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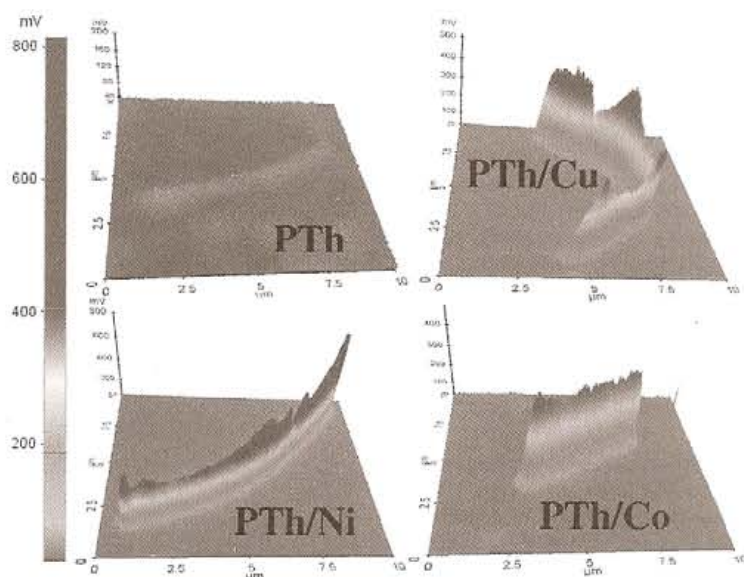
An underwater photograph showing a sandy seabed with several large, rounded, porous coral structures. The coral is light brown and yellowish, with a textured, porous surface. The background is a deep blue, slightly hazy water column.

**Book of Abstracts**



## BRIGHT LIGHT EMISSION OF HYBRID NANOSTRUCTURES USING $\pi$ -D-CONJUGATED SYSTEMS [WTuM1]

Huge enhancement of photoluminescence (PL) for a single strand of conjugated light emitting polymers; polythiophene (PTh), poly (3-methylthiophene) (P3MT), or poly (3-butylthiophene) (P3BT) nanotubes and nanowires, coated with nanoscale Au, Cu, Ni, or Co metal; and so called - coaxial organic-inorganic hybrid double layered nanotubes (HDLNTs). For the HDLNTs, the polymer nanotubes were electrochemically synthesized using an alumina nanoporous template. The metals with nanoscale thickness ( $\sim 10$  nm) were sequentially electrochemically deposited onto the polymer nanotubes. Hybrid nanoparticles (HNPs) using MEH-PPV attached with Au NPs were also prepared through re-precipitation method. The hybrid nanostructures were visualized and confirmed through SEM, TEM, HR-TEM, and elemental analysis. The enhanced PL efficiency in nanoscale was determined through laser confocal microscope (LCM) PL measurements with a high spatial resolution [1]. The LCM PL intensity of the single strand of the PTh/metal HDLNTs increased up to about 100 times depending on the kinds of nanoscale metals [2]. We also found that the nanoscale LCM PL intensities of P3MT nanotube based-HDLNTs remarkably increased up to  $\sim 350$  times as the doping levels of the P3MT nanotubes increased. For the MEH-PPV NPs, we also observed the increase of the LCM PL efficiency after the attachment of the Au NPs. We analyze that the huge enhancement of LCM PL of the light-emitting polymer based-HDLNTs and HNPs might originate from energy transfer and/or charge transfer in a surface plasmon resonance (SPR) coupling. From ultraviolet and visible absorption spectra for the hybrid nanostructures, the SP effects contributed to the enhancement of PL. The SP enhanced PL of organic polymer and inorganic metal hybrid nanotubes could be significantly applied to organic based displays and nanoscale optoelectronics.



Jinsoo Joo (Korea University/Korea), Dong Hyuk Park (Korea University/Korea), Mi Suk Kim (Korea University/Korea), Jin Woo Lee (Korea University/Korea), Yong Baek Lee (Korea University/Korea), Mi Kyung Kim (Korea University/Korea), Eun Hee Cho (Korea University/Korea), Dae Chul Kim (University of Incheon/Korea), Hu Keun Song (University of Incheon/Korea), Jeongyong Kim (University of Incheon/Korea)

[1] S.H. Lee, J. Joo, et al., Applied Physics Letters 91, 263102 (2007). [2] J. Joo, D. H. Park, et al., Advanced Materials 19, 2624 (2007).

## HIGHER ORDER PACKING MOTIFS IN SELF-ASSEMBLED CONJUGATED OLIGO-ELECTROLYTE AGGREGATES: RELEVANCE TO INTERCHAIN ELECTRONIC COUPLING [WMM7]

Conjugated oligoelectrolytes are characterized by a  $\pi$ -delocalized backbone with ionic pendant groups. These oligomers and their polymeric analogues are becoming increasingly popular materials due to their applications in light-emitting electrochemical cells (LECs), as electron-transport layers in polymer light-emitting diodes (PLEDs), and as optical components in biosensors. Their ionic pendant groups allow for solubility in polar solvents such as water and alcohols, allowing for solution-processed devices to be fabricated easily. The performance of these materials in devices is dependent on two factors, the counterion mobilities and the charge carrier dynamics. Counterion mobilities are relevant because ion migration under an applied bias can redistribute the internal electric field, thereby lowering charge injection barriers at the electrode interfaces. Low turn-on voltages and high brightness can thus be achieved. In order for high charge carrier mobilities to be attained, the molecular packing must be optimized. Short interchain distances and coplanar  $\pi$ -systems are desired. These parameters have traditionally been controlled through synthetic modification of the monomer units and by post-deposition annealing. Here, we present a new method for tailoring interchain packing by design of supramolecular assemblies in aqueous solutions. This method differs from conventional solution processing by employing solutions that contain ordered aggregates (at concentrations over three

Julia H. Ortony (University of California, Santa Barbara, USA), Arkadiusz Chworos (University of California, Santa Barbara, USA), Renqiang Yang (University of California, Santa Barbara, USA), Erin Brocker (University of California, Santa Barbara, USA), Helen G. Hansma (University of California, Santa Barbara, USA), Guillermo C. Bazan (University of California, Santa Barbara, USA)