text{P}_2\text{W}_{18}\text{O}_{68}^{10-}$ —complexes claimed in the literature to be superior, highly stable water-oxidation catalysts. Lastly, (iv) the main findings and take-home messages from the research will be provided as a summary.

Thursday, October 13, 2016
12:00 NOON
Room 1400 – Biomedical & Physical Sciences
Professor James McCusker - Host