

Mixed valence oxides – interplay between structure and magnetism revealed by X-ray spectroscopy

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Mixed-valence transition metal oxides – spinel ferrites, manganese perovskites, double perovskites, cuprates, cobaltites, iridates, etc. – exhibit a rich variety of crystallographic, electronic and magnetic phases. They reveal extraordinary coupling of structural, charge, spin and orbital degrees of freedom leading to intriguing transport phenomena, such as Verwey transition, colossal magnetoresistance, and high temperature superconductivity. X-ray spectroscopy is a perfect tool to simultaneously probe their structural and magnetic properties, due to element and site selectivity and high sensitivity to valence state of transition metal ions.

In the talk a survey of the application of high resolution hard X-ray absorption (XAS) and emission (XES) spectroscopy as well as X-ray magnetic circular dichroism (XMCD) in the study of complex electronic phenomena in mixed valence oxides will be given. Results of selected experiments will be reviewed in order to illustrate how the interplay between structure and magnetism can be probed as a function of chemical composition, temperature and magnetic field. In addition, the outcome of recent experiments on nanostructured spinel ferrites by means of 1s2p RIXS-MCD will be discussed.

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