



교육과학기술부 해외우수연구기관유치사업  
Ministry of Education, Science and Technology  
Global R&D Center

한국-스웨덴 탄소기반 나노구조 연구센터  
Korea-Sweden Carbon Based  
Nanostructure Research Center

# The International Symposium on Carbon Electronics (ISCE) 2010

May 03 (Mon) – 04 (Tue)

2010

Seoul National University

Seoul, Korea

# Nanoscale Optoelectronic Characteristics of Organic Nanostructures

Jinsoo Joo<sup>1\*</sup>, Kihyun Kim<sup>1</sup>, J. W. Lee<sup>1</sup>, J. S. Jung<sup>1</sup>, Jeongyong Kim<sup>2</sup>,

<sup>1</sup> *Department of Physics, Korea University, Seoul, Korea*

<sup>2</sup> *Department of Physics, University of Incheon, Incheon, Korea*

Hybrid coaxial nanotubes (NTs) of multiwalled carbon nanotubes (MWCNTs) coated with light-emitting poly (3-hexylthiophene) (P3HT) are fabricated, and their optical and structural properties are characterized. The *I-V* characteristics of the hybrid junction between the outer P3HT NT and the inner MWCNT, for the hybrid single NT, exhibits the characteristics of a diode (i.e., rectification), whose efficiency is clearly enhanced with light irradiation. The rectification effect of the hybrid single NT has been analyzed in terms of charge tunneling models. The quasi-photovoltaic effect is observed at low bias for the P3HT/MWCNT hybrid single NT.

We also report on the fabrication and optoelectronics using organic semiconducting self-assembled copper phthalocyanine (CuPc) and rubrene nanowires (NWs), NTs, and nanosheets (NSs). The structural transformation and enhanced optoelectronic properties for CuPc-based NWs and highly crystalline rectangular NTs are discussed. Nanoscale photoluminescence and optical wave-guiding characteristics for rubrene NTs and NSs are presented.