Growth and Electroluminescent Charactristics of Eu Dope Y_2O_3 and Y_2O_2S Thin Films.

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Thin phosphor films of Y_2O_3:Eu and Y_2O_2S:Eu were grown, and electroluminescent characteristics were studied.

Crystal structure of Y_2O_3:Eu films grown with electron beam deposition was cubic. The crystal structure of Y_2O_3:Eu films grown with magnetron sputtering in 20 % oxygen mixed argon atmosphere was hexagonal and that grown in pure argon was cubic.

Since Y_2O_2S:Eu films were difficult to be grown by conventional deposition methods, the magnetron-sputtering method with Y_2O_2S:Eu powder target added by excess sulphur, and reactive magnetron-sputtering method with sintered Y_2O_3:Eu phosphor target in H_2S mixed to argon atmosphere were introduced. Crystal structure of the film depends on the sulphur concentration in the film. Under the 0.24 of S/Y atomic ratio, the crystal structure is cubic and over 0.40, the crystal phase becomes hexagonal. Luminescent spectrum of the film depends on crystal structure, luminescent spectra similar to that of Y_2O_3:Eu and Y_2O_2S:Eu phosphors were observed by cubic and hexagonal films, respectively.

These phosphor films were difficult to obtain light emission by conventional EL structure. So new EL structure (i.e., phosphor/ZnS/phosphor) was proposed and EL emission was obtained.

Excitation mechanisms were studied from this EL devices. It is considered that light emission may occur by impact ionization of holes generated in the ZnS layer, thickness of excitable light emission layers is varied with applied voltage and 90 % of the light emission is emitted from the thickness of 13 nm light emission layers.