

Abstract Submitted  
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**Effect of a porous polymer layer on electroconvection**<sup>1</sup> ANKUSH MUKHERJEE, Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY, 14853, USA, GAOJIN LI, LYNDEN ARCHER, DONALD KOCH, Robert Frederick Smith School of Chemical and Biomolecular Engineering, Cornell University, Ithaca, NY 14853, USA — Electroconvection enhances the growth of dendrites on the surface of electrodes, reducing the life of a battery cell. Experimental studies have shown that adsorbed polymers on the surface of the electrode increase the stability of lithium deposition and reduce electroconvection. In this presentation, we analyze the linear stability of one-dimensional ion transport near an ion selective surface in the presence of a thin polymer layer modeled as a rigid porous medium. The ultraspherical spectral method is used to fully resolve the thin double layer, space charge layer, Brinkman length scale and the polymer layer. We show that electroconvection can be suppressed by a porous layer of sufficiently small permeability when the layer is thicker than the space charge layer. The attenuation of fluid velocities driven by electrical forces in the space charge layer by drag forces occurs when the polymer layer thickness is larger, and the Brinkman length scale is smaller than the space charge layer thickness.

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