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Directing the self-assembly of copolymers into a metastable complex network phase via a deep and rapid quench MARCUS MUELLER, DE-WEN SUN, Institute for Theoretical Physics, Georg-August University, Goettingen — The free-energy landscape of self-assembling copolymer systems is characterized by a multitude of metastable minima. Using particle-based simulations of a soft, coarse-grained model we explore opportunities to reproducibly direct the spontaneous ordering of these self-assembling systems into a metastable complex network morphology – specifically, Schoen's I-WP periodic minimal surface – starting from a highly unstable state that is generated by a rapid expansion. This process-controlled self-assembly provides an alternative to fine-tuning molecular architecture or blending for fabricating complex network structures. Comparing our particle-based simulation results to recently developed free-energy techniques we critically assess their ability to predict spontaneous formation and highlight the importance of non-equilibrium molecular conformations in the starting state and the local conservation of density.

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