

Structure and optical characteristics of MWCNTs coated with light-emitting poly (3-hexylthiophene)

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We fabricated double wall structure of hybrid nanotube of with light-emitting poly (3-hexylthiophene) (P3HT) coated onto multi-walled carbon nanotubes (MWCNTs). The MWCNTs were grown on n-doped Si substrate by thermal chemical vapor deposition. Light-emitting P3HT materials were directly deposited onto MWCNT surface by using electrochemical polymerization method [1]. To discern structural characteristics of MWCNT, P3HT, and hybrid MWCNT/P3HT nanotubes, scanning electron microscope (SEM) images, ultraviolet/visible (UV/vis) absorption, and Raman ($\lambda_{\text{ex}} = 514 \text{ nm}$) spectra (see Fig. 1) were measured and analyzed. For structural characteristics of a single strand nanotube, laser confocal microscope (LCM) Raman ($\lambda_{\text{ex}} = 488 \text{ nm}$) spectra and transmission electron microscope (TEM) images were measured. The diameter of hybrid nanotubes increased from $\sim 40 \text{ nm}$ to $\sim 100 \text{ nm}$, after coating of P3HT. Both typical Raman modes of MWCNT and P3HT materials were identified. With comparing solution photoluminescence (PL) and LCM PL spectra, luminescence characteristics of MWCNT/P3HT nanotubes were investigated.

References

- [1] S. H. Lee, D. H. Park, K. Kim, J. Joo, D. C. Kim, H. J. Kim and J. Kim,
Applied Physics Letters, Vol. 91, p. 263102 (2007)

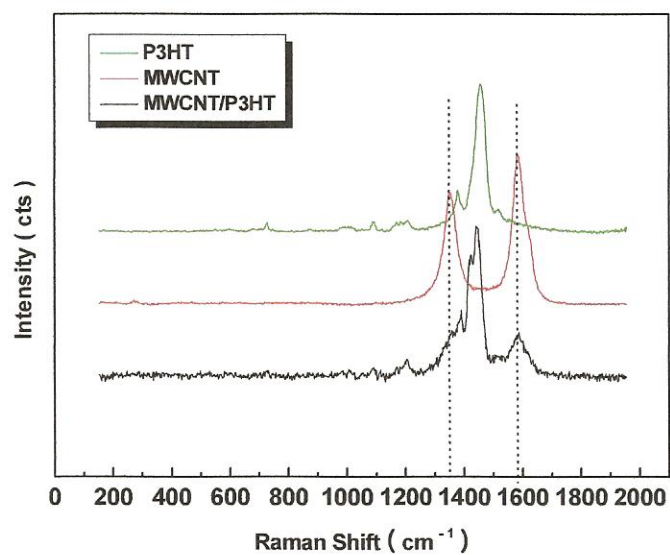


Figure 1. Raman spectra of MWCNT, P3HT, and hybrid MWCNT/P3HT nanotubes.