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The breaking of chiral symmetry using long-range electrostatic forces KEVIN KOHLSTEDT, Northwestern University, FRANCISCO SOLIS, Arizona State University, GRAZIANO VERNIZZI, MONICA OLVERA DE LA CRUZ, Northwestern University — Surface charge heterogeneities result in the adsorption of oppositely charged amphiphilic molecules along charged fibers. The competition of this two-component system between electrostatic interactions, favoring ionic structures, and the net incompatibility of the co-assembled species, favoring macroscopic segregation, leads to local segregation and the formation of periodic patterns along the surface. We analyze the symmetry and size of the surface patterns on the surface of cylindrical structures. Lamellar patterns are arranged into helical structures along the cylinder, breaking the chiral symmetry. We also describe the critical transition between periodic patterns and macroscopic segregation. The characteristic domain size L_0 jumps discontinuously to infinity, resulting in macroscopic phase segregation of the components, at the critical salt concentration κ_c. The dependence of κ_c on the helical pitch angle θ of the lamellar is shown. Our results suggest a new physical method to separate patterned ionic fibers with different pitch angles by modifying the salt concentration.

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