Binary Phase Diagrams of Crystalline Polymers[1] THEIN KYU, RUSHIKESH MATKAR, University of Akron — We have extended the phase field free energy for polymer crystallization to binary crystalline polymer blends to generate phase diagrams that are capable of describing a rich variety of phases including eutectic, peritectic, and a host of other intermediate cases. The thermodynamics of liquid-liquid mixing have been modeled based on the Flory-Huggins theory with a χ interaction parameter. Various coexistence regions have been computed self-consistently by extending the phase field theory of crystallization to binary systems in conjunction with the coupling terms between phase separation and crystallization. The calculated phase diagrams exhibit rich variety of coexistence regions such as liquid + liquid, liquid + crystal, crystal + crystal and neat crystal regions. To describe the spatio-temporal evolution of crystalline morphology, a conserved concentration order parameter and a non-conserved crystal phase order parameter have been utilized in the context of the time-dependent Ginzburg-Landau (TDGL) model C, viz. model A for crystallization and TDGL model B for phase separation. The emerging crystalline morphology is discussed.

Thein Kyu
University of Akron

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