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XAFS observes chemical states and local structures of materials

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Institute of Materials Structure Science (IMSS), KEK, operates two synchrotron rings, Photon Factory (PF) and PF-AR (Advanced Ring). PF is operated with the beam energy of 2.5 GeV, and PF-AR with 6.5 GeV or 5.0 GeV to provide higher x-ray energy. There are about 50 end stations including 6 x-ray absorption fine structure (XAFS) beamlines in hard x-ray region: 9A, 9C, 12C, 15A1, AR-NW2A and AR-NW10A.

XAFS is one of the most demanded methods at synchrotrons and is used to study various materials such as catalysts, batteries, functional oxides, semiconductors, minerals and environmental samples. XAFS is usually divided into two characteristic regions, x-ray absorption near edge structure (XANES) and extended x-ray absorption fine structure (EXAFS). XANES is the region of the spectrum from just below the absorption edge to ~50-70 eV above the edge. XANES reflects electronic states of elements of interest such as valence states, chemical states and coordination symmetry. EXAFS includes the other higher energy region above XANES and analysed to investigate local structures of elements of interest, e.g. bond length and coordination number. We will share recent topics of our XAFS studies performed at our facility. In addition, I would suggest potential topics to be studied at the AfLS in the context of natural resources in the African continent.

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