Conversion-helium ion yield XAFS at La *K*-absorption edge

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Yield detection technique has been widely adopted to the XAFS measurements as an alternative of the transmission method. Among such yield techniques as Fluorescence yield (FLY), total-electron yield (TEY), conversion-electron yield (CEY) and so on, FLY method has been employed at mainly medium energy region, while electron yield method has been utilized at relatively lower energy region because of higher fluorescent yield at higher energy region and consequently higher Auger electron yield at lower energy region. However, technical easiness for both CEY and conversion-helium ion yield (HIY) method should not be overlooked as one of XAFS measurement techniques at even higher energy region.

Through the previous experiment, 1997B0119-NX, the authors have found that the HIY method is applicable for measurements of *Ln K*-XAFS if a plenty of photon flux is available, though Auger electron yield for *Ln K*-shell is less than 1 %. Attempts to measure HIY(CEY)-XAFS spectrum at higher energy region with good *S*/*N* ratio have been executed in the present experiment.

Samples used were lanthanum dioxymonocyanamide and europium dioxymonocyanamide, which are layered compounds and proposed for a new candidate as a matrix of photo luminescent material. These are nonconductive powder and are synthesized from the corresponding rare-earth oxide in the presence of both ammonia and carbon.

Only a few mg of sample was sufficient for the HIY-XAFS measurement though several tens mg of sample was required for the transmission-XAFS, which indicates that the CEY or HIY method is powerful technique for the XAFS measurement at higher energy region. XAFS measurements have been carried out at BL01B1. Monochromator used was Si(311) and higher harmonics was rejected by mirrors with an inclination angle of 1 mrad. The conversion electron and helium ion was detected by the yield cell manufactured by ourselves. All spectra were measured at room temperature.

Figure 1 shows La *K*-XAFS spectrum for $La_2O_2CN_2$ measured by the HIY methods. The k^3-weighed EXAFS spectrum is inserted. *S*/*N* ratio of the spectrum is fairly good in spite of very low S_B ratio, which is due to small edge jump arising from lower yield for La *KLL* Auger electron. Unfortunately, both *S*/*N* and S_B ratios of Eu *K*-XAFS measured by the same manner were still worse and the further improvement should be done, e.g., lowering measurement temperature, lowering noise level and so on.

FLY-XAFS spectra measured by the standard Lytle detector under Kr gas flowing were the worst ones in the present experiment, which seems to owe to lower ionization cross section of Kr gas in the standard fluorescence detector at such higher energy region. This means that either an improvement of the fluorescence detector or an use of SSD is inevitable for the FLY-XAFS at such higher energy region as *Ln K*-edge.

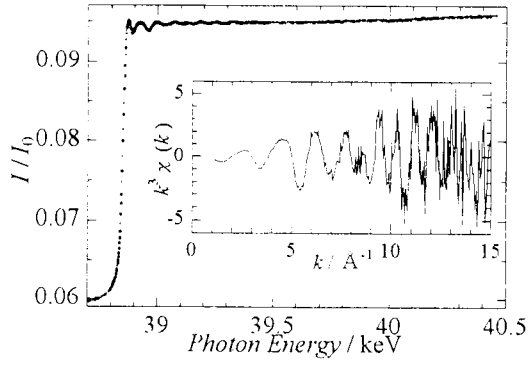

Fig. 1 La *K*-XAFS spectrum for $La_2O_2CN_2$ measured by the HIY method. Inserted is k^3 weighed EXAFS spectrum.