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Colloidal assembly by capacitive deionization RODRIGO GUERRA, PAUL CHAIKIN, Department of Physics, New York University — Compared to the fine spatial and temporal control that can be exerted on the temperature, mechanical stress, and electric and magnetic fields in a colloid, our control over salt concentration stands out as relatively primitive. Like these other parameters, ionic strength is a crucial state variable for many colloidal dispersions, and salt gradients cause stresses, flows, and instabilities that are difficult to explore using conventional techniques. Here we demonstrate a simple approach to control the salt concentration in a colloid using the supercapacitance of mesoporous electrodes. First, we show that these electrodes can push charged particles apart by pulling nearly all the ions out of the surrounding fluid, enabling electrostatic screening lengths several microns long in fluids with large dielectric constants. We also show how these electrodes can controllably pull particles together by modulating the salt concentration in a dispersion of oppositely charged particles.

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