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Transfer of Chirality from Molecule to Phase in Self-assembled Chiral Block Copolymers RONG-MING HO, Department of Chemical Engineering, National Tsing Hua University — Here, we report the mechanisms of chiral transfer at various length scales in the self-assembly of enantiomeric chiral block copolymers (BCPs*). We show the evolution of homochirality from molecular chirality into phase chirality in the self-assembly of the BCPs*. The chirality of molecule in the BCP* is identified from circular dichroism (CD) spectra while the handedness of the helical conformation in the BCP* is determined from split-type Cotton effect in vibrational circular dichroism spectra. Microphase separation of the BCP* is exploited to form a helical (H*) phase, and the handedness of helical nanostructure in the BCP* is directly visualized from transmission electron microscopy tomography. As examined by CD and fluorescence experiments, significant induced CD signals and bathochromic shift of achiral perylene moiety as a chemical junction of the BCPs* can be found while the concentration of the BCPs* in toluene solution is higher than critical micelle concentration, suggesting a twisting and shifting mechanism initiating from microphase-separated interface of the BCPs* leading to the formation of the H* phase from self-assembly. The operation of the self-assembly of the BCP* may provide insights into morphological evolution from the molecular level via homochiral evolution, and give the appealing applications such as chiral metamaterials.

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