

Oct
6

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY COLLOQUIUM
UTAH STATE UNIVERSITY

2021

Thermodynamic and Mechanistic Studies of CO₂ Reduction Catalysts

The increase in global energy demands, coupled with growing environmental concerns, necessitates the development of viable technologies to store solar energy. Towards this end, my group is focused on developing efficient catalysts that convert CO₂ to CO, methanol or formic acid. My talk will first describe our mechanistic studies on known CO₂ hydrogenation catalysts, whereby mechanistic insight is gleaned through thermochemical studies and allows for tuning the product selectivity. We also have uncovered a unique mechanism for CO₂ hydrogenation, whereby CO₂ must first bind to the ligand before subsequent reduction occurs. I will then discuss how we have used the same thermochemical approach to study the mechanism of electrocatalytic CO₂ reduction in a combined carbon capture & reduction system. Finally, I will present a novel ligand scaffold that, when put on Co, allows for both the hydrogenation of CO₂ to formate and the electrochemical reduction of CO₂ to formate; this is unique in that no H₂ is produced electrocatalytically. The collective work underscores the importance of the effective hydricity as a parameter of interest and in using thermochemical parameters to rationalize and uncover alternative mechanisms. The studies presented are contextualized in developing an understanding of how to rationally design energy-efficient CO₂ reduction catalysts.

4-5PM (MDT) | ESLC, Room 046 | Zoom

<https://usu-edu.zoom.us/j/89128547168?pwd=U0ZEUHN4Y0E2YUIxQ2ZRWXJERW9udz09>

Zoom Meeting ID: 891 2854 7168

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