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Optical properties and electronic structure of europium chalcogenides

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**OPTICAL PROPERTIES AND ELECTRONIC STRUCTURE
OF EUROPIUM CHALCOGENIDES**

A Dissertation submitted
to the
SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZÜRICH
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Presented by
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Abstract

The normal incidence reflectivity of europium chalcogenide single crystals and of Gd doped EuO has been measured at room temperature in the spectral region from 250 μm to 12 eV and has been analyzed in terms of the optical constants. In addition, in a reduced spectral region from 0.5 to 6 eV, the optical constants have been evaluated by means of a polarimetric method, as well above as below the magnetic ordering temperature. To enhance the resolution of the magneto-optical transitions, a modulation technique has been applied with a magnetic field as modulating parameter.

The Kramers-Kronig relation has been used to analyze the normal incidence reflectivity and the magnetorelectance spectra in terms of, respectively, the optical constants and the changes in the real and imaginary part of the dielectric response function. For Gd doped EuO the Kramers-Kronig analysis has revealed plasmon and coupled plasmon-phonon modes.

The interband transitions of the europium chalcogenides are discussed within the framework of recent APW and OPW energy band calculations. On the other hand we have derived an energy level scheme of the europium chalcogenides from our optical data.