19p-A26-6

AlN:Mn^{2+}のカソードルミネッセンス

Cathodoluminescence of AlN:Mn^{2+}

物材機構，王暁君，○解栄軍，Benjami Dierre, 武田隆史，末廣隆之，広崎尚登，関口隆史

NIMS, Xiaojun Wang, ○Rong-Jun Xie,　Benjamin Dierre, Takashi Takeda, Takayuki Takeda, Naoto Hirosaki, Takashi Sekiguchi

E-mail: Xie.Rong-Jun@nims.go.jp

Eu and Si codoped AlN has been considered as a promising blue phosphor both for field emission displays and white LEDs. In this work, we attempted to prepare Mn^{2+} doped AlN and to investigate its cathodoluminescence. The AlN:Mn^{2+} powder phosphors with varying Mn concentrations were prepared by firing the powder mixture of AlN and $MnCO_3$ at 1900°C in a 1.0 MPa nitrogen atmosphere. A phase pure AlN:Mn^{2+} was identified by the X-ray powder diffraction, and the fired phosphor had some oxygen dissolved in the crystal lattice. Under the UV light or electron beam excitation, AlN:Mn^{2+} exhibited a strong red emission centered at 600 nm (see Figure 1), which is ascribed to the characteristic $^4T1(^4G)$–$^6A1(^6S)$ transition of Mn^{2+}. Energy level diagrams were constructed to discuss the photoluminescence and cathodoluminescence processes of AlN:1% Mn^{2+}. The oxygen-related defects in AlN had a great influence on the photoluminescence and cathodoluminescence properties of AlN:Mn^{2+}. The dependence of brightness on accelerating voltage or electric current, the decay behavior of CL intensity under the electron bombardment, and the stability of CIE chromaticity coordinates were investigated in detail. The results indicated that AlN:Mn^{2+} showed a higher brightness, higher color purity, and lower saturation compared to the red Y_2O_3:Eu^{3+} phosphor, which gives the AlN:Mn^{2+} phosphor great potential as a red phosphor for full color FEDs.

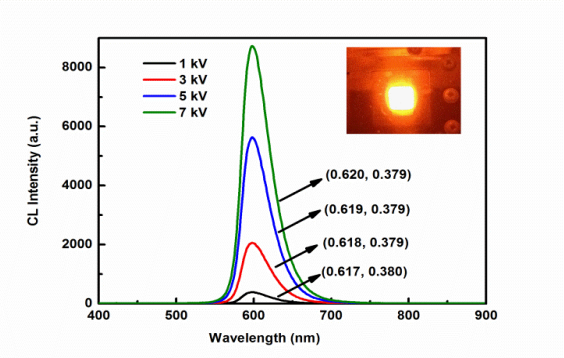

Figure 1 Cathodoluminescene and chromaticity of AlN:1%Mn measured under varying voltages. An insert is seen a photo of the red-emitting phosphor.

Reference:

X.-J. Wang, R.-J. Xie, B. Dierre, *et al. Dalton Trans.*, **43**, 6120-6127 (2014).