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A Facile Route to Large-Scale Hierarchically Structured Conjugated Polymer Assemblies with Enhanced Electrical Conductivity WEI HAN, Georgia Institute of Technology, MING HE, Fudan University, MYUNGHWAN BYUN, University of Massachusetts, BO LI, ZHIQUN LIN, Georgia Institute of Technology — By subjecting a drying droplet containing conjugated homopolymers or all-conjugated diblock copolymer to a judiciously designed geometry consisting of a cylinder situated on a flat substrate (i.e., cylinder-on-flat geometry), a set of highly ordered straight or wavy stripes at the microscopic scale over a large area were yielded, in which each microscopic stripe was composed of bundles of nanofibers or nodule-like nanodomains (i.e., forming hierarchical assemblies). These hierarchical patterns of conjugated homopolymers and all-conjugated diblock copolymer exhibited good electrical properties. Quite intriguingly, the crystallinity of the as-prepared assemblies of all-conjugated diblock copolymer was largely improved after the solvent vapor annealing, resulting in four times increase in electric conductivity. This facile, scalable deposition technique based on controlled evaporative self-assembly renders the crafting of hierarchically structured semicrystalline conjugated optoelectronic materials, and may provide a paradigm to develop high-performance electronic devices in a simple and controllable manner.

Wei Han
Georgia Institute of Technology

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