Materials Science:


"Kuchinashi" - *Gardenia*

One of the most progressing research methods in spectroscopy is a photoemission spectroscopy in the hard-X-ray regime, which provides bulk sensitive and valuable information on materials. This is the so-called hard X-ray photo-electron spectroscopy (HAXPES) and SPring-8 is surely a leader in this field. In this volume, two topics based on HAXPES are introduced. The first one reported by C. S. Fadley and co-workers at BL15XU, is based on the combination of standing waves with HAXPES. This enables us to obtain a detailed profile of multilayer interfaces. Furthermore, they demonstrated the angle-resolved HAXPES for the first time, which opened a new frontier in the investigation of bulk-sensitive band structures in detail. The second HAXPES activity concerns the study of the mixed valence nature of Yb compounds. Matsunami and co-workers confirmed the fully occupied nature of 4*f* states in bulk YbS and Yb metal.

Activities in angle-resolved photoelectron spectroscopy in the soft-X-ray regime at SPring-8 are also leading the field, and provide bulk-sensitive information on band structures. The detailed band and Fermi surface structures of $CeRu_2(Si_{1-x}Ge_x)_2$ has been obtained by Okane *et al*. at BL23SU.

The area of application of photoelectron emission microscope (PEEM) is becoming wider. The dependence of the electronic properties of epitaxial few-layer grapheme on the number of layers was clearly observed by Hibino *et al*. at BL17SU.

ELECTRONIC & MAGNETIC PROPERTIES

Studies in very high-energy-resolution inelastic X-ray scattering (IXS) at SPring-8 are also leading the world. In order to detect the transverse acoustic phonon mode of liquid Ga, IXS was successfully measured by Hosokawa *et al*. at BL35XU.

Investigations of magnetic materials are performed in very wide energy range (from IR to hard-X-ray) at SPring-8. For the hard-X-ray region, not only magnetic circular dichroism (MCD) in absorption spectra but also magnetic scattering measurements are performed. Here, an example of high resolution Compton scattering for transition metal oxides, which was obtained by Barbiellini *et al*. at BL08W, is shown. At BL11XU, Seto *et al*. developed energy domain Mössbauer spectroscopy. This method offers the potential for unique measurement capabilities for various scientific requirements including microscopic measurements. Finally, at BL39XU, very high field MCD measurements have become possible. Matsuda *et al*. developed a miniature magnet with which a 40 T magnetic pulse is available. The valence transition of Eu compounds depending on the field has been clearly observed.

As shown in this volume, some new changes have produced a variety of activities that show us the frontier of materials science.

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