



**BILKENT UNIVERSITY**

**unam** - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY

***FACULTY OF SCIENCE***

**MATERIALS SCIENCE and NANOTECHNOLOGY  
GRADUATE PROGRAM SEMINAR**

**“Conjugated Block Copolymers for Organic Solar Cell”**

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The efficient utilization of renewable and sustainable energy sources grows in urgency with increasingly rapid fossil fuel consumption. Solar energy is abundant, but the production of solar cells based on silicon and other inorganics remains expensive despite optimization. Conjugated polymers represent more easily processable and cost-effective alternative materials for producing solar cells, as they can function as lightharvesting plastics in applications where inorganic materials are not well-suited.

A new, well-defined diblock copolymer (P3HT-b-C60) based on regioregular poly(3-hexylthiophene) (P3HT) and fullerene was synthesized. Annealing thin films of the copolymer revealed nanometer-scale phase separation, a more suitable morphology for enabling excitons generated in the P3HT domain to more efficiently reach the donor-acceptor interface, relative to simple blends of P3HT and C60. As a result, photoluminescence of the P3HT-b-C60 diblock copolymer in the films showed a complete quenching of photoluminescence of P3HT, which is indicative of charge transfer between P3HT and fullerene.

Donor-acceptor diblock copolymers, composed of regioregular poly(3-hexylthiophene) as the electron donor block and poly(perylene diimide acrylate) as the electron acceptor block, were prepared and used to fabricate a solar cell. These copolymers showed efficient photoluminescence quenching in the solid state, indicative of charge separation, and were used to produce a solar cell with power conversion efficiency of 0.49%.

**Date : December 3, 2010 (Friday)**

**Time : 15:40**

**Place : Faculty of Science Building, A Block, Seminar Room (SA 240)**

**Tea will be served after the seminar**