

## PHOTOLUMINESCENCE OF NANO-STRUCTURED PARTICLES: SYNTHESIS AND PROPERTIES

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**INTRODUCTION:** The wet-chemical preparation of semiconductor nanoparticles enables an easy access to quantized matter in gram scale. Synthetic routes have been developed for high quality samples of a wide variety of semiconductors (as well as metals and ceramics) with narrow size distributions and high crystallinity. Due to the quantum size effect, the colour of the particles and their fluorescence can be shifted through the entire visible and near infrared spectral region by varying the size of the particles. The line-width of the luminescence is much narrower than that of organic fluorescence dyes making them interesting candidates for multiplex labelling of biological material.

Since comparable numbers of molecules are located at the surface of nanoparticles and in their crystalline core the electronic structure and, thus, the luminescence properties of the particles is also strongly determined by surface chemistry. State-of-the-art synthesis allows, however, an almost perfect electronic termination of the surface leading to fluorescence quantum efficiencies of up to ~70 % at room temperature and a photo-stability which exceeds that of the best organic fluorescence dyes by orders of magnitudes.

Another advantage of the large surface fraction is the possibility to covalently link the particles via bi-functional ligand molecules to proteins and other biomolecules.

The talk will give an overview of the synthesis and properties of today-available luminescent nanoparticles.