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Surface patterns on co-assembled fibers from charged, amphiphilic molecules KEVIN KOHLSTEDT, Northwestern University, FRANCISCO SOLIS, Arizona State University, MONICA OLVERA DE LA CRUZ, Northwestern University — We analyze local segregation of species in charged multicomponent cylindrical micelles. In particular, we consider co-assemblies of cationic and anionic heterogeneous molecules such as lipids and peptide amphiphiles. Charge heterogeneities can develop at the surface of the fibers due to the competition between the short-range incompatibility of the co-assembled components and the electrostatic interactions. The system can be described by a line tension between domains γ, which favors growth of the domains of segregated components, and the electrostatic energy of the domains with charge density σ, which increases rapidly with the size of the segregated domain L. The competition results in the formation of domains with a characteristic size $L_o = (\gamma\varepsilon/\sigma^2)^{1/2}$. In stoichiometric mixtures the constraints of the geometry and the long range correlations lead to lamellar stripes of different pitch. We present results on the different orientations of the lamellar patterns as a function of the ratio between the lamellar size and the cylinder radius. We find the critical salt concentration, which is a function of radius and lamellar size, at which the patterns grow to macroscopic sizes due to the screening of the Coulomb interactions.

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