



多相复杂系统国家重点实验室

特邀学术报告

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◆ 报告题目 ◆ Synthesis of Semiconductor Nanocrystals

for Optoelectronic Applications

◆ 报告时间 ◆ 2011年2月15日(周二) 15:30~17:00

◆ 报告地点 ◆ 中科院过程大厦_139_室(进门厅后左手边即是)



报告摘要:

Colloidal semiconductor nanocrystals can be used for a variety of optoelectronic applications including light emitting devices (LEDs) and photovoltaics. Their narrow emission spectra make them excellent fluorophors for use in red, green and blue emitting organic LEDs and have been shown to achieve external quantum efficiencies (EQE) as high as 2.7%, 1.8% and 0.4% respectively. Better synthetic methods have produced nanocrystal emitters with higher quantum yield, boosting efficiency, while a better understanding of QD-OLED function has led to improved organic transport materials. We also report use of II-VI nanocrystals in AC driven downconversion LEDs to remove the NCs as active components in the device architecture. Greater synthetic control of the II-VI nanocrystals has yielded type-II CdSe/CdTe nanobells capable of internal exciton separation for photovoltaic applications. Although efficient solar cells using this material could not be produced, the material has given us several insights into the physics and future designs of bulk heterojunction photovoltaic devices. Furthermore, nanocrystal heterostructures formed using J-aggregate dyes electrostatically bound to QDs, have shown potential for use in LCD or lasing device applications. Finally, we examine common architectures and materials used in solar cells in literature and propose improvements to the synthesis and devices with respect to green design principles.

Jonathan E Halpert, 男, 30岁, 2008年获得麻省理工学院博士学位, 长期从事纳米晶异质结构的合成及其在光电器件方面应用的研究, 并取得了大量优秀的研究成果, 开发了II-VI型半导体纳米晶异质结构的合成方法, 并将其与染料结合, 作为活性光学材料装配应用于半导体薄膜器件, 例如发光二极管、半导体激光器和太阳能电池; 同时与Vladimir Bulovic Prof.合作, 设计装配了多种高效发光器件, 并对其性能进行了系统的测试研究。Halpert博士已在Journal of the American Chemical Society, Nano Letters, Journal of Physical Chemistry C等杂志上发表高水平学术论文11篇, 申请专利5项。

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