

CHEMISTRY Departmental Seminar

Fall 2017
CHEM 285 Schedule
Tuesdays at 4:30-5:45PM
Room Duncan Hall 250

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MS Final Oral Seminar

Preparation and characterization of a (viologen) containing main chain PEG-carbon nanotubes phase for hybrid supercapacitor application

For intermittent renewable energy sources like solar and wind to become available on demand requires the use of efficient and reliable energy storage devices. In this regard, the supercapacitors (SCs) and batteries are recognized as the two most important electrical energy storage devices. SCs have some distinct advantages such as high-power density and long cycle life when compared to batteries. However, they have yet to match the energy densities of batteries. In an effort to improve the energy density of SCs, a hybrid supercapacitor was developed using a pair of single walled carbon nanotube electrodes and two polyethylene glycol (PEG-400) gel-polymer electrolytes (GPEs) containing redox additives of Viologen (V) and ferrocene dicarboxylic acid (Fc), respectively. The introduction of V and Fc, was expected to improve the energy performance of the SC due to reversible Faradaic reactions between them in the corresponding GPEs. The V-PEG polymer electrolyte was used in the oxidation half-cell and the Fc-PEG polymer electrolyte was used in the reduction-half cell of the SC, which were separated by polycarbonate membranes in a sandwich configuration. The electrochemical performances of the SC were evaluated by cyclic voltammetry and chronoamperometry. The results confirmed V-PEG polymer and Fc-PEG polymer as suitable electrolyte materials for their application in a hybrid supercapacitor.