Faculty of Engineering and Applied Science
Chemical Engineering Seminar Series

Advancing Electrolysis by Environment Manipulation

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Thursday, October 10, 2024, 2:30pm

Dupuis Hall, Room 217

Electrolysis technologies such as water splitting, CO_2 electroreduction, and other emerging reactions, present potentially sustainable alternatives to power large industries such as transport (fuels), manufacturing (chemical feedstock) and agriculture (fertilizers). The viability of these technologies hinges upon achieving sufficient achieving sufficient performance in metrics such as product selectivity, productivity (or current density), energy efficiency, and stability; based on scalable catalysts and processes.

Conventionally, improvements in these reactions have been sought after in catalyst designer fashion, tuning the electronic and physicochemical properties of (pre)catalysts through sophisticated compositional and structural modifications. Here I will show, instead, approaches to tune electrocatalytic activity and stability in water and CO_2 electrolysis by manipulating reaction environment and the electrochemical interface. I will discuss the need of tailored activation protocols and situ and operando spectroscopies at relevant working conditions to achieve reliability in catalyst design and operation. To conclude, I will overview sustainability issues in the scale up and path to market of CO_2 electrolysis technologies.