

New functionalities of semiconductor nanocrystals by controllable coupling to molecules

Initiative: Trilaterale Partnerschaften – Kooperationsvorhaben zwischen Wissenschaftler(inne)n aus der Ukraine, Russland und Deutschland

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The main goal of the project is to establish the interrelation between optical, electronic, vibrational, and structural properties of water-soluble NC-molecule conjugates, which are relevant for a controllable localization of charge carriers or their transfer through the interface. Particularly, the energy level alignment, exciton binding energy, electron-phonon coupling, and the eventual formation of hybridized electronic states will be investigated as the function of NC size and chemical composition, as well as of sort of the bound molecule (ligand). A combination of optical techniques (UV-vis, Raman and Infrared spectroscopies, ellipsometry) and electron spectroscopies (X-ray, UV and inverse photoemission), as well as direct structural methods (scanning probe and electron microscopies) will provide a complex approach aiming at understanding the above listed characteristics and phenomena. Targeted NC-molecule systems will be based on ZnO, PbS, CdS(Se), Cu(Ag)InS₂ NCs and small organic molecules such as phthalocyanine or porphyrine functionalized in a way that their energy levels or solubility are tuned for appropriate bonding to NC surfaces. To achieve this goal a set of environmentally benign and versatile methods of preparation of such NCs, especially in water, will be developed within this project.

Projektbeteiligte

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