



# **The 3rd Korea-China Workshop on Nanotubes and Nanowires**

Date: 2006. 5. 17 - 20

Place: 600<sup>th</sup> Anniversary Building  
Sungkyunkwan University  
Seoul, Korea

## **Abstract Book**



Center for Nanotubes and Nanostructured Composites

## Functional Polymer Nanotubes and Nanowires: Synthesis, Characteristics, and Applications

D. H. Park, M. Y. Cho, S. J. Lee, Y. B. Lee, H. S. Kim, Jinsoo. Joo\*

Department of Physics and Institute of Nano Science, Seoul 136-701, Korea

J. Y. Kim

Department of Physics, University of Incheon, Dowha-dong 177, Nam-ku  
Incheon 402-749, Korea

The synthesis and characteristics of nanotubes and nanowires of (semi) conducting polymers, such as polypyrrole (PPy), poly (3,4-ethylenedioxythiophene) (PEDOT), polythiophene (PT), poly (3-methylthiophene) (P3MT), and poly (3-hexylthiophene) (P3HT), are presented. The field emission characteristics for FED (field emission display) using conducting PPy and PEDOT nanotubes and nanowires are discussed. Hybrid double-walled nanotubes (HDWNTs) of light emitting polythiophene (PT) or poly (3-methylthiophene) (P3MT) enveloped by ferromagnetic nickel (Ni) nanotubes were also synthesized through electrochemical method by using nanoporous anodic aluminum oxide ( $\text{Al}_2\text{O}_3$ ) template. The results of high-resolution transmission electron microscope (HR-TEM), scanning electron microscope (SEM), and X-ray diffraction (XRD) experiments are presented for (semi) conducting polymers nanomaterials including HDWNTs (Fig. 1(a)). The photoluminescence (PL) characteristics including UV/Vis absorption spectra for the PT/Ni and P3MT/Ni HDWNTs were measured for the use of nano optical devices (Fig. 1 (b)). Using confocal microscope, the PL spectra of single strand of P3MT/Ni and P3MT nanotube are compared. The hetero-nanojunctions of PEDOT–PPy and PEDOT-PT were fabricated through sequential electrochemical polymerization method. From the  $I$ - $V$  characteristic curves, hetero-nanojunctions  $\pi$ -conjugated polymer nanowires shows a rectification effect.

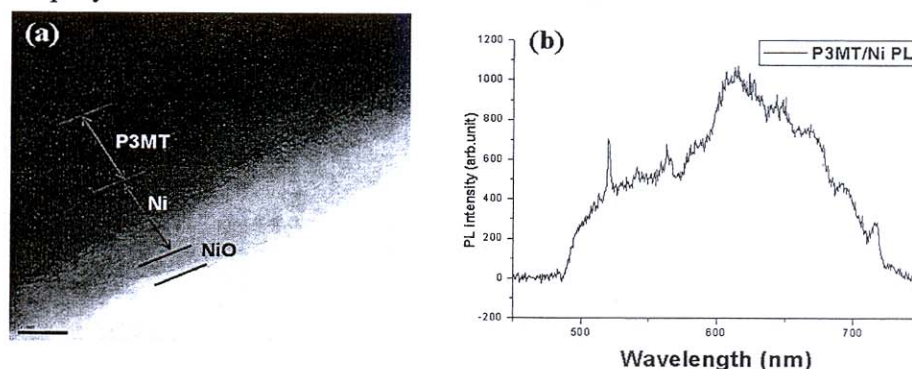


Fig. 1. (a) TEM image of HDWNT (b) PL spectrum of HDWNT.

\*Email address: jjoo@korea.ac.kr