

Pulsed laser deposited $\text{KY}_3\text{F}_{10}:\text{Ho}^{3+}$ thin films: Influence of target to substrate distance

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ABSTRACT:

The influence of target to substrate distance (d_{ts}) on the structural, morphological and photoluminescence (PL) properties of commercially obtained $\text{KY}_3\text{F}_{10}:\text{Ho}^{3+}$ phosphor thin films prepared by pulsed laser deposition is investigated for d_{ts} values in the range of 4-7 cm. Analysis of XRD indicates that high crystalline quality film with largest grain size is obtained for target to substrate distance of 4 cm. Decrease in the thickness of the films is observed at larger target to substrate distances. This is attributed to the increased hemispherical expansion of the laser induced plasma plume at larger distances reducing the particle flux of the target species over a substrate area. Main PL emission at 540 nm due to the $^5\text{F}_4-^5\text{I}_8$ and $^5\text{S}_2-^5\text{I}_8$ transitions of Ho^{3+} is investigated using four excitation wavelengths namely: 362, 416, 454 and 486 nm. The highest PL intensity occurs at excitation of 454 nm for all target to substrate distances considered. All the films are characterized by low reflectance and high absorption in the visible region.