

Domain Morphologies of Poly(3-dodecylthiophene)-based Block Copolymers Depending on Regioregularity

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Phase separation of conjugated-amorphous block copolymers (BCPs) is mainly determined by interplay between Flory-Huggins interaction (χ), liquid crystalline (LC) interaction and crystallization. In particular, the strong LC interaction and crystallization can provide morphological richness, but often suppress the formation of ordered domains. Therefore, tuning the LC and crystalline behavior can be a key to form desirable nanostructures of conjugated-amorphous BCPs. Here, we studied morphologies of poly(3-dodecylthiophene)-block-poly(2-vinylpyridine) (P3DDT-b-P2VP) depending on regioregularity (RR), which determines the LC and crystalline behavior of conjugated polymer. Above the melting temperature, we observed a clear transition in domain spacing of ordered structures as the RR decreased from 94% to 85%. This could be attributed to a change in chain-packing configuration due to the reduction in LC interaction.