

Dosimetric studies of YAlO_3 : Mn co-doped with transition (Co, Cu, Fe) and rare earth (Yb, Ce) metal ions

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Abstract

Dosimetric studies on single crystals of YAlO_3 :Mn co-doped with transition (Co, Cu, Fe) and rare earth (Yb, Ce) metal ions using UV radiation exposure for the duration 5–30 min have been studied. A single well resolved thermoluminescence glow peak was observed at 183 °C in Co and Cu co-doped single crystals. In Fe co-doped single crystals, two well resolved glow peaks at 196 °C and 238 °C were observed. A well resolved glow peak at 215 °C in Yb and 176 °C in Ce co-doped single crystals was observed. Variations of thermoluminescent (TL) glow peaks intensity in all the co-doped crystals with different UV-exposures were studied. TL glow peak intensity increases sublinearly in Co, Cu co-doped crystals, whereas in Fe co-doped crystals glow peaks at 196 °C and 238 °C increase linearly. Fading effect was studied at different intervals up to 30 d for all co-doped crystals exposed to UV source for 10 min. Strong fading was observed initially and stabilized after 15 d. Fe co-doped YAlO_3 :Mn²⁺ records 40% fading, whereas other samples of YAlO_3 :Mn²⁺ co-doped with Cu, Co, Yb and Ce show 60% fading. The kinetic parameters (E , b , s) were