LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

Physikalische Chemie
Hartschuh Group
Department Chemie
Center for NanoScience (CeNS)

CeNS Center for NanoScience | LMU

Master Thesis in Physical Chemistry

Topic: Ultrafast transient absorption spectroscopy of perovskite thin films

In transient absorption spectroscopy a broadband probe pulse monitors changes in the transmission of a sample material induced by an earlier pump pulse. These changes can arise from the absorption of photo-excited state and photo-generated charge carriers and transitions between other transient states. Importantly, the temporal resolution of such a pump-probe scheme only depends on the duration of the pump and probe pulses used in the experiment and can thus reach down into the femtosecond regime using ultrafast laser sources. Transient absorption spectroscopy is thus a particularly powerful and widely used tool for the investigation of photo-induced phenomena, such as the charge carrier formation and decay in optoelectronic materials. Here, perovskite thin films of various chemical composition are currently being developed as very promising absorber and transport materials in solar cells and other applications.

The central aim of this Master thesis project is to investigate the dynamics of photo-generated charge carriers in perovskite thin films using a newly developed transient absorption spectroscopy setup. Covering an extremely broad temporal range from 100 fs up to 1 ms, this setup provides access to the initial steps of photo-excitation, charge carrier formation as well as their subsequent recombination on the ns to µs time-scale. In this thesis, the photo-induced dynamics of perovskite thin films of different chemical composition and synthesis parameters fabricated by our collaboration partners will be investigated and related to their respective photo-voltaic performance and other characteristics.

(This project is part of the Munich DFG Exzellenzcluster e-conversion.)

Starting date: Flexible

Interested in challenging experimental work and in the photo-dynamics of photovoltaic materials?
– Contact Prof. Achim Hartschuh (achim.hartschuh@lmu.de, E2.066) or any member of the Hartschuh Group to learn more about the project.

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