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Ion Exchange Polymeric Coatings for Selective Capacitive Deionization AMIT JAIN, Department of Chemical and Biomolecular Engineering, Rice University, JUN KIM, QILIN LI, Department of Civil and Environmental Engineering, Rice University, RAFAEL VERDUZCO, Department of Chemical and Biomolecular Engineering, Rice University — Capacitive deionization (CDI) is an energy-efficient technology for adsorbing and removing scalants and foulants from water by utilizing electric potential between porous carbon electrodes. Currently, industrial application of CDI is limited to low salinity waters due to the limited absorption capacities of carbon electrodes. However, CDI can potentially be used as a low-cost approach to selectively remove divalent ions from high salinity water. Divalent ions such as sulfonates and carbonates cause scaling and thus performance deterioration of membrane-based desalination systems. In this work, we investigated ion-exchange polymer coatings for use in a membrane capacitive deionization (MCDI) process for selective removal of divalent ions. Poly-Vinyl Alcohol (PVA) base polymer was crosslinked and charged using sulfo-succinic acid (SSA) to give a cation exchange layer. 50 um thick standalone polymer films had a permeability of $4.25*10^{-7}$ cm^2/s for 10mM NaCl feed. Experiments on electrodes with as low as 10 υm thick coating of cation exchange polymer are under progress and will be evaluated on the basis of their selective salt removal efficiency and charge efficiency, and in future we will extend this work to sulfonated block copolymers and anion exchange polymers.

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