

**Construction of a Non-Linear Ellipsometer;
an experimental Approach to Non-Linear Spectroscopy**

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Abstract

In this talk we proposed the characterization of the non-linear optical properties of solids using an experimental setup similar to a linear ellipsometer. Using an Electrically Focus Tunable Lens (EFTL) and a pair of integrating spheres, we were able to measure the nonlinear absorption (in transmission) and nonlinear refraction (in reflection) in a long range of wavelengths (690-1040 nm). To demonstrate the technique, we used two typical semiconductor materials ZnSe and CdS, which had been well characterized in the past and are used as a reference for the calibration of the system. We also compared our results with theoretical approaches used to explain the dispersion relations of the non-linear properties of semiconductors, and found excellent agreement with the experimental results. The system has no moving parts, is highly compact, and fully automated.