

**Center for Quantum Science and Engineering (CQSE)
&
National Center of Theoretical Sciences (NCTS/TPE)**

**Joint Seminar
May 21, 2010 (Friday)**

Time: May 21, 2:30pm ~ 3:30pm
Title: Charge separation, transport and recombination in
organic/inorganic hybrid solar cells
Speaker: Prof. Chun-Wei Chen (陳俊維)
Department of Materials Science and Engineering, NTU
Place: Rm716, CCMS & New Physics Building, NTU

Abstract

Over the past decade, solar cells based on organic dye molecules or conjugated polymers have attracted a great interest for fabricating low-cost large-area photovoltaic devices with respect to the conventional inorganic counterparts.

For the polymer solar cells, the most promised device structure is based on the polymer/fullerene derivative bulk heterojunctions. An alternative type of polymer solar cells based on polymer/inorganic nanocrystals hybrid device structure has also been attractive owing to the advantage of relatively high electron mobility and good physical and chemical stability of inorganic nanocrystals.

In this talk, I would like to talk about the fundamental mechanisms of charge separation, transport and recombination in polymer/inorganic nanocrystal hybrid solar cells. Two kinds of polymer solar cells will be addressed; one is the bulk heterojunction solar cell based on polymer/TiO₂ nanocrystals hybrids and the other is nanostructured hybrid solar cell consisting of aligned ZnO nanorod/polymer hybrids. The carrier dynamics and the corresponding device performance will be addressed and compared.

Reference:

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2. Yun-Yue Lin, Yi-Ying Lee, Liuwen Chang, Jih-Jen Wu, Chun-Wei Chen*, "The influence of interface modifier on the performance of nanostructured ZnO/polymer hybrid solar cells", *Applied Physics Letters*, Vol.94, 63308, 2009

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“Improved charge separation and transport efficiency in poly(3-hexylthiophene)
/TiO₂ nanorods bulk heterojunctions”, *Journal of Materials Chemistry*, 18, 2201,
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4. Y-Y Lin, T- H Chu, **C.W. Chen***, W.F. Su, C.C. Lin, C.-H Ku and J.-J. Wu, C.-H.
Chen, Nanostructured metal-oxide/conjugated polymer hybrid solar cells by
low-temperature solution processes, *Journal of Materials Chemistry*, 17, 4571, 2007
5. Shao-Sian Li, Kun-Hua Tu, Chih-Cheng Lin, Chun-Wei Chen*, Manish Chhowalla
“ Solution processable graphene oxide as an efficient hole transport layer in polymer
solar cells” (*ACS Nano*, in press)

