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Electrical charging effects on sliding lubrication properties of a model confined ionic liquid ROSARIO CAPOZZA, International School for Advanced Studies (SISSA), Via Bonomea 265, 34136 Trieste, Italy, ANDREA BENASSI, Empa, Materials Science and Technology, Überlandstrasse 129, 8600 Dübendorf, Switzerland, ANDREA VANOSSI, CNR-IOM Democritos National Simulation Center, Via Bonomea 265, 34136 Trieste, Italy, ERIO TOSATTI, International School for Advanced Studies (SISSA), Via Bonomea 265, 34136 Trieste, Italy
— Ionic liquids lubricants, used under conditions of nanometric confinement between parallel plates or tip-surface gaps, explore the dependence of friction upon charging, suggestive of some electrical control of friction. Using a simple ionic liquid model, we first study by molecular dynamics the friction between parallel plates under conditions of successive layering reached by squeezout under an increasing inter-plate force. We then simulate the frictional changes brought about by different charging states of the plates, related to charging-induced switches corresponding to squeezout (or suck-in) transitions between different layering states as predicted by local minima in the charge-dependent enthalpy curves. Although the actual frictional behavior obtained does depend upon the assumed features and parameters of the model liquid and its interaction with the plates, the broader scenario obtained for charging effects, its relationship to the equilibrium layering and its enthalpy characterization appear of general value.

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