Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Magnetically Tuned Porous Electrode Formation in Electrochemical Flow Capacitor HOWARD HU, EDWARD REILLY, University of Pennsylvania — In electrochemical flow capacitors (EFCs), high surface area, conducting, porous particles suspended in an electrolyte solution flow from one storage tank to another through a charging/discharging device between collecting electrodes (collector). In the collector, the particles quickly aggregate to form percolated, electrically conducting networks that facilitate electron flow. To achieve a highly conductive and rapidly assembling network, a high concentration suspension is needed. To facilitate easy pumping, a low concentration suspension is desired. To speed up the network formation process and overcome these conflicting requirements, it is possible to use magnetizable colloids. The particles will acquire a magnetic moment in the presence of an external magnetic field. The magnetic moment will reversibly disappear as soon as the magnetic field is removed. The magnetic field will be applied during the charge and discharge phases to accelerate the formation of electrically connected networks when desired and will be removed when it is time to flow the slurry and refresh the contents in the collector. In this study, we explore the network assembly process, and estimate the network connectivity and electric properties.

Howard Hu
University of Pennsylvania

Date submitted: 31 Jul 2014 Electronic form version 1.4