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Universal Phase Diagrams in Rod-Coil Block Copolymers and Applications to Optoelectronics and Bioinspired Materials RACHEL SEGALMAN, VICTOR HO, BRYAN BOUDOURIS, UC Berkeley and Lawrence Berkeley National Laboratories — The thermodynamics of self-assembly of rod-coil block copolymer systems is significantly altered from that of well-characterized coil-coil block copolymers due to the difference in chain topology and the liquid crystalline interactions between rod blocks. As a result, the phase space of rod-coil block copolymers appears to be at least four dimensional (relying on rod-coil and rod-rod interactions as well as two geometrical parameters). Here, we demonstrate that systematic tuning of the rod-rod interactions in conjugated rod-shaped polythiophenes allows for manipulation of the ratio of Maier-Saupe to the Flory-Huggins parameter. This ratio of thermodynamic parameters appears to be crucial in determining morphology and in obtaining long-range order. The fundamental self-assembly of molecules of unusual shapes as well as applications of rod-like block copolymers in optoelectronics and bioinspired materials will be discussed.

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