

Tuesday Afternoon Poster Sessions

Biofabrication and Novel Devices Focus Topic

Room: East Exhibit Hall - Session BN-TuP

Biofabrication and Novel Devices Poster Session

BN-TuP1 Photoluminescence Characterization of Polythiophene Films Incorporated with Highly-Functional Molecules Such as Metallophthalocyanines. *H. Kobe, K. Onaka, H. Kato, S. Takemura, T. Hiramatsu, K. Shimada, K. Matsui,* Kanto Gakuin University, Japan

Conducting polymer polythiophene (PT) films incorporated with highly-functional molecules such as phthalocyanines with different center metals were synthesized and characterized by x-ray photoelectron spectroscopy (XPS) measurements, photoluminescence measurements (PL) and time correlated single photon counting (TCSPC) measurements in order to obtain fundamental photoluminescence properties of various PT-phthalocyanine complexes prepared by different solvents. The electrochemical polymerization was performed in acetonitrile containing thiophene monomer and $(\text{ET})_4\text{NBF}_4$ as a supporting electrolyte and the polymerization on an indium tin oxide (ITO) was conducted by applying positive voltage to the anode. The dopant molecules were iron phthalocyanine (FePc), copper phthalocyanine (CuPc), magnesium phthalocyanine (MgPc), lithium phthalocyanine (Li_2Pc) and cobalt phthalocyanine (CoPc). Those molecules were doped in the polymer film by the diffusion method. The solvents used in the doping process were acetonitrile and toluene. At first, it was confirmed by XPS measurements that the metallophthalocyanines were introduced in the PT films. In the photoluminescence measurement, emission peaks were different in intensity and wavelength according to the additional dopant molecules. Those peaks were influenced by Soret and Q bands. The solvent used in the doping process also influenced the emission characteristics. In the case of CuPc using acetonitrile as a solvent, emission peaks which originated from Soret and Q bands were observed in the photoluminescence emission spectrum. On the other hand, emission peaks only due to Q band were observed in the cases of FePc, MgPc, Li_2Pc and CoPc. Using toluene as a solvent drastically changed the emission characteristics. In the case of FePc, Li_2Pc and CoPc, the emission peaks only due to Soret band were observed. As for CuPc, an emission peak due to Soret band was dominated. In the TCSPC measurements, it was confirmed that the number of life time components fitted to the decay curve ranged from 3 to 5 with several nanoseconds to several hundreds of nanoseconds. The life time and the number of components depended on the center metals of the doped phthalocyanine and the solvent used in the doping process. The present work clarified that the photoluminescence emission peak position, intensity and life time were varied by solvents and center metals of phthalocyanines.

BN-TuP3 Towards F_1 -ATPsynthase Based Hybrid Nanobiodevice Fabrication. *J.K. Settle, M.L. Richter, C.L. Berrie,* University of Kansas

Incorporation of biomolecules into nanoscale devices, termed nanobiodevices, requires control over biomolecule placement within the device. Nonspecific adsorption of the tiny molecular motor, F_1 -ATPsynthase (ATPase), results in a variety of protein orientations on the surface. To improve the functionality of the immobilized protein, only one orientation (gamma unit upright) is desired. Therefore, controlling orientation is also imperative in increasing the number of functional molecules. Several techniques have been utilized to study and control this adsorption process. Atomic force microscopy was used to graft a dithiol into a resist matrix monolayer, exposing a thiol group. Through maleimide chemistry, a maleimide-nitriloacetic acid (NTA) group can be attached to the terminal end of the dithiol pattern. NTA will coordinate with nickel ions, which then coordinates with the histidine tag on the ATPase, thus controlling orientation. This process has also been studied via surface plasmon resonance. By coordinating these efforts with nanoelectrode construction, a functional nanobiodevice may be engineered.

Authors Index

Bold page numbers indicate the presenter

— B —

Berrie, C.L.: BN-TuP3, 1

— H —

Hiramatsu, T.: BN-TuP1, 1

— K —

Kato, H.: BN-TuP1, 1

Kobe, H.: BN-TuP1, **1**

— M —

Matsui, K.: BN-TuP1, 1

— O —

Onaka, K.: BN-TuP1, 1

— R —

Richter, M.L.: BN-TuP3, 1

— S —

Settle, J.K.: BN-TuP3, **1**

Shimada, K.: BN-TuP1, 1

— T —

Takemura, S.: BN-TuP1, 1