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"

Bert Hecht

Physikalisches Institut, Julius-Maximilians-Universität Würzburg, Germany

Plasmonic Nanoantennas for Opto- and Quantum Electronics

Günter Kewes

Institut für Physik, Humboldt-Universität zu Berlin, Germany

Extreme Light-Matter Interaction with Plasmonic Nanoantennas

Time: Thursday, 12.12.2019, 15:15

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

Collaborative Research Centre 951
Department of Physics
Humboldt-Universität zu Berlin

Email: sfb951@physik.hu-berlin.de
Tel.: +49 30 2093 66380
www.physik.hu-berlin.de/sfb951

Partners

Plasmonic Nanoantennas for Opto- and Quantum Electronics

Bert Hecht
Physikalisches Institut, Julius-Maximilians-Universität Würzburg

Light-matter interaction can be controlled in great detail by means of plasmonic nanoantennas. This includes colour and directionality of emitted photons as well as their emission rate in the weak coupling regime. In strong coupling even single-photon nonlinearities may be achieved.

In the presentation we will put special emphasis on electrically driven plasmonic nano antennas as nano light sources. Starting from light generation by means of resonant inelastic electron tunnelling we will work our way up to organic-plasmonic hybrid devices, so-called organic light-emitting antennas (OLEAs). For the latter we show that the emission colour and directionality are controlled by antenna properties and that both may be switched electrically.

Extreme Light-Matter Interaction with Plasmonic Nanoantennas

Felix Stete, Wouter Koopman, Nils Bochow, Oliver Benson,
Günter Kewes
Institut für Physik, Humboldt-Universität zu Berlin

The research field of plasmonics is driven by the hope to boost the strength of light-matter interaction with intense near-fields and to increase the integration density of optical-electronic elements. Actual applications have mostly been limited by the intrinsic properties of the used metal nanostructures, i.e., luminescence quenching, absorption losses and heat production. However, in recent years fascinating results have been reported in plasmonics, namely strong coupling with fluorophores at ambient conditions as well as electrically driven light emission by inelastic tunneling. Both processes become possible/efficient, when extreme hotspots are spatially matched with fluorophores/electrical currents.

Here we report on our current attempts to understand and model such systems and to establish a reproducible production and quick characterization of quasi identical nanoparticle on mirror (NPoM) antennas in the lab. Our current results indicate that the description of fluorophores with the dipole approximation fails in such systems, i.e., complete exciton wavefunctions must be taken into account.