Publications

The following aspects of the present work were published or submitted for publications.

Metal-to-Semiconductor phase transitions in VO_2

in preparation, April 2007

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Abstract The nature of the phase transition in VO_2 film as a function of the temperature has been investigated by means of valence-band and core-level photoemission spectroscopy measurements. Concretely, one can follow directly changes of the density of states of the V 3d levels by varying the temperature. The results show that the phase transition temperature and the nature of the phase transition depend on sample treatment

Transient changes of the dimer buckling at Si(100)

in preparation, April 2007

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Abstract Changes of the electronic structure of Si(100) induced by laser excited e-h plasmas were studied directly by time-resolved valence band and core level photoelectron spectroscopy with combined laser and synchrotron radiation. For a laser fluence of 180 mJ/cm^2 at 800 nm irreversible changes of the electronic structure were observed. At a fluence well below the damage threshold (110 mJ/cm^2) reversible

changes in the photoelectron spectra were detected, which could be assigned specifically to changes of the Si(100) surface and bulk electronic structure. The transient band structure renormalization for the D_{down} surface band could be extracted directly from the photoemission data. While depopulation (population) of the bulk bands are estimated to be in the 1 % range, the depopulation of the D_{up} surface band reaches 40 %. The reversibility of the laser-induced changes at the surface at the observed high excitation densities is explained in terms of a stabilizing effect of the underlying substrate.

Magnetization dynamics of Gadolinium probed by linear dichroism in 4f photoemission

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Abstract

Here we report on a combined laser-synchrotron pump-probe experiment which aims at a direct measure of the temporal evolution of the 4f contribution to the magnetization. After excitation with an intense 60 fs infrared laser pulse ($h\nu$ = 1.53 eV) the transient magnetization is followed by linear magnetic dichroism of the Gd 4f photoemission line [Kru04]. We observe a loss in magnetization after laser excitation and find similar time scales for relaxation of the magnetization to the equilibrium value as in the non-linear optical studies [Mel03].