Specifics of Spectroscopic Features of Yb^{3+}-doped Lu_2O_3 Laser Transparent Ceramics.

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Streszczenie

Some specifics of spectroscopic and laser properties of Yb^{3+} dopant are shown in Yb^{3+}-doped Lu_2O_3 cubic sesquioxide transparent ceramics, a very important laser material, fabricated by Akio Ikesue using the method based on solid-state mixing of oxides and sintering by hot isostatic pressing (HIP) technique. For instance, despite the simplicity of Yb^{3+} electronic configuration, it is emphasized that a lot of precautions need to be considered during the evaluation and the assignment of Yb^{3+} experimental data in this sample and also in all Yb^{3+}-doped materials. First, we focus our discussion on the position of $^2F_{7/2}$ (ground state) and $^2F_{5/2}$ (excited state) Stark levels of the most populated C_2 symmetry site, and on the presence of the magnetic dipole transitions from the C_{3i} (S_6) inversion symmetry site. Then, we point out the strong influence of the self-trapping and the self-quenching processes on the measurement of the $^2F_{5/2}(5)$ upper level decay time which needs the pin-hole method. Finally, we comment on the spectrum of the tuneable laser emission behaviour near 1033 nm with respect to the losses of the laser cavity without the laser emission near 1080 nm, as observed in other laser materials.

Słowa kluczowe

laser transparent ceramics, Lu2O3 sesquioxide, opical spectroscopic properties, Yb3+ dopant

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