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ABSTRACT BOOK

Nanoscale Characteristics and Applications of Organic Nanostructures

J. Joo,^{1*} D. H. Park,¹ E. H. Cho,¹ J. W. Lee,¹ S. H. Lee,¹ M.S. Kim,¹ J. Kim,² and D. J. Ahn³

¹Departments of Physics, Korea University, Seoul, Korea, *e-mail: jjoo@korea.ac.kr, ²Department of Physics, University of Incheon, Korea, ³Departments of Chemical and Biological Engineering, Korea University, Seoul, Korea

Light-emitting organic nanoparticles (NPs), nanowires (NWs), nanotubes (NTs), nanosheet (NSs), and their hybrid nanostructures with nanoscale metals were fabricated. Laser confocal microscope (LCM) with AFM function has been used for the nanoscale PL characteristics of the nanosystems. We could control light-emitting colors and intensities of perylene, rubrene, and poly(3-hexylthiophene) NPs through hydrothermal process. Depending on the dimensionality and shape of organic nanostructures, the distinct nanoscale PL characteristics were observed. We found the huge enhancement of PL intensity for organic-based hybrid nanostructures with nanoscale metals, because of surface plasmon resonance coupling. The light waveguide characteristics of the NWs and NTs were investigated through the LCM experiments. The label-free optical DNA and protein detection using bio-hybrid light-emitting poly(3-methylthiophene) single NW was analyzed in terms of dopant-mediated fluorescence energy transfer effect. The applications to optoelectronic devices and optical nanobarcodes using various organic nanostructures are also presented.