Hybrid Inorganic/Organic Systems for Opto-Electronics

Collaborative Research Centre 951

Colloquium Announcement

of the Collaborative Research Centre 951
"Hybrid Inorganic/Organic Systems for Opto-Electronics"

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Hybrid Inorganic-Organic Systems for Optical Switches

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Photoinduced Ultrafast Processes at an Organic/Inorganic Interface

Time: Thursday, May 24, 2018, 3 pm c.t.

Place: Erwin-Schrödinger-Zentrum, Rudower Chaussee 26, Room 0`119.

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Hybrid Inorganic-Organic Systems for Optical Switches

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Optical switches are key components for data processing on the basis of "silicon photonics", in which they perform the crucial conversion of a photonic information from an optical fiber into an electric information for a silicon-based processing unit. The status of the switch is controlled by an external light source, emitting at a wavelength suitable to be absorbed by the conductive channel to photo-induce additional charge carriers and modulate the current output of the switch in close analogy to a classic transistor. This presentation details how hybrid superlattices of semiconducting nanocrystals and organic pi-systems with long-range order are applied as active layers in functional optical switches. The particular novelty for optical switching is an activated absorption mechanism, in which stimulation with one optical signal sensitizes the material towards an amplified recognition of a second optical stimulus. Several examples with different material combinations are presented and the importance of exciton formation as well as charge transfer across the inorganic-organic interface is discussed.

Photoinduced Ultrafast Processes at an Organic/Inorganic Interface

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In a first part of the talk recent work on excitation energy transfer in nano-hybrid systems is reviewed. Afterwards different scenarios of photoinduced charge separation dynamics at a para-sexiphenyl ZnO interface are discussed. The dependence of electron-hole separation on photon energy and duration of the laser pulse excitation is emphasized. In order to account for relaxation processes it is explained how the first principle parameterized Hamiltonian used so far is incorporated into a stochastic Schroedinger equation approach. Finally, an outlook is given on the control of electron-hole motion due to metal nano-particles placed in the vicinity of the interface.