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Electric field induced self assembly of floating rectangular plates

MUHAMMAD JANJUA, SAI NUDURUPATI, Lake Superior State University, IAN FISCHER, PUSHPENDRA SINGH, New Jersey Institute of Technology, NADINE AUBRY, Carnegie Mellon University — We show that an external electric field normal to a fluid-fluid interface can be used to self assemble rectangular plates floating on the interface and that the lattice spacing of the monolayer thus formed can be varied by changing the electric field intensity. In our experiments, a rectangular plate floats so that the contact line is pinned at the upper edge. Plates experience lateral forces due to capillarity which cause them to cluster. In the presence of an electric field, plates are also subjected to the repulsive electrostatic forces which, together with the attractive capillary forces, determine the equilibrium spacing of the monolayer. The interface profile around the plates is also modified by the electric field.

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