HIGH-RESOLUTION XRF IN 35-60 KEV:-LANTHANIDES' K-SPECTRA

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A brilliant X-ray source in the high-energy region is extremely attractive for studying heavy elements such as Lanthanides, because it is possible to excite K shell electrons. In the present study, we developed a wavelength-dispersive XRF spectrometer for high-energy X-rays (35-60 keV). This will help us to explore both the chemical environment and electronic structure of Lanthanides, which are strongly correlated to the materials' exotic properties. The experiments were performed at BL37XU B-branch, SPring-8, Harima, Japan. The primary X-ray photons used are 10^{th} harmonics of an undulator beam, and the energy is 75.5 keV. The samples measured were cerium and gadolinium compounds. The typical energy resolution obtained was 39 eV and 58 eV, at Ce $K\beta_1$ (39.2574 keV) and Gd $K\beta_1$ (48.6964 keV), respectively. The spectra are ca. 10 times better than those obtained by means of conventional energy-dispersive measurement using a Ge detector, which can usually resolve only 2 peaks, $K\beta_1$ and $K\beta_2$. As it is now possible to separate $K\beta_1$ and $K\beta_3$ peaks, as well as $K\beta_2$ and $KO_{II,III}$, changes in the spectra due to chemical effects can be studied much better than before. Further details of instrumentation and some typical high-resolution spectra for Lanthanides' compounds will be presented.

References

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