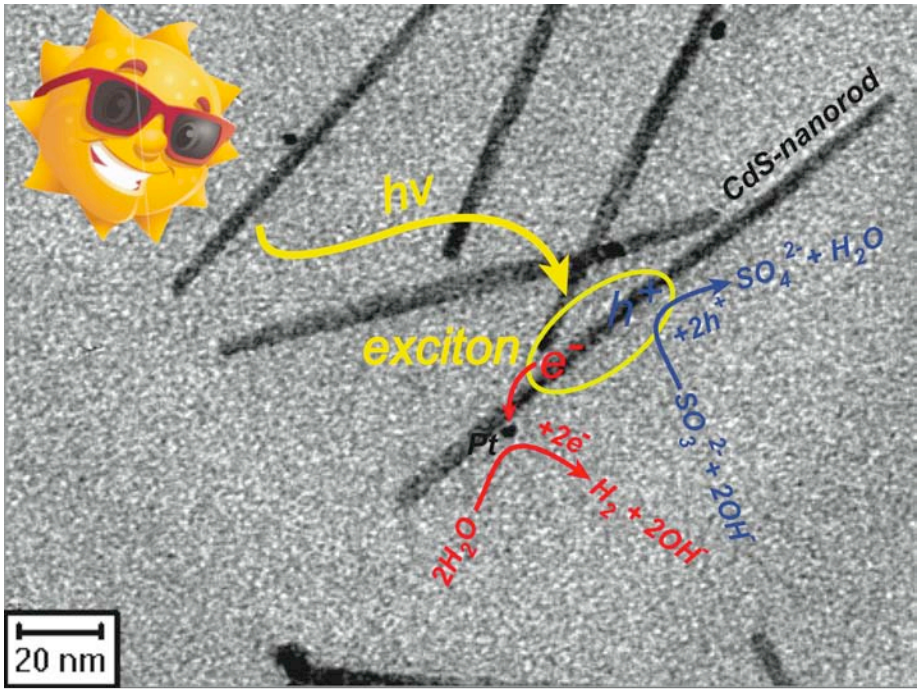
LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

Photonics and Optoelectronics Group

Clean energy: Hydrogen production with sunlight

MASTER, BACHELOR & DIPLOMA THESES AVAILABLE

With the approaching end of the fossil energy era of humanity the need for clean, abundant energy sources increases constantly. The use of solar energy to split water, i.e. to produce H_2, is regarded as a possible solution for this problem. The general is to use a semiconductor material that absorbs light and creates an exciton. This electron-hole pair is then separated either by a hole-scavenger or by a semiconductor multi-junction. Finally, the electron is transferred to an H_2-catalyst, e.g. noble metal, where water is splitted and H_2 evolves.



In these theses, the conversion efficiency of different metal-decorated semiconductor nanocrystals shall be investigated and optimized. Semiconductor nanoparticles available in our group (CdS-nanorods, CdS-CdSe core-shell nanoparticles etc.) will be modified for water-splitting. This modification includes ligand exchanges for water transfer, metal decorations, etc.. Subsequently the samples will be characterized with transmission electron microscopy & a setup for light-to-hydrogen conversion efficiency measurement. For efficient samples the transient absorption spectrum will be measured in our pump-probe setup.

Requirements:
- High motivation
- Experimental aptitude
- Sound standing knowledge base on solid state physics
- Experience in a chemistry laboratory desirable

Techniques may include:
- sample preparation in chemistry lab
- transmission electron microscopy
- gas-chromatography
- UV/VIS -Absorption spectroscopy
- transient absorption spectroscopy

Contact:

Dipl.-Phys. Maximilian Berr
Amalienstr. 54
D-80799 München
Phone +49 89 2180 -1443
Mobile +49 171 5000 133
Email Maximilian.Berr@physik.uni-muenchen.de