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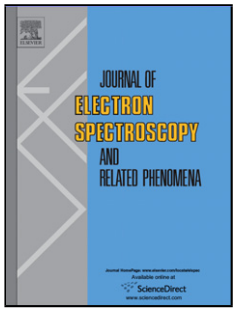

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Magnetic dichroism in angular resolved hard X-ray photoelectron spectroscopy from buried magnetic layers.

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Abstract

This work reports on the measurement of magnetic dichroism in angular-resolved photoelectron spectroscopy from in-plane magnetized buried thin films. The high bulk sensitivity of hard X-ray photoelectron spectroscopy (HAXPES) in combination with circularly polarized radiation enables the investigation of the magnetic properties of buried layers. Angular distributions of high kinetic energy (7 to 8 keV) photoelectrons in a range of about 60° were recorded in parallel to the energy distribution. Depending on purpose, energy and angular resolutions of 150 to 250 meV and 0.17° to 2° can be accomplished simultaneously in such experiments. Experiments were performed on exchange-biased magnetic layers covered by thin oxide films. More specifically, the angular distribution of photoelectrons from the ferromagnetic layer Co_2FeAl layer grown on MnIr exchange-biasing layer was investigated where the magnetic structure is buried beneath a MgO layer. Pronounced magnetic dichroism is found in the Co and Fe $2p$ states for all angles of emission. A slightly increased magnetic dichroism was observed for normal emission in agreement with theoretical considerations.

Keywords: Hard X-ray photoelectron spectroscopy, HAXPES, Circular magnetic dichroism, Angular resolved photoelectron spectroscopy

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