

Spin Resolved Photoemission

Application Notes

The SPECS hemispherical analyzer PHOIBOS 150 can be equipped with a mini-Mott Spin Detector for electron spin resolved data acquisition. The detector allows the parallel acquisition of spin resolved and non-spin resolved data. The non spin resolved data is acquired with six standard channeltrons. The spin resolved data is measured using a mini-Mott polarimeter of the Rice university design. This detector uses four channeltrons and allows to determine two spin components.

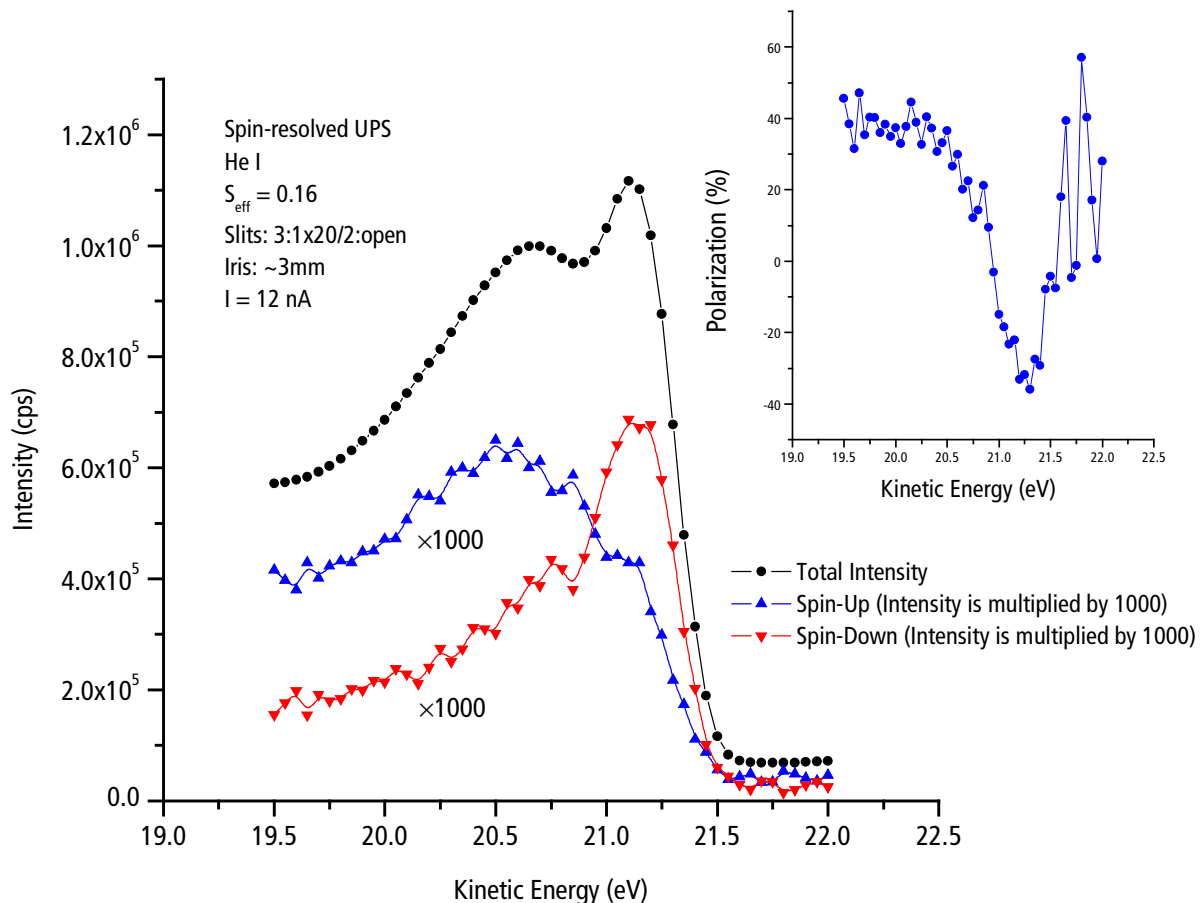


Fig. 1: Spin resolved valence band of 40 Å Fe on W(110), excited with UV radiation. Black: non-spin resolved data; red and blue: spin-up and spin-down component; light blue: polarization derived from the spin detector data. Data courtesy of Prof. Laubschat, Dr. Dedkov, TU Dresden, Germany.

The data presented here has been measured with a SPECS Spin Detector and a PHOIBOS 150 analyzer at the TU Dresden (Dr. Dedkov, Prof. Laubschat). Figure 1 shows the spin-resolved valence band of a 40 Å iron film on W(110), excited with HeI UV radiation. Figure 2 shows the Fe 2p_{3/2} core level, excited with Al Kα radiation.

The black curve I_0 is the non-spin-resolved data in six standard channels. The polarization curve P is calculated from two spin channels (I_R and I_L) using two measurements with opposite sample magnetization (called + and -):

$$P = \frac{1}{S_{eff}} \left(\sqrt{I_R^+ I_L^-} - \sqrt{I_L^+ I_R^-} \right) / \left(\sqrt{I_R^+ I_L^-} + \sqrt{I_L^+ I_R^-} \right); S_{eff} = 0.16$$

The spin-up and spin-down intensities are calculated from I_0 using

$$I_{spinup} = 0.5 I_0 (1 + P) \quad \text{and} \quad I_{spindown} = 0.5 I_0 (1 - P)$$

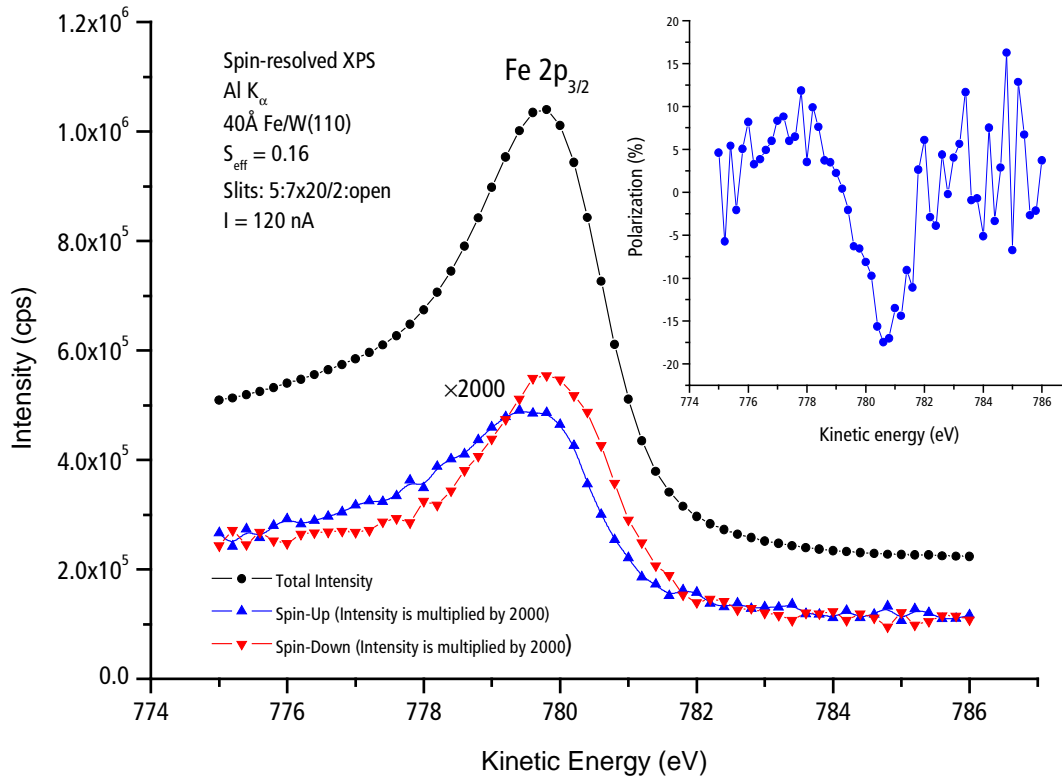


Fig. 2: Spin resolved Fe 2p_{3/2} core level of 40 Å Fe on W(110), excited with Al Kα radiation. Black: non-spin resolved data; red and blue: spin-up and spin-down component; light blue: polarization derived from the spin detector data. Data courtesy of Prof. Laubschat, Dr. Dedkov, TU Dresden, Germany.

SPECS GmbH
Surface Analysis
and Computer Technology
Voltastraße 5, 13355 Berlin
Germany

Phone: +49 30 467824-0
Fax: +49 30 4642083
E-mail: support@specs.de
http://www.specs.de