Luminescence properties of $Y_3Al_5O_{12}$:Ce nanoceramics.

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Streszczenie

Comparative analysis of the luminescent properties of $Y_3Al_5O_{12}$:Ce (YAG:Ce) transparent optical ceramics (OC) with those of single crystal (SC) and single crystalline film (SCF) analogues has been performed under excitation by pulsed synchrotron radiation in the fundamental absorption range of YAG host. It has been shown that the properties of YAG:Ce OC are closer to the properties of the SCF counterpart, where Y_{Al} antisite defects are completely absent, rather than to the properties of SC of this garnet with large concentration of Y_{Al} antisite defects. At the same time, the luminescence spectra of YAG:Ce OC show weak emission bands in the 200–470 nm range related to Y_{Al} antisite defects and charged oxygen vacancies (F^+ and F centers). YAG:Ce OC also possesses significantly larger contribution of slow components in the Ce^{3+} luminescence decay under high-energy excitation in comparison with SC and SCF of this garnet due to the involvement of antisite defects, charged oxygen vacancies as well as boundaries of grains in the energy transfer processes from the host to the Ce^{3+} ions.

Słowa kluczowe

Luminescence Ce3+ ions, Optical ceramics, Single crystal and single crystalline films, Antisite defects, Oxygen vacancies

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