DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE
VIRTUAL SEMINAR SERIES
SPRING 2021

DATE: WEDNESDAY, FEBRUARY 24

TIME: 12:30-1:50pm

LOCATION:
https://njit.webex.com/njit/j.php?MTID=mdfe4f718778e9a7ffb4eefa8ea5acb98

Meeting number: 1202085541
Meeting password: yaP9itPpR74

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GUEST SPEAKER

Ellen M. Matson
Wilmot Assistant Professor
Department of Chemistry
University of Rochester

TOPIC

Development of metal-oxide clusters as charge carriers for nonaqueous redox flow batteries

ABSTRACT

Effective integration of renewable energy from intermittent sources (i.e. solar and wind) requires the development of efficient energy storage systems which can function in tandem with the electrical grid. Non-aqueous redox-flow batteries have emerged as promising systems for large-capacity, reversible energy storage capable of meeting the variable demands of the electrical grid. The use of non-aqueous solvents increases the energy density of these systems, however there are few electrolytes with sufficient solubility and electrochemical stability to function in organic media. In this work, we investigate the potential for Lindqvist polyoxovanadate-alkoxide (POV-alkoxide) clusters to serve as both the anolyte and catholyte for symmetric, non-aqueous redox-flow batteries. POV-alkoxide clusters display numerous, highly reversible redox events, and demonstrate significant solubility and electrochemical stability in organic solvents. These bulky compounds also

demonstrate the ability to mitigate species crossover and membrane fouling, thereby improving the energy efficiency and lifetime of flow battery cells. The application of POV-alkoxides as electrolytes in organic media demonstrates that the remarkable redox properties of multimetallic clusters can be harnessed for non-aqueous energy storage applications, and represents an important new direction for the generation of high performance redox-flow batteries.

BIO

Ellen was born in Washington D.C. and spent most of her life moving around the world with her family. Ellen attended Boston University, where she participated in the BUCOP program, pursuing simultaneous degrees in Science Education (B.S.) and Chemistry (B.A.). Following graduation, she journeyed out west to begin her graduate work at Purdue University, where she became a founding member of the research group of Suzanne C. Bart. Her thesis was centered around the synthesis and reactivity of low-valent, organouranium complexes. In 2013, she completed her Ph. D. work and began a postdoctoral position in the Fout Laboratory at UIUC till 2015, where she studied the development of bioinorganic systems for functional models of nitrite reduction. In 2016 she joined University of Rochester as an assistant professor. Research in the Matson Group focuses on using a synthetic inorganic chemistry perspective to address current global issues related to Energy Storage and Production.

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