The CATALYSIS SOCIETY of Metropolitan New York

www.nycsweb.org

Wednesday, November 15th, 2017

Clarion Hotel, 60 Cottontail Ln, Somerset, NJ 08873

Jingguang Chen
Thayer Lindsley Professor of Chemical Engineering, Columbia University

Converting CO_2 via Thermocatalysis and Electrocatalysis

Rising atmospheric concentration of CO_2 is forecasted to have potentially disastrous effects on the enviroment from its role in global warming and ocean acidification. Converting CO_2 into valuable chemicals and fuels is one of the most practical routes for reducing CO_2 emissions while fossil fuels continue to dominate the energy sector. The catalytic reduction of CO_2 by H_2 can lead to the formation of three types of products: CO through the reverse water-gas shift (RWGS) reaction, methanol via selective hydrogenation, and methane by the methanation pathway. In the current talk we will first describe our efforts in controlling the catalytic selectivity for the three products using a combination of DFT calculations and surface science studies over single crystal surfaces, catalytic evaluation of supported catalysts, and in-situ characterization under reaction conditions. Next, we will discuss our efforts in converting CO_2 without using H_2. This is motivated by the fact that ~95% of H_2 is generated from hydrocarbon-based feedstocks, producing CO_2 as a byproduct. We will present two approaches to avoid using H_2 for CO_2 conversion. The first approach involves the utilization of light alkanes, such as ethane, to directly reduce CO_2 via the dry reforming pathway to produce synthesis gas ($C_2H_6 + 2CO_2 \rightarrow 4CO + 3H_2$) and the oxidative dehydrogenation route to generate ethylene ($C_2H_6 + CO_2 \rightarrow C_2H_4 + CO + H_2O$). The second approach is the electrolysis of CO_2 to produce synthesis gas with controlled CO/H_2 ratios. We will conclude our presentation by providing a perspective on the challenges and opportunities in converting CO_2 via various routes in thermocatalysis and electrocatalysis.

Speaker Bio:

Jingguang Chen is the Thayer Lindsley Professor of chemical engineering at Columbia University, with a joint appointment as a senior chemist at Brookhaven National Laboratory. He received his PhD degree from the University of Pittsburgh and then carried out his Humboldt postdoctoral research in KFA-Julich in Germany. After spending several years as a staff scientist at Exxon Corporate Research, he started his academic career at the University of Delaware in 1998 and rose to the rank of the Claire LeClaire Professor of chemical engineering and the director of the Center for Catalytic Science and Technology. He moved to Columbia University in 2012. He is the co-author of 21 US patents and over 340 journal publications with over 15,000 citations. He is currently the president of the North American Catalysis Society (NACS) and an associate editor of *ACS Catalysis*. He received many catalysis awards, including the 2015 George Olah award from ACS and the 2017 Robert Burwell Lectureship from NACS.

Dinner is a buffet, and includes		Members	**$40**
a choice of beef, chicken or fish		Non-members	**$50**
Social Hour (Cash Bar)	6:00 PM	Students	**$25** (***Student Members*** **= $10**)
Dinner	7:00 PM	Retired/Post-Doc/Unemp.	**$40** (***Members*** **= $30**)
Presentation	7:45 PM	Annual Membership Dues	**$35 (*Students* = $15)**

Deadline for dinner reservations is **4:00 p.m. Sunday, November 12, 2017**

To make your reservation, fill out the online form. With the exception of extreme circumstances, anyone not canceling reservations by the above deadline will be billed for dinner regardless of attendance.
