Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **1961** Type: **Invited Speaker / Conférencier(ère) invité(e)**

On the Design of Organic Molecules for Redox Flow Batteries (I)

Wednesday, 13 June 2018 15:30 (30 minutes)

The development of charge-storage materials for use in redox flow batteries (RFBs) requires possession of a diverse property set that will lead to high capacities, voltages, and lifetimes for large-scale stationary storage application. High capacities require high solubilities in all states of charge. High voltages stem from large differences in redox potentials. Long lifetimes require stability far greater than the timescales at which many chemists are used to operating, who rarely have the need to isolate a charged species at high concentration in diverse environments for a decade or more. None of these properties may be compromised in realizing a commercial battery, on top of which low cost and scalability are paramount. Given the demands in materials design, cost, and scale, it's a small wonder that the variety of redox couples utilized in commercial redox flow batteries are few. While the challenge of meeting these requirements may at first seem daunting, to the right organic chemist, an opportunity is presented. The flexibility in design and tunability of properties of organic materials presents a cornucopia of choices to evaluate as electrolyte candidates. The most challenging question is "Where do we begin?"In this presentation, I will focus on the design and characterization of organic molecules as candidates for charge-storage species in non-redox flow batteries, covering both aqueous and nonaqueous electrolytes, with focused results in the latter environment. I hope to provide a general represent of accomplishments as well as examples of the many remaining opportunities in this nascent field of research and development.

Primary author: Prof. ODOM, Susan (University of Kentucky)

Presenter: Prof. ODOM, Susan (University of Kentucky)

Session Classification: W4-1 Energy Storage 4 (DCMMP) | Accumulation d'énergie 4 (DPMCM)

Track Classification: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)