

Abstract Submitted  
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**Electroconvection near the interface of ion-selective membranes and a microchannel** KAREN WANG, ALI MANI, Stanford Univ — The transport dynamics of electroconvective flows near ion-selective membranes subject to charged sidewalls are studied using a direct numerical simulation of the coupled Poisson-Nernst-Planck and Navier-Stokes equations. Previous studies have investigated electroconvective instability near infinitely large flat membranes and have demonstrated their role in significant enhancement of transport via added advection effects. This study demonstrates how the presence of sidewalls from a connecting microchannel can affect the onset of electroconvective flows and also impact the net ion transport rate. We demonstrate that sidewalls without charge stabilize the flow and delay the onset of electroconvection while walls with properly signed charges can induce flow and lead to enhancement of transport. Impact of the sidewalls in energy and throughput efficiency will also be discussed.

Karen Wang  
Stanford Univ

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