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Modeling of Crystallization and Phase Separation in Binary Blends Driven by Photopolymerization[1] PANKAJ RATHI, THEIN KYU, University of Akron — Polymerization of a reactive component in a binary blend raises the molecular weight of the reactive species which drives phase transformation involving phase-separation, mesophase ordering in liquid crystals or crystallization. We demonstrate a novel phenomenon of photo-polymerization induced crystallization in a blend of a crystalline component and reacting monomer. Blending a crystalline substance with a solvent or monomer lowers melting temperature of the crystalline component. When photopolymerization is carried out at an isotropic phase temperature above the melting point of the blend, the depressed melting point curve of the crystalline component shifts above the reaction temperature and triggers crystallization. To predict this phenomenon, a theoretical model has been developed. Phase diagrams are calculated from the free energy description of a blend containing crystalline constituent. Snapshots indicating the movement of melting point curve and the upper critical solution temperature with polymerization reaction are demonstrated. Pattern formation dynamics are calculated to demonstrate the crystal growth driven by photopolymerization.

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