

SEMINAR

**Organic photovoltaics: a green
alternative for fabricating solar cells**

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Low band gap conjugated polymers have been researched intensively owing to the high performances as active materials in organic photovoltaics (OPVs). These offer the potential for cheap, solution-processed photovoltaic devices. To demonstrate high efficiency, the active layer of polymer solar cells must attain a high absorption of the solar spectrum. However, the limited absorption profiles of the commercially available organic materials prevent the attainment of these higher efficiencies. Therefore, to improve the performance of OPVs, one of the most critical challenges is to develop donor conjugated polymers that possess a low energy band gap for a strong and broad absorption spectrum extending to near-infrared to capture more solar photons, whilst simultaneously maintaining high hole mobility for efficient charge transport.

In this presentation, the current state of the art of polymers used in OPVs will be discussed. I will also present a number of our current research interests. This includes the material characterization of low band gap conjugated polymers for OPVs and the optimization steps required to give high performing OPV devices. One of the major issues with OPVs is their lifetime as devices rapidly degrade in the presence of oxygen and waters, which prohibits the widespread commercialisation. I discuss techniques to improve the lifetime of OPVs using techniques such as using crosslinkable polymers and substituting of layers, which are known to degrade rapidly.

Finally, I will discuss the use of nanoimprint lithography (NIL) to fabricate nano-structures in organic electronics. Two areas will be discussed; firstly the direct patterning of semiconducting polymers for nanoscale Organic Field Transistors (OFETs). Secondly, the nano-patterning of anti-reflective structures for OPVs. I show show that the reflection losses of the air-substrate can be reduced and that the improvement is shown to increase with the angle of irradiation.

REMEMBER

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April 9, 2013 - 11:00 h.

Place: CIN2 Seminar Hall, CIN2 Bldg, UAB

Invited by: Dr. Nikolaos Kehagias