

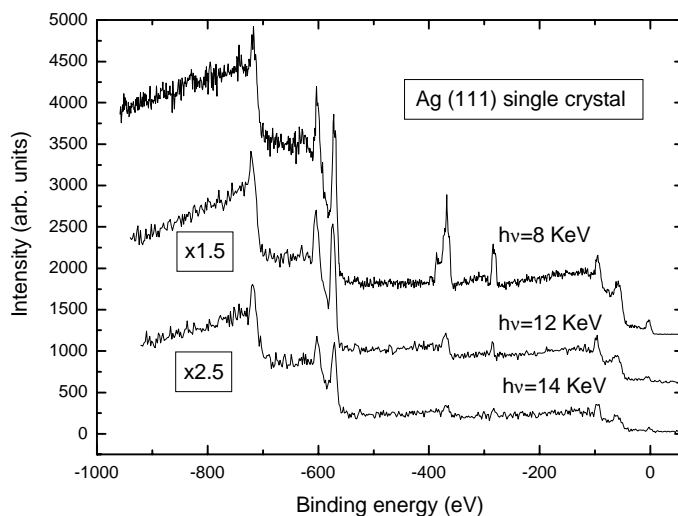
Subshell ionization cross-section on Cu, Ag and Au in the photon energy range 7-22KeV

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The progress of the Hard X-ray XPS (HAXPES) is strongly influenced by an exhaustive knowledge of the subshell ionization cross-sections for high photon energies. Up to now, limited data is available in the photon energy range for which the kinetic energy of the emitted photoelectrons ranges under the HAXPES scope. In this work we present a systematic study of the subshell photoionization cross-sections as a function of the involved atomic level, atomic number, photon energy, element and photoelectron kinetic energy. For that we have chosen three materials with different atomic numbers: Cu ($Z=29$, $3d^{10} 4s^1$), Ag ($Z=47$, $4d^{10} 5s^1$) and Au ($Z=79$, $5d^{10} 6s^1$). The photon energy from the SpLine beamline was tuned between 7 KeV and 22 KeV in order to detect photoelectrons with kinetic energies ranging between 1KeV and 15 KeV, depending on the atomic level excited.



Particularly, we have determined the subshell ionization cross-sections for Ag (single crystal): 2s, $2p_{1/2,3/2}$, 3s, $3p_{1/2,3/2}$, 3d, 4s, 4p, 4d; Cu (polycrystalline): 1s, 2s, $2p_{1/2,3/2}$, 3s, 3p, 3d and Au (polycrystalline): 3s, $3p_{1/2,3/2}$, $3d_{3/2,5/2}$, 4s, $4p_{1/2,3/2}$, $4d_{3/2,5/2}$, $4f_{5/2,7/2}$, 5p. A comparison between the measured values for Cu, Ag and Au as a function of the photon energy has been performed in order to establish a generic behavior applicable to subsequent

HAXPES experiments. These measurements demonstrate the feasibility of the SpLine experimental station (beamline + electron analyzer) to detect low (surface) and high (bulk) photoelectron kinetic energies under the same experimental set-up.