CHALMERS
UNIVERSITY OF TECHNOLOGY

Master Thesis in Sensitized Molecular Switches (30 or 60 credits)

Division of Chemistry and Biochemistry, Department of Chemistry and Chemical Engineering

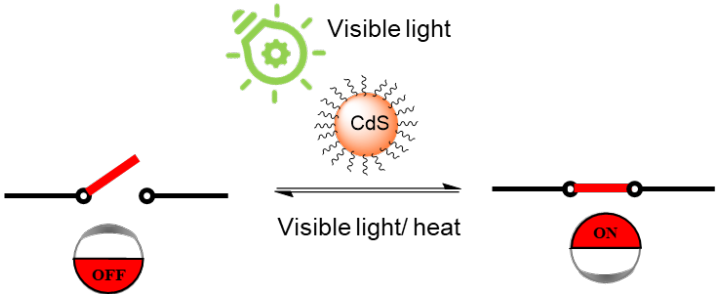
Objective of the project

Driving UV-absorbing molecular switches with visible light through triplet state sensitization using CdS quantum dots. Studying the switching and sensitization mechanism using various optical spectroscopy techniques.

Description of the project

Molecular switches [1] with the switching functions at the molecular scale (few nanometers) are the key elements to build artificial molecular machines and molecular-scale electronics.[2] However, to induce photo switching in many classes of molecular switches, UV light is required, which have short penetration depth and can induce unwanted damaging photochemistry. Here we will drive molecular switches using visible light irradiation by combining with CdS quantum dots (QDs)[3] as triplet state sensitizers.

The research project will include synthesis and characterization of CdS quantum dots, and study their performance in combination with UV-absorbing molecular switches. The photo switching upon visible light irradiation will be characterized using UV/vis absorption spectroscopy. Triplet sensitization mechanism between QDs and a few selected molecular switches will be confirmed by time-resolved laser spectroscopy.



During the project, you will have opportunities to learn and get familiar with several techniques and skills:

UV/Vis absorption, Fluorescence and Laser spectroscopy
Synthesis and characterization of quantum dots

Interested? Please contact us for further information!

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Reference:
1. Feringa, B. L., *Molecular switches*. Wiley-VCH: Weinheim; Chichester, 2001.
2. Molecular-Scale Electronics: From Concept to Function. *Chem Rev* **2016,** *116* (7), 4318.
3. Semiconductor clusters, nanocrystals, and quantum dots. *Science* **1996,** *271* (5251), 933.