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Formation of Lamellar Heterolattices in Block Copolymer Thin Films by Sequential Electrospray Deposition[1] YOUNGWOO CHOO, HANQIONG HU, KRISTOF TOTH, CHINEDUM OSUJI, Yale University — Electrospray deposition (ESD) of block copolymers (BCPs) on a heated substrate provides precise control over the formation of BCP thin films. This continuous deposition process allows one to fabricate heterogeneously assembled thin films by altering the deposition materials. Here, we demonstrate such the sequential ESD of lamellae-forming poly(styrene-*b*-4-vinylpyridine) BCPs with differing molecular weights and explore the morphology of the composite films. The resulting structure of the heterolattice interface was a strong function of temperature. Sharp interfaces with abrupt changes in the lamellar period (L_0) were observed at lower deposition temperatures (150 - 170 C), while higher temperature (190 C) produced a smooth variation in the lamellar period from one molecular weight to the next. Furthermore, the ordering kinetics of a secondary layer which was deposited onto the primary layer could be substantially enhanced depending on the molecular weight of the polymer present in the underlying primary layer. We elucidate these findings in the context of temperature and molecular weight dependent diffusion dynamics of the polymers in the melt which control the inter-mixing of the layers.

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