K-XAFS study of rare earth ions doped in long-lasting phosphor

Yutaka Shimizugawa*(3596), Katsumi Handa[1](4398), Ichiro Sakai[1] (5166)

Osaka National Research Institute, Aist, Ikeda, Osaka 563-8577, Japan

[1]Ritsumeikan University, Kusatsu, Shiga, 525-8577, Japan

Glasses doped with reduced rare earth ions possess new optical properties. These optical properties are related to the local structure around reduced rare earth ions. X-ray absorption fine structures (XAFS) analysis is a powerful method to investigate the local structure around particular ions in multicomponent glasses. Especially in the case of rare earth ions, the peak of X-ray Absorption Near Edge Structure (XANES) spectra of L_{III} XAFS assigned to $2p \rightarrow 5d$ transition are separated by the valence of rare earth ions. For recent years, we have been studied the local structure of Sm^{2+}, Ce^{3+} and Eu^{2+}-doped borate glasses by L_{III} XAFS analysis.

However the materials which can be investigated has been limited to relatively light atoms. The K XAFS of rare-earth atom by SPring-8 is expected to be extend the region of object materials. In this study, we investigate Eu^{2+}, Dy^{3+}:$SrAl_2O_4$ long-lasting phosphor by Eu K XAFS in order to reveal the relationship between optical property and the local structure around reduced rare earth ions.

X-ray absorption spectra were measured in a transmission mode using a Si(311) double crystal monochromator at BL01B1. Europium K XANES spectra of Eu^{2+}, Dy^{3+}: $SrAl_2O_4$ is shown in Fig. 1 with those of reference samples. The shift of the absorption edge the valence of europium ion is also clearly observed in the case of K XAFS study. We plan to continue the study to get data of sufficient S/N to investigate the local structure around europium ion.

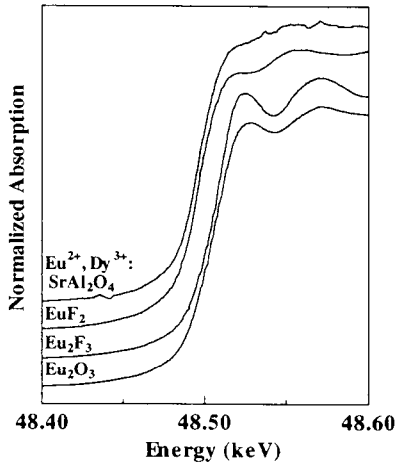

Fig.1 Europium K XANES spectra of Eu^{2+}, Dy^{3+}: $SrAl_2O_4$ with those of reference samples.