Self-assembly of Dendron-Jacketed Block Copolymers: Hierarchically helical transfers from a focal asymmetry

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Helical-*within*-helical superstructures have been discovered for the first time in dendron-jacketed block copolymers (DJBCPs), which are achiral diblock copolymers, poly(styrene)-*block*-poly(4-vinylpyridine) (PS-*b*-P4VP) and poly(styrene)-*block*-poly(2-vinylpyridine) (PS-*b*-P2VP) grafted with asymmetric dendron **aD** and symmetric dendron **sD** via hydrogen bonding. This hierarchical helicity in the achiral assemblies arising from spontaneous symmetric breaking is induced by a focal asymmetry designed from position isomers in the two dendrons (**aD** and **sD**) with two alky tails respectively binded at 3,4- and 3,5-position of benzonic acid and hydrogen binding sites on para- and ortho-position of pyridine (P4VP and P2VP). With symmetric/asymmetric matching, two donor-accepter assemblies of P4VP(**aD**) and P2VP(**sD**) blocks form axial heicity by the staggered - stacking around the backbone and generate a characteristic optical activity of circular dichroism. Hierarchical transfers of supramolecular helicity result in quaternary helical nanostructure of achiral PS microdomains (helical phase) through primary position isomers, secondary helical conformation of backbones and tertiary supramolecular helical assemblies in order.

References

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