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Dynamic response in electric field-induced nanowetting in salt solution[1] DUSAN BRATKO, DAVIDE VANZO, ALENKA LUZAR, Virginia Commonwealth University, DEPARTMENT OF CHEMISTRY TEAM — Electric field applied across hydrophobic nanopores can control wetting/dewetting transitions. This switching effect is of potential importance in applications from fluid flow control in nanofluidics to imbibition of nanoporous materials to surface energy absorption and storage. Dynamic response to the imposition or cessation of the field occurs at two stages characnterized by different timescales. Fast response, O(ps), involves the change in the effective surface tension, which takes place along with water polarization. Slower response, associated with wetting/dewetting transitions involves solution infiltration or expulsion, an activated process we show to be kinetically viable only in nanoscale pores. Using molecular dynamics simulations, we identify a window of conditions where O(ns) responses of the wetting/expulsion cycle can be secured for experimentally realizable fields, porosity and salinity of the solution.

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Dusan Bratko
Virginia Commonwealth University

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