Comparison of conversion electron yield and transmission Eu K-XAFS spectra for $Eu_2O_2CN_2$

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Lanthanum dioxymonocyanamide, $La_2O_2CN_2$, has recently been proposed for a new candidate as a matrix of photoluminescent material since the compound takes a layer structure, which seems to have a merit against the concentration quenching. Actually, the photoluminescent intensity for Eu doped $La_2O_2CN_2$ does not decrease with the dopant concentration below 7 at%. $Eu_2O_2CN_2$ also takes a layer structure but the coordination around rare-earth atoms is different between $La_2O_2CN_2$ and $Eu_2O_2CN_2$, ie., the coordination number of La and Eu is 8 and 7, respectively. We have been interested in the relation between the local structure around Eu and the photoluminescent nature. The Eu *K*-XAFS measurement has been, then, conducted for both Eu doped $La_2O_2CN_2$ and $Eu_2O_2CN_2$.

As for the dilute system, the yield method such as the fluorescent yield and the electron yield method is more advantageous than the transmission method to obtain the XAFS spectrum of excellent quality. Comparing the fluorescent yield and the electron yield methods, the former requires a proper filter while a decrease in Auger electron yield at higher energy region comes into question though any filter is unnecessary for the latter method.

In the present work, XAFS spectra measured by the conversion electron yield(CEY) method has been compared with those measured by the conventional transmission method. The CEY-XAFS spectra measurements have been carried out under an atmospheric He gas flow. Ar and Kr gases are used in I_0 and I gas ionization chamber, respectively. Eu *K*-XAFS spectra for $Eu_2O_2CN_2$ measured by both methods are plotted in Fig.1 . Current gain of I_0 and I gas ionization chamber is in the order of 10^{-9} A and that of the yield cell is in the order of 10^{-10} A. S/N ratio of I_0 signal is 21.7 and 74.0 for the CEY and the transmission XAFS spectra at 48.6 keV, respectively, as shown in Fig.1. This affects noisier CEY-XAFS spectrum while S/N ratio for I_Y is rather high. Unfortunately, no satisfactory spectrum has not been obtained for a fluorescent material, $La_2O_2CN_2$; Eu (7 at%).

The present results lead the followings; first, both the S/N ratio of output from gas ionization chamber and the photon flux must be increased. Second, the fluorescent yield XAFS method might be chosen for measuring XAFS spectra of the present compounds. Finally, an applicable energy range for the CEY-XAFS method should be determined.

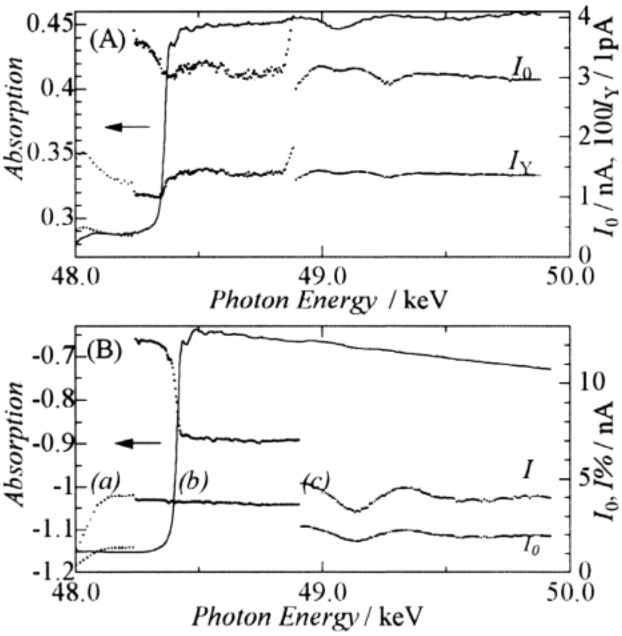

Fig.1 Eu K-XAFS spectra for $Eu_2O_2CN_2$, measured by (A)CEY method and (B)transmission method, Dwell time for region (a), (b) and (c) are 1, 3 and 2 sec, respectively.