Preparation and low energy cathodoluminescent properties of $SrGa_2S_4$ thin films activated with rare earth

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Field emission displays (FEDs) are promising as one of the future flat-panel display technologies. For the success of FEDs, the phosphors are required to be low resistive to suppress the charging-up and also to have stable surface for high-density electron beam irradiation. The rare-earth-activated $SrGa_2S_4$ phosphors are expected as potential candidates as the phosphors with its high luminous efficiency, saturated chromaticity and stability for high electron irradiation. However, these phosphors have high resistivity. However, they are overcome by making phosphors thin films. Therefore, the deposition of rare-earth-activated $SrGa_2S_4$ thin films aimed at application for FEDs have carried out by a multi-source deposition technique. In this study, influence of Ga_2S_3/Sr flux ratio during the deposition and thermal annealing after the deposition for structural and luminescent characteristics of the $SrGa_2S_4$ thin films activated with Ce or Eu. It was concluded as a result that the optimum conditions for the Ga_2S_3/Sr flux ratio and the annealing process to prepare stoichiometric $SrGa_2S_4$ films were around 60 and 800℃ for 1 hour in H_2S, respectively. The $SrGa_2S_4$:Ce and $SrGa_2S_4$:Eu films prepared by optimum conditions showed blue and green emission with luminance of 1700 and 4000 cd/m^2 and luminous efficiency of 3.0 and 7.1 lm/W with (0.13, 0.10) and ((0.28, 0.59) chromaticity, respectively. These results suggest the potential for the phosphor screens in FEDs.