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Process-accessible structures in block copolymers[1] MARCUS MUELLER, DE-WEN SUN , Georg-August University, Goettingen, Germany — Process-directed assembly copolymers refers to thermodynamic processes that reproducibly direct the kinetics of structure formation from an initial, unstable state into a selected metastable structure. Specifically we investigate the spontaneous structure formation of ACB triblock copolymers after a rapid transformation of the middle block C from A to B. This prototypical process (e.g., photochemical transformation), which occurs on a time scale faster than the molecular relaxation time, convert the initial equilibrium structure of the AAB block copolymer into a well-defined but unstable structure of the ABB copolymer. The spontaneous structure formation that ensues from this unstable state becomes trapped in a metastable morphology, and we systematically explore, which metastable structures can be fabricated by varying the block copolymer composition of the initial and final state. In addition to the equilibrium structures linear diblock copolymers we find 6 metastable periodic structures, inter alia, Schoens F-RD periodic minimal surface. Generally, we observe that the metastable structure of the ABB copolymer possesses the same symmetry as the initial equilibrium structure of the AAB material.

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