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Facile Alignment of Amorphous Poly(ethylene oxide) Microdomains in a Liquid Crystalline Block Copolymer Using Magnetic Fields[1] CHINEDUM OSUJI, MANESH GOPINADHAN, PAWEL MAJEWSKI, Yale University — Large area microdomain alignment in poly(ethylene oxide-b-methacryalte/LC) diblock copolymers was successfully accomplished in the melt state by application of a 6 T magnetic field while cooling from elevated temperatures. Small angle X-ray scattering demonstrated that both lamellar and cylindrical PEO microdomains oriented with their interfaces along the applied field while the smectic layers of the liquid crystalline mesophase are perpendicular to the field. This is in agreement with the positive diamagnetic anisotropy of the cyano-biphenyl mesogen and a homogeneous anchoring condition at the inter-material dividing surface (IMDS) between the two blocks. Addition of homopolymer acrylic acid and LiClO4 suppress PEO crystallinity and produce stronger segregation between the polymer blocks leading to improved order. Our experiments demonstrate the creation of well aligned arrays of amorphous PEO domains over large length scales and offer a route to functional materials, in particular for selective transport applications such as solid ionic electrolytes.

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