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## POLY (3-HEXYLTHIOPHENE) NANOWIRES: NANOSCALE PHOTOLUMINESCENCE AND FIELD-EFFECT CHARACTERISTICS

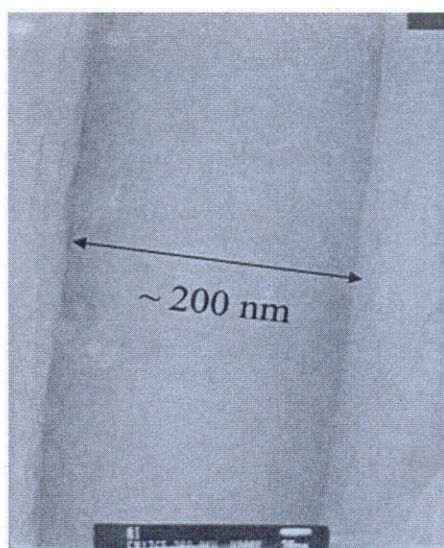
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Poly (3-hexylthiophene) (P3HT) nanowires were electrochemically synthesized in the nanoporous membrane. The electrolyte used for the electrochemical polymerization consisted of 3-hexylthiophene (3HT) monomers, 1-butyl-3-methylimidazolium hexafluoro-phosphate (BMIMPF<sub>6</sub>) as a dopant, and acetonitrile (CH<sub>3</sub>CN) as a solvent. The Au, which was thermally evaporated onto one side of membrane, was used as a working electrode. The applied voltage and synthesis time were 4.5~5.0 V and 10 min, respectively. The formation of P3HT nanowires was visualized through scanning electron microscope and transmission electron microscope. The diameter and length of nanowires was 200 nm and 25~38  $\mu$ m, respectively (see Fig. 1). The Raman and Fourier transform infrared (FTIR) spectroscopy were performed to confirm the electrochemical polymerization of the P3HT nanowires. From the UV-Vis absorption and PL spectra of P3HT nanowires in chloroform solution, the  $\pi$ - $\pi^*$  transition, bipolaron state, and PL peaks were observed. The nanoscale PL spectrum of the single strand of P3HT nanowires was obtained through laser confocal photoluminescence experiments. The field effect characteristics of P3HT nanowires are presented.



**Figure 1.** TEM image of P3HT nanowire with diameter of ~200 nm.