ABSTRACT:

This talk will describe three fundamental examples of interfacial dynamics – viscous fingering, deionization shock propagation, and dendritic electrodeposition – whose stability can be controlled by electrokinetic phenomena in charged porous media. The suppression of these notorious instabilities by electro-osmotic flow and surface conduction will be demonstrated both theoretically and experimentally. Potential applications include electrically enhanced oil recovery, water purification by shock electrodialysis, and energy storage with metal batteries.