

Laser tests as a tool for studying photodynamic processes in UV active media

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Abstract

Opportunities of laser tests as a powerful and unique research tool of active medium fundamental properties directly in real laser operation conditions for variable intracavity losses are discussed. New technique of laser experimental data interpretation was developed and applied to the analysis of laser tests results for the series of $\text{Ce}^{3+}:\text{LiYbLu}_{1-x}\text{F}_4$ single crystals. Contribution coefficient into total pump-induced intracavity losses of ESA from upper laser level of Ce^{3+} ions and CC absorption at the laser wavelength was estimated. Basic parameters relevant to laser action performance were defined: Ce^{3+} ions ionization cross-section by pumping radiation and Ce^{3+} ion ESA at the laser wavelength, CC absorption (ionization) cross-section at the both pumping and laser radiation wavelength, life-times of transient and long-living color centers, stimulated emission cross-section and relative values of pump-induced free-charges trapping rate by host lattice defects and their corresponding recombination rate.

<http://dx.doi.org/10.1117/12.562188>

Keywords

Color center, ESA, Laser test interpretation, UV solid-state active medium