

CdSSe, ZnS and SrS Thin Films and Superlattices and its Application to EL Devices

October, 1992

Yoji Takeuchi

ZnS:Mn and SrS:Ce thin films for phosphor layers of electroluminescent(EL) devices were prepared by hot wall technique. Furthermore, Mn doped CdS-ZnS and Ce doped CdSSe-SrS superlattice EL devices were proposed and fabricated. For ZnS:Mn, it was shown that maximum luminance and efficiency of the optimum device with double insulating layer were 3200cd/m^2 and 1.31lm/W , respectively, at 1kHz sinusoidal excitation. The threshold voltage of CdS-ZnS:Mn superlattice EL device that Mn was doped into ZnS layers was lower than typical ZnS:Mn device. It was revealed that the optimum EL structure was ZnS:Mn sandwiched by CdS-ZnS superlattice. The maximum luminance and efficiency of this device were 1300cd/m^2 and 1.1lm/W , respectively. The spectra of CdSSe:Mn-ZnS superlattices that Mn was doped into CdSSe layers showed red shift. It was indicated that the shift was not due to Mn cluster but lower symmetry of the Mn surrounding. The maximum luminance and CIE chromaticity of CdSe:Mn-ZnS superlattice were $982\text{cd/m}^2(x,y) = (0.61, 0.38)$, respectively. This is promising to red EL device. For SrS:Ce, it was suggested that the thin films were high quality by X-ray diffraction and Auger analysis. Maximum luminance was 682cd/m^2 . For CdSSe-SrS:Ce superlattice, 420nm emission band which is not detected in SrS:Ce EL device was observed. It is supposed to be attributed emission of quantum well level.