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Substrate Surface Energy Effects in Triply-Periodic Block Copolymer Thin Films THOMAS EPPS, MICHAEL FASOLKA, NIST, Polymers Division — The effect of substrate surface energy on the thin film structure of ABC triblocks exhibiting triply-periodic bulk morphologies was investigated. Several films, with various polymer compositions and film thicknesses near the bulk triblock domain spacings (d), were studied by atomic force microscopy (AFM) on gradient substrates. Surface energy gradient libraries were generated on silicon wafers coated with a chlorosilane SAM, accelerated under a UV/ozone lamp. Using this approach, surface energies ranging from 25 mJ/m2 to 72 mJ/m2 were probed on a single wafer. Surface energy and composition influenced the polymer nanostructures and the film's terrace structures. Terrace heights typically corresponded to 1/2 d and 3/2 d, and terrace structures varied with surface energy. Additionally, at least three distinct polymer morphologies were identified, including a hexagonally-packed structure, a network-like structure, and a disorganized microphase-separated structure. For several triblock films, the morphologies were surface energy dependent, and polymer morphologies often varied from the 1/2 d terrace to the 3/2 d terrace.

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