We have developed a novel HAXPES measurement system equipped with a high energy electron spectrometer, Focus HV-CA 300/15, which has the photoelectron having the kinetic energy up to 15 keV can be analyzed. This system has been installed in BL46XU of SPring-8 for industrial research. In this poster, the details of the system and some of the HAXPES spectra acquired by this system are presented.

Overview of BL46XU

HAXPES measurement system with HV-CSA at BL46XU in SPring-8

Features:
- Cylindrical sector type analyzer.
- Wide kinetic energy range: 0.1 eV - 15 keV.
- Pass energy: 1 - 500 eV (typically 50 - 200 eV).
- Lens magnification: 5 - 40 (typically 5-10).
- Entrance slit size: 0.5, 1.5, or 4.5 mm x 12 mm.
- 2D event counting detector with MCP and CMOS camera.
- Compact and light in weight: 50 kg.
- Remote control via TCP/IP.
- Gating electrode for time resolved experiment.

HAXPES spectra of Au (10 nm) / SiO₂ (10 nm) / Si:
- Excitation energy and take-off-angle dependences
- Analysis depth can be tuned by changing either excitation energy or take-off-angle.
- Si bulk signal through the 20 nm thick overlayer can easily be observed in the most bulk sensitive condition.

14 keV-HAXPES of Au (100 nm) / Si:
- Valence: Fine structures are clearly resolved.
- Total energy resolution: 50 eV.
- High energy resolution enough for practical surface analysis.

Analysis of the industrial material: Ni (20 nm) on SiC substrate

Sample preparation:
- Substrate: 4H-SiC (n-type)
- Deposition of Ni by DC sputtering
- Anneal treatment: 950°C, 1 min, 1×10⁵ Pa

Acknowledgements

Drs. N. Isomura and K. Dohmae (Toyota Central R&D Labs., Inc.), Messrs. K. Shimizu, A. Nakaguchi, and Dr. H. Tomizuka (Omicron Nanotechnology Japan, Inc.)

References