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Effects of dipole reorientations on ion solvation in polymer blends and block copolymer melts[1] ISSEI NAKAMURA, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences — We study the thermodynamic property of ion solvation in polymer blends and block copolymer melts and develop a dipolar self-consistent field theory for polymer mixtures. Our theory accounts for the chain connectivity of polymerized monomers, the compressibility of the liquid mixtures under electrostriction, the permanent and induced dipole moments of monomers, and the resultant dielectric contrast among species. We show nonmonotonic changes in the volume fraction profile and the dielectric function of the polymers with respect to those of simple liquid mixtures. Importantly, the spatial variations near an ion can be at nanometer scales, producing significant differences in the solvation energy among simple liquid mixtures, polymer blends, and block copolymers. Furthermore, we illustrate the oscillatory behavior of the dielectric function near an ion pair and the disparity of the dielectric functions between like and unlike charges. These results depend significantly on the chain length and Kuhn length of the diblock copolymers.

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