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Lamellae to Gyroid Epitaxial Transitions in Weakly Segregated Diblock Copolymers FENG QIU, NAN JI, PING TANG, Fudan University, AN-CHANG SHI, McMaster University — We combine the string method and self-consistent field theory (SCFT) for polymers to investigate the kinetic pathways connecting the lamella (L) and gyroid (G) phases in weakly segregated block copolymers. We focus on the nucleation and growth mechanism as well as the spinodal decomposition, in which a nucleus of the new phase grows locally, or the old phase evolves gradually to the new phase, respectively. Through this method, the free energy landscape for the transition from L to G can be obtained and the epitaxial relationship and several metastable states between L and G phases are systematically studied. In particular, the one-step mechanism and two-step mechanism are distinguished. The details of the nucleation and growth of the Perforated Lamella (PL) structure and G phase are presented. Our result is helpful in understanding the kinetic relationship among L, G, and PL phases in microphase transitions of diblock copolymers.

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