Probing Tailor-Made (2D) Nanostructures for Innovative Optoelectronics by Transient Absorption Spectroscopy

Solution-processed two-dimensional (2D) nanostructures are highly promising materials for innovative ultrathin optoelectronics. When strongly confined in their thickness to one or few monolayers, e.g. the band gap size of the materials can be synthetically controlled, and they show significantly increased exciton binding energies as compared to their solid-state or nanocrystalline counterparts. These optoelectronic properties in turn are highly interesting for studying and ultimately utilizing opto-, spin- and valley-tronic effects in the structures including probing of highly mobile charge carriers or strongly bound excitons.
I will report on our combined colloidal synthesis approach for tailoring the desired optoelectronic properties of the nanostructures and their characterization and assessment by time-resolved terahertz and transient absorption spectroscopy.