ULTRAFAST DYNAMICS OF EXCITONS AND CHARGE CARRIERS IN SEMICONDUCTOR NANOCRYSTALS

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The development of ultrathin two-dimensional (2D) semiconductor nanostructures have generated considerable interest over the past years. Among these nanostructures, colloidal semiconductor nanoplatelets (NPLs) have a thickness controlled with atomic precision (defined number of monolayers) which leads to strongly tunable and exceptionally narrow optical features [1]. The recent development of II-VI semiconductor heterostructures of various shapes and compositions has allowed to access new optical properties [1]. Here we use femtosecond transient absorption spectroscopy to study the ultrafast dynamics of excitons and charge carriers in CdSe-CdTe core-crown NPLs [2].

We will also present the current progress in the development of a new two-dimensional electronic spectroscopy setup operating in the visible and ultra-violet range to investigate the sub-100 fs dynamics of colloidal nanocrystals after optical excitation well above the bandgap of the semiconductor nanostructures [3].

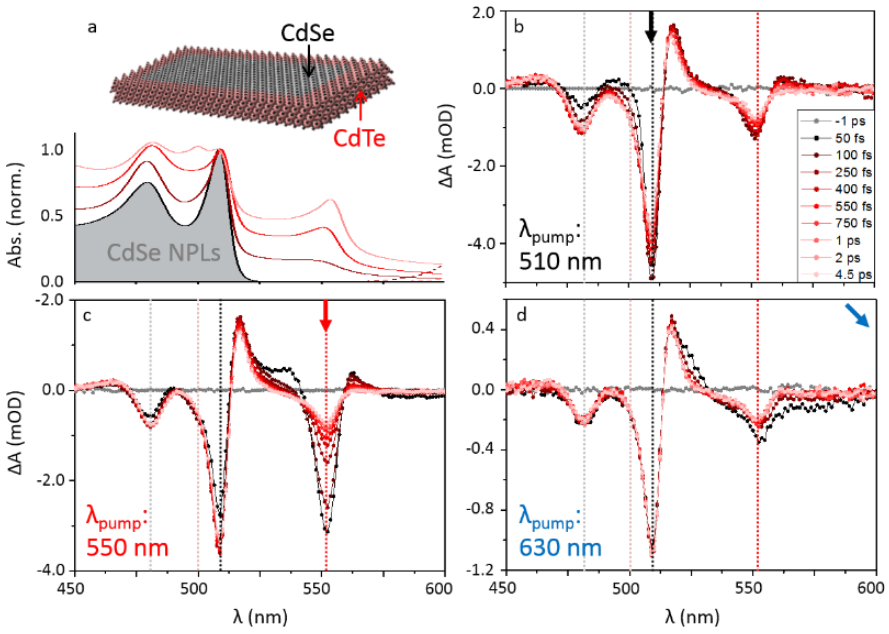

Figure 1. a) Schematics of CdSe-CdTe core-crown NPL and absorption spectra of three different samples (bare CdSe NPL spectrum displayed in grey). b-d) TA spectra at various pump-probe times for three different excitation wavelengths.

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