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Surface Tension and Lamellar Spacing in Polyelectrolyte Blends and Block Copolymers CHARLES SING, University of Illinois at Urbana-Champaign, MONICA OLVERA DE LA CRUZ, Northwestern University — Heterogeneous polymer systems such as block copolymers (BCPs) are governed primarily by a competition between the surface tension between different chemical species and the entropic stretching of the polymer chains. Charged BCPs represent a class of materials that is currently of great interest to the polymer community due to the promise of charged BCPs as nanostructured membranes for batteries and fuel cells. The inclusion of charge presents a powerful way to tune the structure of BCPs, and we develop our understanding of how to do so by investigating the interfacial properties (surface tension and microstructure size) of polyelectrolyte blends and block copolymers. We use a new method that combines the features of liquid state (LS) theory and self consistent field theory (SCFT) into a multiscale LS-SCFT theory that provides beyond-mean-field predictions of polyelectrolyte systems. We find that charge size, charge correlations, and the fraction of charged monomers plays a crucial role in determining surface tension, and we therefore demonstrate how BCP structure changes upon inclusion of charges. Finally, we will show that these predictions provide the ideal basis for comparison to experiment and subsequent refinement of LS-SCFT theory.

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