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Competing interactions in two dimensional Coulomb systems: Surface charge heterogeneities in co-assembled cationic-anionic incompatible mixtures SHARON LOVERDE, YURI VELICHKO, MONICA OLVERA DE LA CRUZ, Department of Materials Science and Engineering, Northwestern University — A binary mixture of oppositely charged components confined to a plane such as cationic and anionic lipid bilayers may exhibit local segregation. The relative strength of the net short range interactions, which favors macroscopic segregation, and the long range electrostatic interactions, which favors mixing, determines the length scale of the finite size or microphase segregation. The free energy of the system can be examined analytically in two separate regimes, when considering small density fluctuations at high temperatures, and when considering the periodic ordering of the system at low temperatures (F. J. Solis, S. I. Stupp and M. Olvera de la Cruz *J. Chem. Phys.* 122 (5), 054905 (2005)). A simple Molecular Dynamics simulation of oppositely charged monomers, interacting with a short range Lennard Jones potential and confined to a two dimensional plane, is examined at different strengths of short and long range interactions. The system exhibits well-defined domains that can be characterized by their periodic length-scale as well as the orientational ordering of their interfaces. By adding salt, the ordering of the domains disappears and the mixture macroscopically phase segregates in agreement with analytical predictions.

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