Max Born Institute

Sonderkolloquium des SFB 450 (FU) und des MBI

am Dienstag, den 11.11.2003, 11.30 Uhr

Max-Born-Saal

es spricht

Prof. Dr. Mischa Bonn, Institute of Chemistry, Leiden University, Netherlands

über

„Novel Phase Transition in a Biomimetic Lipid Monolayer and Electron Dynamics in Nanoparticle Systems"

Abstract

Phospholipids are key constituents of cell membranes. Thanks to their amphiphilicity and ability to self-organize they form the skeleton of living cells. Knowledge of the behaviour of the self-organization of these phospholipids thus forms an important aspect in the understanding of cell structure. We have investigated the self-organizing behaviour of a phospholipid monolayer, in contact with water. We can map the order inside the alkyl chains using Vibrational Sum-Frequency Generation (VSFG), and the mesoscopic properties of the monolayer using fluorescence microscopy. This unique combination of optical tools allows us to observe, as the molecular surface area is increased, a novel, sharp phase transition, attributed to the curling up of the apolar alkyl chains as their exposure to the polar water environment increases, in addition to the known transitions. We also present recent results on the novel application of VSFG to non-planar surfaces.

The response of a confined electron-hole pair (exciton) to an externally applied field is not only of technological importance, but also of fundamental interest as a textbook quantum mechanics 'particle in a box '-problem. Thanks to the progress in synthesizing mono-dispersed crystallite CdSe semiconductor nanoparticles, also known as quantum dots (QDs), we can study this phenomenon in great detail. The field-induced response is due to deformation of the electron and hole wave functions, which determine the DC polarizability of the exciton. THz time-domain spectroscopy is applied to determine exciton polarizability of photo-excited CdSe nanoparticles. The large exciton polarizability of ~10^4 Å^3, is found to be strongly size-dependent and associated mainly with the hole. This value is orders of magnitude larger than typical molecular polarizabilities, but is in good agreement with theoretical calculation based on the multiband effective mass approximation.

Interessenten sind herzlich eingeladen

Prof. W. Radloff