

## **AN INNOVATED LABORATORY XAFS APPARATUS**

TAGUCHI Takeyoshi, HARADA Jimpei, TOHJI Kazuyuki\* and SHINODA Kohzo\*

Rigaku Corporation, 3-9-12 Matsubara-cho, Akishima-shi, Tokyo 196-8666, Japan

\* TOHOKU University, Aramaki-Aza-Aoba-01, Aoba-ku, Sendai-shi, Miyagi 980-8579,

Japan

X-ray Absorption Fine Structure (XAFS) spectroscopy is one of the most powerful tool to determine the valence state of local atoms in various material. XAFS spectroscopy has an advantage in providing the structural information of amorphous, liquid or catalyst which can not be obtained by the ordinary powder diffraction technique. Results from XAFS spectroscopy are commonly reported using synchrotron radiation facilities, but result obtained using a laboratory XAFS apparatus has rarely been reported. The shortage of data obtained from a laboratory XAFS apparatus has been mainly due to its complicated mechanism. We have recently developed an innovated laboratory XAFS apparatus, which is compact in size and easy to use. We believe this new apparatus provides an easy access to the XAFS method for both of XAFS experts and beginners.

The main feature of this apparatus is in its unique vertical goniometer with a newly developed compact “demountable” X-ray source. The “demountable” X-ray source is designed that its target material can easily be changed depending upon the experiment, and the X-ray tube is evacuated by TMP. The filament material can also be chosen to eliminate undesired emission lines caused by contamination. The vertical goniometer design allows an easy access to optical components and the sample, and each component is placed at equal distances from the operator. A combination of the new compact X-ray source and the vertical goniometer provides a great benefit which has never been achieved with a conventional laboratory XAFS apparatuses. As in a conventional laboratory XAFS apparatus, the position of X-ray source is fixed, and the monochromator and sample chamber moves along a Rowland circle. Such a system makes it very difficult to install an environmental cell in a catalysis study. In the newly developed system, the sample position is fixed, while the X-ray source and the monochromator moves around. So the position and the direction in which monochromatic X-rays is fixed. Therefore experimenter can put an in-situ cell without concerning about wiring and plumbing.