Technische Universität Braunschweig

Synthesis, characterization and functionalization of quantum dots

iPAT Institut für Partikeltechnik

Quantum dots are semiconductor nanoparticles (in this work especially cadmium selenide; <12*nm*) which **spectroscopic properties** are directly correlated to their **size**, **structure** and **functionalization**. These parameters can be specifically addressed and varied to make them useful to a broad field of applications, such as an optical marker in bio imaging, LED displays, white phosphors, photovoltaics or computer technology, while it is important that each sample still has to be characterized and validated for its use.

This work will focus around the '*bottom-up*' **synthesis** of monodisperse quantum dots at different sizes as well as their **characterization**. The methods of choice will be **absorption** and fluorescence spectroscopy, dynamic light scattering (DLS), small angle X-ray scattering (**SAXS**) and transmission electron microscopy (**TEM**).

The main objective will be to address **the influence of the immediate surroundings, such as ligands or solvents,** onto each **individual method** and their **correlation**.

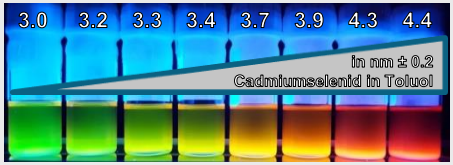

Abb. 1: Typical appearance of quantum dots at different sizes under ultra violet light at λ = 365 nm.

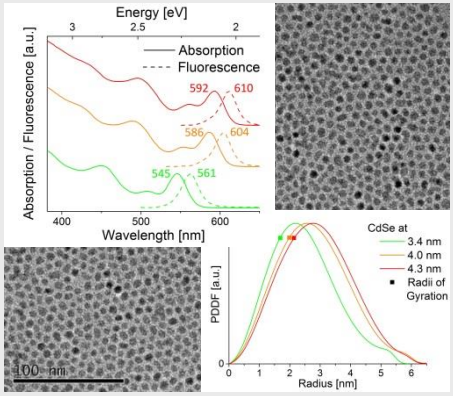

Abb. 2: Exemplary characterizations showing **UV/VIS**, **SAXS** and **TEM**.

Suitable for all type of thesis's

which can be done by students who work on their degree in chemistry, bioengineering or any similar studies with training in laboratory practice. The range of the project can be adjusted to suit the requirements each thesis type demands.

Start: **individually arranged**

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