

## **Toward a distributed renewable electrochemical energy and mobility system: Polymer electrolytes and electrocatalysis**

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One of the grand challenges facing humanity today is the development of an alternative energy system that is safe, clean, and sustainable and where combustion of fossil fuels no longer dominates. A distributed renewable electrochemical energy and mobility system (DREEMS) could meet this challenge. At the foundation of this new energy system are a number of electrochemical devices including fuel cells, electrolyzers, and flow batteries. For all these devices polymer electrolytes and electrocatalysis plays a critical role in controlling their performance and cost, and thus their commercial viability. In this presentation, I will focus on our recent work on hydroxide exchange membrane fuel cells which can work with non-precious metal catalysts and inexpensive polymer electrolytes, and thus can be economically viable. More specifically I will show our latest results on a super-stable organic cation, why hydrogen oxidation reactions are slower in base than in acid, and how we have developed some of the highest performing non-precious metal hydrogen oxidation reaction catalysts.