X-ray absorption near edge spectroscopy (XANES) using linear and circular polarized light offers a powerful toolbox of element-specific probe of local structural properties, valence and magnetism. We have used XANES and in particular x-ray linear dichroism (XLD) and x-ray magnetic circular dichroism (XMCD) to study the K-edges of transition metal doped oxides. The local atomic configuration of the dopant species and its respective valence as measured using XLD is decisive in understanding the origin of the observed magnetic properties as measured with either XMCD or integral magnetometry. Hard x-rays ensure bulk sensitivity and thus buried interfaces can be studied non-destructively.

We will use the example of the widely studied dilute magnetic oxide, Co-doped ZnO, where a quantitative set of XANES-based quality indicators can be introduced assuring phase pureness of the samples, i.e., Co dopant atoms substitute for Zn which is correlated with paramagnetism [1,2]. In cases where long range magnetic order is found in the samples, it could be directly evidenced by means of XANES and XMCD that it originates from metallic Co inclusions which was corroborated by analytic transmission electron microscopy [3]. In phase-pure Co-doped ZnO XMCD measurements up to 17 Tesla could recently be used to directly evidence and quantify the antiferromagnetic coupling of next cation-neighbor Co dopant atoms [4].

Ort: Hörsaal P2, Petersgasse 16, Technische Universität Graz
Zeit: Tuesday, 8 April 17:15, 16:50 meet the speaker tea
Gastgeber:

For a regularly updated colloquium program see: http://www.if.tugraz.at/colloquium.html