



Master Thesis in Green-to-UV Photon Upconversion (30 or 60 credits)

Motivation of the project

Harvesting and converting solar energy is highly demanded, as it provides a clean solution for energy crisis. However, only a small fraction of the solar spectrum provides sufficient energy for fuel cells and photovoltaic application. Triplet–triplet annihilation photon upconversion (TTA-UC),^{1,2} a process in which low energy photons are readily converted to high energy photons under terrestrial solar irradiance conditions, is an emerging approach to harvest the solar energy.



In this master project, we are aiming to develop a green-to-UV TTA-UC system. Green light features the highest irradiance in the solar spectrum, through TTA-UC process, the energy of the photons is ready to be converted into UV light for further application in fuel cell, photosynthesis and photocatalysis.

Description of the project

You will team up with researchers in Physical Chemistry to investigate the process of green-to-UV TTA-UC. In a TTA-UC system, a triplet sensitizer and a triplet annihilator are needed to achieve upconversion. In more detail, you will

- Study the properties of several sensitizers and annihilators, including the energy levels, absorption, emission.
- Combine laser spectroscopies to investigate energy transfer process.
- Characterize TTA-UC performance and calculate efficiencies.

During the project, you will learn

- Problem-solving capability, oral communication and written skills
- Gain a solid background in Physical Chemistry
- Characterization of TTA-UC process
- Spectroscopic skills, including emission, laser spectroscopy, etc.

Interested? Please contact us for further information!

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Reference:

1. *Phys. Chem. Chem. Phys.* 2014, **16**, 10345
2. *Adv. Funct. Mater.* 2021, 2106198, doi.org/10.1002/adfm.202106198