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Influence of Chirality in Ordered Block Copolymer Phases ISHAN PRASAD, GREGORY GRASON, University of Massachusetts Amherst — Block copolymers are known to assemble into rich spectrum of ordered phases, with many complex phases driven by asymmetry in copolymer architecture. Despite decades of study, the influence of intrinsic chirality on equilibrium mesophase assembly of block copolymers is not well understood and largely unexplored. Self-consistent field theory has played a major role in prediction of physical properties of polymeric systems. Only recently, a polar orientational self-consistent field (oSCF) approach was adopted to model chiral BCP having a thermodynamic preference for cholesteric ordering in chiral segments. We implement oSCF theory for chiral nematic copolymers, where segment orientations are characterized by quadrupolar chiral interactions, and focus our study on the thermodynamic stability of bi-continuous network morphologies, and the transfer of molecular chirality to mesoscale chirality of networks. Unique photonic properties observed in butterfly wings have been attributed to presence of chiral single-gyroid networks, this has made it an attractive target for chiral metamaterial design.

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