

Am Freitag, den 7. November 2014, 14.00 Uhr s.t., spricht

Professor Dr. Harald Giessen

(4. Physikalisches Institut der Universität Stuttgart)

im Hörsaal des Forschungszentrums Jülich über das Thema

Complex and hybrid functional plasmonics – from basics to applications



Quelle: Universität Stuttgart

We present a number of new materials and hybrid structures for active and reconfigurable nanoplasmonics. In particular, we use the metal-to-insulator transition of yttrium hydrides to completely switch the particle plasmon on and off in nano-antennas with their spectral response tuned to the near infrared. A key challenge for the development of active plasmonic nanodevices is the lack of materials with fully controllable plasmonic properties.

In this work we demonstrate that a plasmonic resonance in top-down nanofabricated yttrium antennas can be completely and reversibly turned on and off using hydrogen exposure. We fabricate arrays of yttrium nanorods and optically observe in extinction spectra the hydrogen-induced phase transition between the metallic yttrium dihydride and the insulating

trihydride. Whereas the yttrium dihydride nanostructures exhibit a pronounced particle plasmon resonance, the transition to yttrium trihydride leads to a complete vanishing of the resonant behavior. The plasmonic resonance in the dihydride state can be tuned over a wide wavelength range by simply varying the size of the nanostructures. Thus, our nanorod system serves as a versatile basic building block for active plasmonic devices ranging from switchable perfect absorbers to active local heating control elements. Additionally, we are going to demonstrate switching functionalities in phase change hybrid plasmonic materials. For example, perfect absorbers as well as chiral plasmonic structures can be tuned over a large wavelength range or even switched on and off and have their handedness reversed.

Zu diesem Vortrag lädt ein:

Prof. Dr. Uwe Rau

Im Namen des Wissenschaftlich-Technischen Rates des Forschungszentrums Jülich

Kolloquium