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Electric Field Driven Self-Assembly of Colloidal Rods JAIME JUAREZ, KUNDAN CHAUDHARY, QIAN CHEN, STEVE GRANICK, JENNIFER LEWIS, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign — The ability to assemble anisotropic colloidal building blocks into ordered configurations is of both scientific and technological importance. We are studying how electric field-induced interactions guide the self-assembly of these blocks into well aligned microstructures. Specifically, we present observations of the assembly of colloidal silica rods (L/D $\sim$ 4) within planar electrode cells as a function of different electric field parameters. Results from video microscopy and image analysis demonstrate that aligned microstructures form due to the competition between equilibrium interactions of induced dipoles and non-equilibrium processes (i.e., electro-osmosis). Under the appropriate electric field conditions ($\sim$ kHZ AC fields), aligned colloidal rod fluids form over large areas on the electrode surface. The superposition of a DC electric field to this aligned colloidal rod fluid initiates their condensation into a vertically oriented crystalline phase. Ongoing work is now focused on exploring how temporal changes to electric fields influence colloidal rod dynamics and, hence, the assembly kinetics of aligned colloidal monolayers.

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