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Ultrathin film crystallization of poly(ϵ-caprolactone) in blends containing styrene-isoprene block copolymers: the nano-rose morphology GIOVANNI KELLY, JULIE ALBERT, Tulane Univ — Semi-crystalline polymers have been studied for decades due to unique physical, optical, and chemical properties that make them attractive materials for packaging, opto-electronics, and tissue engineering. While the thin film morphologies of semi-crystalline polymers have been well-studied for decades, blending with other crystalline and amorphous polymers and copolymers continues to provide new insights on crystal growth and morphology control. Blending can also lead to the discovery of novel, useful crystalline morphologies. This work discusses the discovery and investigation of what we refer to as the nano-rose morphology. The nano-rose morphology is a relatively monodisperse collection of 500 nanometer diameter crystalline spirals, exceptionally different from both the crystalline and blend morphologies typically observed in ultrathin films. Non-conventional crystal growth in the form of lamellar scrolling, twisting, and s-shaped and c-shaped crystals has been noted previously by others. Through a systematic study of variables that dictate morphology in ultrathin films, our results complement those findings and reinforce the hypothesis that unbalanced surface stresses acting on growing crystalline lamellae cause polymer crystals to grow in an unconventional matter.

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