TSL of $BaMgAl_{10}O_{17}:Eu^{2+}$: PDP PHOSPHOR

R. P. Rao
Plasmaco, Inc.
(Matsushita Electric Ind. Co. Ltd.)
Highland, NY 12528, USA

Divalent europium (Eu^{2+}) activated barium magnesium aluminate ($BaMgAl_{10}O_{17}$:Eu - BAM) phosphor, is currently used in plasma display panels (PDP's) as a blue emitting phosphor. The life (duration of display operation) of BAM is short when compared with the life of green and red emitting phosphors. Efforts are being made to understand the degradation mechanism in BAM. A limited number of papers have been published explaining various reasons, but no one is able to fully understand (1-3). We are trying to correlate the degradation with the defects created in the BAM phosphor particles during VUV irradiation. Thermally stimulated luminescence (TSL) and TSL spectra have been used as a tool to determine the nature of point defects in phosphor materials with the help of trapping parameters such as trap depth (E) and frequency factor (s) (4,5). In the present investigation, TSL of polycrystalline BAM phosphor has been studied by exciting with UV (mercury vapor lamp) and VUV (custom-made 147nm line emitting Xenon lamp and high intensity Xenon flash lamp) at room temperature. The TLD reader (Harshaw TLD-3500) was used to record TSL glow curves. TSL glow curves from BAM samples after excitation by UV, VUV and VUV flash lamps are shown in figure 1. From TSL glow curves, three prominent glow maxima around 145^0C, 266^0C and 320^oC are observed. A broad shoulder of low intensity at 470^0C is also observed. The relative intensities of TSL peaks depend on the excitation wavelength from various UV or VUV lamps. Complex glow curves are resolved by analytical methods. Trapping parameters (E and s) are calculated with the help of Chen's formula (6). The trap depth and frequency factor values are in the range of 0.3 to 0.35ev and 10^8 to 10^9 sec^{-1} for low temperature peak and 0.48 to 0.54ev and 10^7 to $10^8 sec^{-1}$ for high temperature peaks. Lattice impurities and point defects produced during excitation from TSL data in BAM phosphor are discussed.

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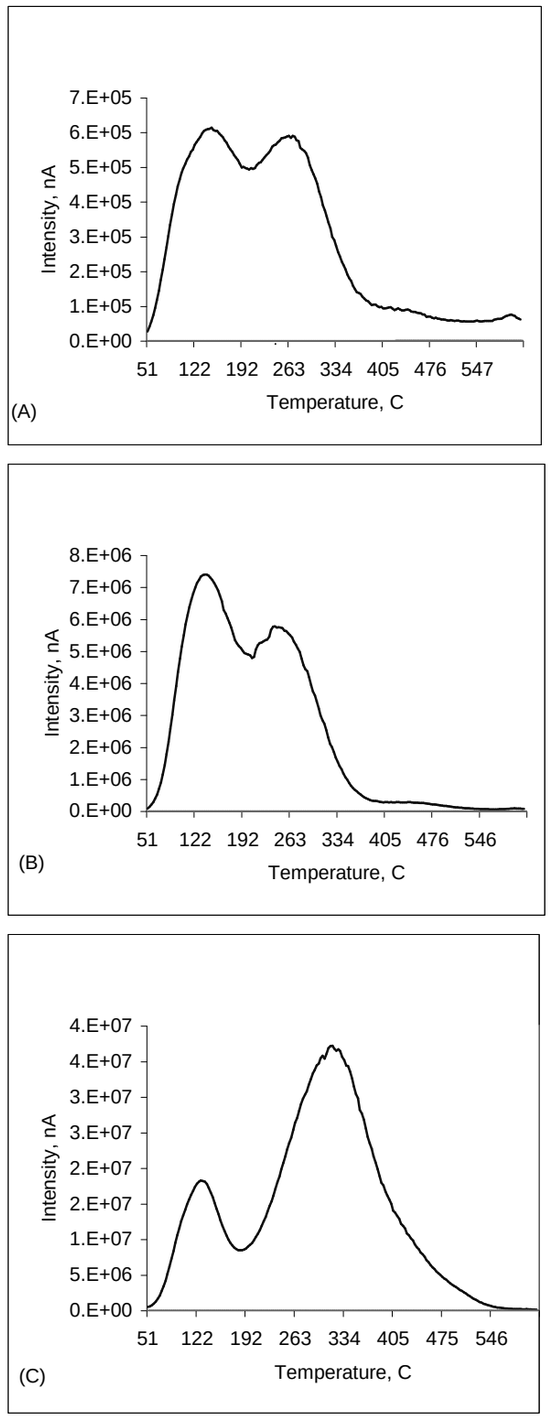

Fig. 1 TSL glow curve of BAM phosphor excited by (A) 254 nm lamp, (B) 147nm lamp and (C) Xe flash lamp at room temperature.