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S E M I N A R

aus

Halbleiterphysik und Nanotechnologie

Di, 28.6.2011, 11 Uhr c.t.
Hörsaal für Physik

"RELIABLE STRUCTURE TO PROPERTY RELATIONS IN ORGANIC SEMICONDUCTORS"

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Organic light-emitting diodes (OLEDs) have attracted much attention in the past decades, offering an competitive alternative to existing display technologies and inorganic solid state lighting devices. In comparison to existing technologies, OLEDs exhibit superior properties with respect to device efficiency and performance, fabrication costs and adaptive device design. For all above mentioned device implementations well defined material properties (carrier mobility, emission color, film forming properties, etc.) and in particular a high shelf and operational stability of the light emitting semiconductor are inevitable to achieve the targeted lifetimes of devices beyond ten thousand of hours.

One pivotal point for the successful development of light emitting organic semiconductors is a profound spectroscopy based fundamental understanding of the structure to property relations in this class of materials. As discussed in this seminar many of the achievements towards reliable structure to property relations were made possible by the elucidation of the significant role of very low concentrations of chemical defects and other impurities as well as their interplay with optically and electronically excited states. In particular we will show how the fundamental insights from steady state [1] and time resolved optical pump-probe spectroscopy [2] lead to the desired and improved material properties based on a rational design of different macromolecules such as light emitting conjugated [3,4] polymers, dedritic polymers and multi chromophore dendrons [5].

References:

[1] E.J.W. List et al. *Advanced Materials* **14**, *374* (2002)
[2] C. Gadermaier, et al. *Physical Review Letters*, 100, 057401 (2008)
[3] T. M. Figueira-Duarte et al. *Advanced Materials* **21**, *1* (2010)
[4] S. Sax et al. *Advanced Materials* **22**, *2087* (2010)
[5] T. Qin, et al., *Angewandte Chemie*, **47**, 8292, (2008)