

Kinetics of cerium emission in a YAG:Ce single crystal: the role of traps.

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Streszczenie

We have measured the emission spectra and decay kinetics of Ce-doped YAG under both optical and gamma excitation, at temperatures ranging from 60 to 600 K. The decay traces under gamma excitation display an unusual pattern of temperature dependence. Beginning with the lowest temperatures, the characteristic time constant of the decay coincides with the intrinsic (radiative) decay time up to about 180 K, at which point it suddenly jumps by more than 30%. The decay time remains longer than radiative until well above room temperature, then gradually reverts to the intrinsic value. This behaviour can be explained in terms of an array of shallow traps, whose existence is confirmed by the presence of thermoluminescent glow peaks. Depending on temperature, one or more of these traps acts as a temporary way-station for the free carriers that carry the excitation to the Ce ion, delaying its emission beyond what would be required by radiative decay alone.

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