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Spinodal Decomposition of Polydispersed ABA' Triblock Copolymers Determined from the Random Phase Approximation T.W. CAPEHART, GM Research & Development Center, ARMAND SOLDERA, University de Sherbrooke — Triblock copolymers produced by free radical polymerization are typically characterized by each of the blocks having a broad distribution of molecular weight. To investigate the effect of this polydispersity on the stability of the homogenous phase of a triblock copolymer, the spinodal decomposition of an ABA' copolymer consisting of ideal Gaussian chains was determined using the random phase approximation (RPA), with each block length characterized by a Zimm-Schulz chain length distribution. The spinodal stability and scattering behavior resulting from microphase separation were determined for volume fractions $0.1 \leq \phi_B \leq 0.9$ and polydispersity indices $1.67 \leq \text{PI} \leq 100$. Consistent with the reported behavior of fully dispersed multiblock copolymers and diblock copolymers having a single polydispersed block, polydispersity in symmetric ABA' triblocks decreases the stability of the homogenous phase and lowers the value of the Flory-Huggins mixing parameter χ_{HF} required for microphase separation at the Lifshitz point by more than a factor of two.

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