

## High Resolution Hard X-ray Photoelectron Spectroscopy at BL29XU in SPring-8

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Photoelectron Spectroscopy (PES) is a powerful method to investigate electronic structure of materials. However, conventional vacuum ultraviolet (VUV) and soft x-ray (SX) PES is surface sensitive because of the short inelastic-mean-free-paths of photoelectrons. This requires us to prepare clean surface and sometimes obscures intrinsic bulk states. In order to realize bulk-sensitive or surface-insensitive PES, we have developed hard x-ray (HX) PES using high-brilliance synchrotron radiation at BL29XU in SPring-8 [1,2]. Large probing depth of high energy photoelectrons enables us to probe intrinsic bulk states almost free from surface condition. A combination of x-ray optics and an electron energy analyzer dedicated for HX-PES achieved the total instrumental energy resolution of 63 and 55 meV (FWHM) at 5.95 and 7.94 keV, respectively. A special arrangement of an analyzer and a sample was employed and increased photoelectron intensity drastically. We will report present performance of our apparatus and characterize HX-PES by showing typical spectra.

[1] K. Kobayashi, M. Yabashi, Y. Takata, T. Tokushima, S. Shin, K. Tamasaku, D. Miwa, T. Ishikawa, H. Nohira, T. Hattori, Y. Sugita, O. Nakatsuka, A. Sakai and S. Zaima: *Appl. Phys. Lett.* **83** (2003) 1005.

[2] Y. Takata, M. Yabashi, K. Tamasaku, Y. Nishino, D. Miwa, T. Ishikawa, E. Ikenaga, K. Horiba, S. Shin, M. Arita, K. Shimada, H. Namatame, M. Taniguchi, H. Nohira, T. Hattori, S. Södergren, B. Wannberg and K. Kobayashi: *Nucl. Instrum. Methods A* **547** (2005) 50.