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Anomalous phase behavior of ionic polymer blends and ionic copolymers VICTOR PRYAMITSYN, HA-KYUNG KWON, Northwestern University, JOHANNES ZWANIKKEN, University of Massachusetts Lowell, MONICA OLVERA DE LA CRUZ, Northwestern University — The development of DHEMSA approximation and its application for the ionic polymer blends and ionic copolymers has resulted in the prediction of "inverted" phases in ionic diblock-copolymers. In a contrast with uncharged diblock copolymers, ionic-neutral diblock-copolymers at high electrostatic coupling (Γ) and a low fraction of the ionomer component (f) form phases where the minority phase goes into the outside matrix and the majority phase forms inside cylinders. We have found that such behavior is related to the phase segregation of ionic polymer blends at high Γ where neutral polymer can coexist with a blend of neutral and charged components. We combined the DHEMSA approximation with Helfand-Tagami theory to calculate the interfacial tension γ between coexisting phases of ionomers. Knowledge of γ allows us to use strong stretching theory and evaluate the whole phase diagram as a function of f, Γ, χ, and the degree of polymerization N. In addition to the commonly formed lamella, sphere, and cylinder phases in diblock copolymers, we found "inverted" cylinder and sphere phases. 3D SCFT modeling then confirmed the existence of the "inverted" bi-continuous phases between lamella and the inverted cylinder phases.

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