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Functionalized Semiconductor Heterostructures Workshop
March 13, 2019
1pm – 5pm
OSC 821

Stephan W. Koch
University Marburg

Title: First Principles Microscopic Design and Functionalization of Semiconductors and Semiconductor Devices

Abstract: This talk gives an overview of the combination of ab-initio density functional theory (DFT) with a microscopic many-body approach to quantitatively predict and design electro-optical properties of semiconductors. The applications include semiconductor heterostructures for micro-laser applications, perovskites for solar cells, as well as transition metal dichalcogenites (TMDCs).

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Wolfram Heimbrodt
University Marburg

Title: Optical spectroscopy of organic-inorganic semiconductor hybrids – a promising material system for novel optical applications

Abstract: Semiconducting organic-inorganic hybrids have already enabled a number of optical applications like highly efficient displays employed in mobile devices, dye sensitized solar cells or colloidal semiconductor quantum dots as labels in fluorescence sensing and fluorescent imaging microscopy. Nevertheless, the comprehension of fundamental physical processes is still insufficient. We studied in our research group suitable model systems using various linear-optical spectroscopic methods to develop a better understanding of such functionalized semiconductor heterostructures.

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Sangam Chatterjee
University Giessen

Title: Spectroscopic characterization of materials and heterostructures for next-generation emitter concepts

Abstract: Semiconductor lasers are currently presumably the most efficient light sources. They feature extreme wall-plug efficiencies and long-term performance. However, several wavelength-regimes remain challenging to address using conventional diode-laser concepts, including the mid-to far infrared or even continuous extremely broadband spectra. Several concepts tackling these approaches based on innovative functionalization are discussed based on spectroscopic investigations of model heterostructures.

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Kerstin Volz
University Marburg

Title: Quantitative four-dimensional transmission electron microscopy of semiconductor heterointerfaces

Abstract: Functionalized semiconductor heterostructures contain multiple interfaces. Their atomic structure might have a strong influence on device performance as also electric fields can arise from certain atomic interface configurations. Quantitative scanning transmission electron microscopy can be used to address both, if real space as well as reciprocal space information is exploited. This presentation will summarize our current understanding of interface formation in semiconductor heterostructures and will introduce a novel electron microscopic technique, which allows to retrieve information on electric fields across interfaces.