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Semi-Crystalline/Amorphous Polymer Blend Films Formed by MAPLE[1] YUCHENG WANG, MITHUN CHOWDHURY, HYUNCHEOL JEONG, RODNEY PRIESTLEY, Princeton University — An enabling film processing method, termed Matrix Assisted Pulsed Laser Evaporation (MAPLE), is employed to investigate the morphology and thermal properties of polymer blend systems comprising both miscible and immiscible pairs: poly(ethylene oxide) (PEO)/ poly(methyl methacrylate) (PMMA) and polyethylene (PE)/PMMA. This novel technique holds an intrinsic uniqueness in that it features ultra-slow deposition rate, thereby allowing the simultaneous film growth and crystallization of molecules atop a temperature controlled substrate. In this work, the effect of substrate temperature as well as growth rate on film structure and thermal properties are probed with the aid of morphological, calorimetric, and scattering characterizations. Compared with solution casted films, variances sourced from the new approach help to understand the functionality of an existing amorphous polymer in semi-crystalline/amorphous binary systems, especially regarding the impact on melting point differentiation and change of crystalline structures.

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