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Self-Assembling Semicrystalline Polymer into Highly Ordered, Microscopic Concentric Rings by Evaporation MYUNGHWAN BYUN, SUCK WON HONG, Materials Science and Engineering Iowa State University, LEI ZHU, Materials and Biomolecular Engineering University of Connecticut, ZHIQUN LIN, Materials Science and Engineering Iowa State University, MYUNGHWAN BYUN, SUCK WON HONG, AND ZHIQUN LIN TEAM, LEI ZHU COLLABORATION — A drop of semicrystalline polymer, poly(ethylene oxide) (PEO) solution was placed in a restricted geometry consisting of a sphere on a flat substrate (i.e., sphere-on flat geometry). Upon solvent evaporation from the sphere-on-flat geometry, microscopic concentric rings of PEO with appropriate high molecular weight were produced via controlled, repetitive pinning ("stick") and depinning ("slip") cycles of the contact line. The evaporation-induced concentric rings of PEO exhibited a fibrillar-like surface morphology. Subsequent isothermal crystallization of rings at 40 $^{\circ}$C and 58 $^{\circ}$C led to the formation of multilayer of flat-on lamellae (i.e., spiral morphology). In between adjacent spirals, depletion zones were developed during crystallization, as revealed by AFM measurements. The present highly ordered, concentric PEO rings may serve as a platform to study cell adhesion and motility, neuron guidance, cell mechanotransduction, and other biological processes.

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