

Title: *Time-resolved laser spectroscopy of nanomaterials:
Study of nonlinearities using z-scan method*

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Abstract:

This diploma thesis is oriented to study of nonlinear properties in semiconductor nanocrystals using ultrashort femtosecond pulses. There is a detailed description of theory and experimental setup of the z-scan method, which can be used to measure the nonlinear refractive index and two-photon absorption coefficient. In the theoretical part we describe the influence of measurement by quality of laser beam, quality and thickness of the sample. There are numerical simulations of measurements influenced by these parameters. This theory is used for processing of measured dates by a simple program, which is attached to this thesis on CD. In experimental part we were measured nonlinear refractive indeces of diamond nanocrystals fabricated by the PECVD method, silicon and CdS nanocrystals in glass matrices. One part of this thesis was also the preparation and optimalization of experimental setup and increasing the signal/noise ratio.

Keywords: *Z-scan, Kerr effect, nonlinear refractive index, two-photon absorption, nanocrystals*