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Decoupling Bulk Thermodynamics and Wetting Characteristics of Block Copolymer Thin Films[1] SANGWON KIM, University of Minnesota, Twin Cities, PAUL NEALEY, University of Wisconsin, Madison, FRANK BATES[2], University of Minnesota, Twin Cities — The incorporation of a random copolymer molecular architecture has been known to induce notable changes in the physical properties, often with commercial implications. In this presentation, the consequences of controlled degrees of epoxidation on both bulk and thin-film properties of poly(isoprene) blocks in poly(styrene-*b*-isoprene) (PS-PI) diblock copolymers and poly(isoprene) (hPI) homopolymers have been studied, where the products after epoxidation are denoted as hPIxn and PS-PIxn. Small angle X-ray scattering and dynamic mechanical spectroscopy were conducted on PS-PIxn to calculate the effective interaction parameters χ_{eff} between the PS and PIxn blocks in bulk (3-D) while the surface energy of thin-film PIxn (2-D) was estimated based on contact angle measurements on hPIxn and lamellar orientations of thin-film PS-PIxn. A non-linear change with a minimum at the intermediate degrees of modification is observed for χ_{eff} in bulk whereas thin-film experiments suggest that the surface energy of PIxn increases linearly with epoxidation. This decoupling of bulk and thin-film thermodynamic behaviors is attributed to the different roles that a random copolymer architecture plays in establishing 3-D order versus wetting at a 2-D surface.

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