X-ray emission spectrometer at BL39XU of SPring-8

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X-ray emission spectrometer with high efficiency are now developing at BL39XU of SPring-8 to investigate electronic states for functional materials at a viewpoint of basic aspects and their applications. Target materials are mainly bulk/single crystals in strongly correlated electron systems, nanoclusters and thin films in reactive catalyst, and so on. The spectrometer with the scattering plane on a horizontal plane has three towers which can mount a set of five analyser crystals each. The initial operation was started with five analyzer crystals mounted on a tower. An acrylic chamber filled with helium gas is placed on the X-ray paths of sample-to-analyzer and analyzer-to-detector to avoid a decrease of X-ray emission intensity. In near future, a dedicated vacuum chamber will be installed to put the towers and the analyser goniometers into the vacuum instead of the acrylic chamber.

Incident photon energy of 4.92-23 keV with variable polarization (horizontal/vertical linear and circular) is available by a diamond X-ray phase retarder. Emitted photon energy of 4.66-15.87 keV is covered by using Si, Ge, and InSb crystals. Wide energy range can provide us information of electronic states for many intended elements using the X-ray emission spectroscopy.

Recently, study on valence states and chemical states in 3*d*/5*d* transition metal, 4*f* rare-earth, and uranium compounds using high-energy resolution XAFS measurements in High-Energy Resolution Fluorescence Detection (HERFD) method [1] have been actively investigated by using the spectrometer [2-7]. Polarization/configuration dependence of XES and HERFD-XAFS measurements have been also performed in the spinel-type ferrites, the single crystals of Ce, Pr, Tm, and Yb compounds, and TiO_2 nanosheets [8-11]. In this workshop, recent activities using the spectrometer are presented.

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