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Dynamics of desalination shocks in microstructures ALI MANI, Stanford University, MARTIN BAZANT, MIT — We describe a nonlinear regime of ion transport that results from coupled conduction effects of electric double layers (surface conduction) in electrokinetic systems. Mani, Zangle, and Santiago (*Langmuir*, 25, 3898–3916) recently showed that sharp concentration gradients can be formed and propagate away from a microchannel/nanochannel junction, analogous to shock waves in gases. Propagation of these shocks in microchannels leaves behind a region with orders of magnitude lower salt concentration acting to desalinate the bulk electrolyte. In this talk we describe the basic dynamics of desalination shocks and present the mathematical theory of shock existence and propagation in complex microstructures. We predict that desalination shocks accelerate and sharpen in narrowing structures and decelerate and weaken, even disappear, in widening channels. We will also discuss mathematical models for propagation of desalination shocks in porous media.

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