Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Physical Property Requirements of Ion-exchange Polymer Membranes for Acid-base Flow Batteries SUPACHAREE RODDECHA, PETER THAYER, JACOB JORNE', MITCHELL ANTHAMATTEN, University of Rochester — Flow batteries offer feasible solutions to grid-scale storage of intermittent power. We are developing a new type of flow battery that reversibly controls an acid-base neutralization reaction. The battery consists of two highly reversible hydrogen gas electrodes that are exposed to low and high pH process streams. A brine solution runs between the acid and base streams and is separated by cationic and anionic exchange membranes. For both charge and discharge phases, hydrogen gas is produced at one electrode and consumed at the other. During charging, an external potential is applied across the two electrodes to electrochemically produce acid and base from the fed brine solution. Discharge involves electrochemical neutralization of acid and base streams, resulting in current flow through an external load. Several charge and discharge cycles were performed to demonstrate proof of concept. Experiments were conducted to determine the physical property requirements of the ionic exchange polymer layers. Properties including ion conductivity, permselectivity, and membrane stability will be discussed.

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Date submitted: 17 Nov 2012 Electronic form version 1.4