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Enhancing the segregation strength of amphiphilic block copolymer melts using selectively associating homopolymers: Well ordered systems from inexpensive components. JAMES WATKINS, University of Massachusetts, VIJAY TIRUMALA, ALVIN ROMANG, ERIC LIN, POLYMER SCIENCE AND ENGINEERING, UNIVERSITY OF MASSACHUSETTS COLLABORATION, NIST POLYMERS DIVISION COLLABORATION, CHEMICAL ENGINEERING, UNIVERSITY OF MASSACHUSETTS COLLABORATION — Amphiphilic block copolymers based on poly (oxyethylene-oxypropylene-oxyethylene) are commercially available (Pluronic^{TM}, BASF), inexpensive and used in a variety of solution-based applications. But their use as thin film templates in applications is limited by their low molecular mass, presence of impurities, and weak segregation. Here, we show that the segregation strength of such copolymer melts can be dramatically enhanced by blending with a homopolymer that selectively associates with one of the segments via hydrogen bonding. Examples include poly (acrylic acid), poly (4-vinyl phenol) and poly (styrene sulfonate). SANS measurements indicate that the order-disorder transition temperature of a deuterated copolymer analogous to Pluronic F68 increases by at least 180 ^{o}C when blended with poly (acrylic acid) suggesting a significantly higher effective interaction parameter. This approach has many implications including the preparation of highly ordered templates from inexpensive components.

James Watkins

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