Halbleiter-Nanophotonik

SFB 787

Einladung

Es spricht: **Dr. Anna Rodina**
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Zeit: **Donnerstag, 16. Februar 2016, 11:00 Uhr**

Ort: **Technische Universität Berlin**
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Thema: **„Dark exciton radiative recombination and danling bond magnetic polaron in CdSe colloidal nanocrystals"**

Abstract:

Surprisingly, after more than 20 years of research the mechanism of radiative recombination of the ground exciton state in colloidal CdSe nanocrystals (NCs), which is known to be an optically passive (dark) exciton state, is still under discussion. The experimentally observed radiative recombination from the dark exciton state should be caused by the admixture with optically active (bright) exciton states via phonons or some external or internal magnetic field. The energy splitting between the dark exciton and the lowest bright exciton state depends strongly on the size and shape of the NC and might be of the order of 20 meV in CdSe NCs with 2.3 nm diameter. Thus, radiative recombination from the dark exciton state determines the low temperature photoluminescence (PL) from colloidal NCs. We show first theoretically that the exchange interaction between electron and dangling bonds at the surface of colloidal NC assists the radiative recombination of the dark exciton and leads to the formation of a dangling bond magnetic polaron (DBMP) [1,2]. We report next on the experimental proof of the dangling bond assisted recombination of the dark exciton and observation of DBMP in 2.8 nm diameter CdSe colloidal NCs [3]. Theoretical modeling of the temperature dependent fluorescence line narrowing spectra and PL decay time allowed us to evaluate the exchange energy and number of dangling bonds at the NC surface.

1. A. Rodina and Al. L. Efros, Nano Lett., 15, 4214 (2015)
2. A. Rodina and Al. L. Efros, Phys. Rev. B 93, 155427 (2016).
3. L. Biadala et al., Nature nanotechnology – accepted for publication (2017).

Gäste sind herzlich willkommen!
Prof. Dr. A. Hoffmann