Conjugated Polymer Nanowires: Preparation, Morphology, Optical Properties and Field-Effect Transistors AMIT BABEL, YAN ZHU, DAN LI, YOUNAN XIA, SAMSON A. JENEKHE, Department of Chemical Engineering and Department of Chemistry, University of Washington, Seattle, WA.

Nanowires of conjugated polymers are ideal system for studying 1-D confinement effects on optical and electrical properties and hold promise as building blocks for nanoelectronics. We have prepared high quality nanowires of conjugated polymer semiconductors, such as poly(3-hexylthiophene) (PHT), poly(4-hexylquinoline) (PHQ), poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene] (MEHPPV), poly(9,9-dioctylfluorene) (PFO) and their blends, using self-assembly and electrospinning techniques and investigated their morphological, optical and electrical properties. Self-assembled crystalline nanowires of binary blends of regioregular PHT and PHQ showed good ambipolar charge transport with hole and electron mobilities of 0.012 and 0.004 cm$^2$/Vs, respectively. Electrospun fibers of MEH-PPV and its blends with PHT and PFO had diameters of 30-500 nm and tunable optical and charge transport properties. $p$-Channel field-effect transistors based on the MEH-PPV/PHT blend nanofibers had hole mobility of up to $1\times10^{-4}$ cm$^2$/Vs.