Fibers of functional nanocomposites of poly(3-hexythiophene) containing fullerene derivatives and carbon nanotubes

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We report on electrospinning of fibers composed of poly(3-hexylthiophene) P3HT fullerene derivative, phenyl-C61-butyric acid methylester (PCBM), and Single Walled Carbon Nanotubes (SWNT). While of great promise for photovoltaic applications, functional structures with a controllable morphology provide a great challenge. Here we show that control over the colloidal behavior of the SWNT and the PCBM via a tailor-made block-copolymer enables the electrospinning of long, uniform fibers of the polymer-nanostructures composites. The fibers exhibit improved crystallinity and efficient quenching of the photoluminescence. Light-Induced Electron Spin Resonance (LESR) spectroscopy provides a direct evidence of electron transfer between PCBM and P3HT components in both two- (P3HT/PCBM) and three-component (P3HT/PCBM/SWNT) fibers.