

Luminescence properties obtained from $\text{Y}_2\text{O}_3:\text{Eu}$ fluorescent whiskers

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Abstract

Europium-doped yttrium oxide ($\text{Y}_2\text{O}_3:\text{Eu}^{3+}$) luminescent films and whiskers were produced from vaporized metalorganic precursor using a chemical-vapor-deposition technique operated under atmosphere. Photoluminescence analysis was conducted to investigate and understand the advantage of fluorescent whisker. The $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ fluorescent films showed no specific orientation. On the other hand, the $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ fluorescent whiskers aligned preferentially in directions toward the growth front, that is, perpendicular to the substrate surface, with preferential orientation toward $\langle 100 \rangle$ crystalline direction. The red luminescence at 611 nm assigned to $^5\text{D}_0 \rightarrow ^7\text{F}_2$ transition was observed from the film and whisker samples. The intensity of the red luminescence of the whiskers was higher than that of the films. This phenomenon is considered using the cite analysis technique for the luminescence center.

Keywords: Y_2O_3 , CVD, orientation, whisker, phosphor, photoluminescence