

Abstract Submitted
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Effects of Confinement on the Crystallization of Perfectly Linear Polyethylene SASHA MYERS, RICHARD REGISTER, Princeton University — The crystallization behavior of diblock copolymers of perfectly linear polyethylene (LPE) and polyvinylcyclohexane (PVCH) is evaluated in a variety of morphologies, with LPE forming either the matrix or the discrete domains. Because the glass transition temperature of PVCH is higher than the crystallization temperature of LPE, the mesoscale morphology is frozen upon cooling, confining crystallization within or around glassy microdomains. Previous work on confined polyethylene crystallization has employed hydrogenated polybutadiene (hPBD) as the “polyethylene” block, but in that case, the ethyl branch defects in hPBD control the crystal thickness and crystallinity rather than confinement. For LPE confined within spheres and cylinders, crystal thickness is limited by microdomain size and the degree of crystallinity is reduced. Lamellar morphologies impose lesser limitations on LPE crystallization, because the crystals stack orthogonally to the lamellar microdomains. Crystal thicknesses inferred from melting point depression and measured directly by SAXS on flow-aligned lamellar samples are in good agreement. Maximum thickness is influenced by both diblock structure and thermal history.

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