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Solution Assembly of Hybrid Poly (3-hexyl thiophene) and Cadmium Selenide Nanowires FELICIA BOKEL, EMILY PENTZER, TODD EMRICK, RYAN HAYWARD, University of Massachusetts Amherst — Optimizing morphology of self-assembled systems containing both electron carrying (n-type) and hole carrying (p-type) materials holds promise for the fabrication of improved devices, such as solar cells. In this talk, two routes to formation of hybrid p-n composite fibrils consisting of crystalline p-type poly(3-hexyl thiophene) (P3HT) nanowires with n-type cadmium selenide (CdSe) quantum dots and nanorods into well-defined structures will be discussed. The first method involves co-crystallization of freely soluble P3HT and P3HT-functionalized CdSe nanorods to form crystalline hybrid nanowires upon addition of a marginal solvent. Transmission electron microscopy reveals that nanorods preferentially orient parallel to and flank the sides of fibers. In a second route to forming hybrid materials, chain-end functionalized P3HT is crystallized into fibrillar nanowires. Introduction of nanoparticles promotes binding at the fibril edge, forming parallel composite pathways or “superhighways.” These assembly approaches represent efficient means to organization of conjugated polymers and semiconducting nanostructures, thus offering new opportunities for optoelectronic device design.

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