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Phase ordering mechanism of triblock copolymers. A dynamic density functional study JIANFENG XIA, FENG QIU, HONGDONG ZHANG, YULIANG YANG — Using dynamic density functional theory (DDFT), we studied the morphology and kinetics of microphase separation of linear triblock copolymers. ABC triblock copolymers with equal and unequal interaction energies were taken as examples to investigate the microphase separation kinetics of the linear triblock copolymers. The calculation was carried out in two dimensions and shows that, the equilibrium microphase structures of the linear triblock copolymers are consist with the results obtained by the self-consistent field theory (SCFT) and previous experiments. We found that the ordering process of the triblocks could be divided into two regimes-an initial fast phase separation regime followed by a slow defects annihilation regime-according to the time evolution of the free energy and the global order parameters. Furthermore, we have found that both one-step and two-step microphase separation mechanisms can occur during the disorder to order transition, which depend on the average volume fractions of the different blocks, interaction energies, and topological sequences of the blocks. The results we presented may be guidance to design experiments to explore the kinetics of triblock copolymers and to obtain desired micro-structures in linear triblock copolymer melts.

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