Structural and magnetic properties of chlorine-doped $CuCr_2Se_4$

J. Neulinger[1]; *M. Liberati*[2,3]; *R. Chopdekar*[4,5]; *E. Arenholz*[3]; *Y. Idzerda*[2]; *Y. Suzuki*[5]; *A. Stacy*[1]
1. Chemistry, University of California, Berkeley, Berkeley, CA, USA.
2. Physics, Montana State University, Bozeman, MT, USA.
3. Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA, USA.
4. Applied Physics, Cornell University, Ithaca, NY, USA.
5. Materials Science and Engineering, University of California, Berkeley, Berkeley, CA, USA.

Spin-polarized materials have recently attracted a lot of attention as new materials for spintronics. $CuCr_2Se_4$ is a highly spin-polarized chalcogenide spinel of interest for magnetic tunnel junctions, as its electrical conductivity and magnetic properties can be chemically tuned by substitution of halogen atoms[1] onto the anion site. Chemical vapor transport with $SeCl_4$ transport agent yields single crystals of lightly chlorine-doped $CuCr_2Se_4$. Single crystal X-ray diffraction indicates a symmetry-broken rhombohedral phase (space group R-3) compared to the cubic spinel parent phase. Bulk magnetic measurements confirm ferromagnetic behavior to well above room temperature; Curie temperatures are depressed with increased doping. X-ray absorption spectroscopy (XAS) and X-ray magnetic circular dichroism measurements have been performed; a clear dichroism signal has been observed at the $L_{2,3}$ Cr edges, as well as an induced spin polarization on the Cu atoms. The structural changes induced by Cl doping do not affect the Cr XAS and XMCD lineshapes. Changes in the Cu XAS lineshape are observed, though the dichroism remains similar.

Miyatani, K; Minematsu, K; Wada, Y; Okamoto, F; Kato, K; Baltzer P K. *J. Phys. Chem. Solids*. **32** (1971) 1429-1434