HL 30: Hybrid systems

Time: Wednesday 14:15–14:45 Location: H17

HL 30.1 Wed 14:15 H17

Nanomechanical control of an optical antenna — •Annika Zuschlag, Jörg Merlein, Matthias Kahl, Alexander Sell, Andreas Halm, Johannes Boneberg, Paul Leiderer, Alfred Leitenstorfer, and Rudolf Bratschitsch — Fachbereich Physik und Centrum für angewandte Photonik (CAP), Universität Konstanz, D-78464 Konstanz, Germany

We mechanically tune the length and feedgap of a single gold bowtie antenna by precise nanomanipulation with the tip of an atomic force microscope. The nanoantenna consists of two gold nanotriangles fabricated with a colloidal nanomask. The optical response of the nanostructure is determined via dark-field scattering spectroscopy. We find no unique single antenna resonance. Instead, the plasmon mode splits into two dipole resonances. The exact three-dimensional shape of the nanoantenna is the reason for this effect, as may be seen in discrete dipole approximation calculations of the backscattering spectra of single nanostructures with differently-shaped antenna arms.

HL 30.2 Wed 14:30 H17

Hybrid Systems made out of Carbon Nanotubes and the Photosynthetic Reaction Center I (PS I) — Itai Carmeli[2], Markus Mangold[1], Bernd Zebli[1], Klaus-Dieter Hof[1], Ludmila Frolov[2], Chanoch Carmeli[2], Shacher Richter[2], and •Alexander Holleitner[1] — [1]Center of NanoScience (CeNS) and Department für Physik, LMU München, Germany — [2]Center for NanoScience, Tel Aviv University, Israel

We study the nanoelectronic properties of hybrid systems made out of carbon nanotubes (CNTs) and the photosynthetic reaction center (PS I). Generally, the utilized PS I can be found in the thylakoid membranes of cyanobacteria and it mediates light-induced electron transfer in the photosynthesis [1]. The nano-sized dimension, the generation of 1V photovoltage, the energy yield of approximately 58%, and a quantum efficiency of almost 100% makes the PS I reaction center a promising unit for applications in molecular nano-optoelectronics. Utilizing a unique Cys mutation at the end of PS I by genetic engineering, we demonstrate that the reaction center can be coupled to carbon nanotubes (CNTs) via chemical self-assembly using carbodiimide chemistry [2]. The method allows studying hybrid nanosystems for the construction of optoelectronic devices based on PSI-CNTs heterostructures. Three different architectures of PSI-CNTs hybrid structures are presented which allow exploiting the potential of PS I as an integrated part of CNT devices for optoelectronic applications. [1] K. Brettel, Biochimica et Biophysica Acta 1318 , 322 (1997); [2] I. Carmeli, B. Zebli, L. Frolov, C. Carmeli, S. Richter, and A.W. Holleitner (2007).