

Observation of Component Fine Structure in the Linear Dichroism of Fe3p Photoelectron Emission

F.O.Schumann and J.G. Tobin

Lawrence Livermore National Laboratory, Livermore, CA 94550, USA

For the first time, we have observed the fine structure predicted for linear dichroism in the photoelectron emission of the Fe 3p and confirmed our assignments using spin polarized photoelectron spectroscopy. X-ray Magnetic Linear Dichroism in Photoelectron Spectroscopy was first reported by Kisker et al [1] and subsequently confirmed by others. [2-4] By setting up a chiral configuration for photoelectron emission from a magnetized sample, dichroic effects induced by magnetization reversal were observed even without spin resolving detectors. However, until now, the fine structure predicted by multiple scattering calculations [5] was not observed in 3p emission of 3d transition metals, thus calling into question the analysis. Furthermore, our assignments using the the dichroic experiments (non-spin resolving detection) were confirmed by performing spin-resolving measurements on the same systems. Finally, using a simple single electron picture similar to that put forward by Tamura et al, we can simulate our experimental results, with previously derived selection rules [6] and the orthogonalized basis sets for the 3p manifold. [7,8]

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Contact Person: James G. Tobin, Lawrence Livermore National Laboratory, 7000 East Avenue, POB 808, L-357, Livermore, CA 94550. Telephone: 925-422-7247; Fax: 925-423-7040. Email: Tobin1@LLNL.Gov.