Yb^{3+} rare earth structural probe and correlation between morphology and spectroscopic properties in $La_2Mo_2O_9$. Comparative analysis with mixed cubic La_2MoWO_9 translucent ceramics.

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Streszczenie

We present and discuss the structural and spectroscopic properties of micro-crystalline Yb^{3+}-doped $La_2Mo_2O_9$ molybdates (0–25mol% of Yb^{3+} ions) synthesized by the high-temperature solid-state reaction in which Yb^{3+} optical rare earth ion play the role of a structural probe. The main objective is to apply these materials to transparent optical ceramics. The XRD and SEM analysis reveal a strong structural dependence of the crystal structure on Yb^{3+} ion concentration. The high-resolution of the $^2F_{7/2} \leftrightarrow {}^2F_{5/2}$ 0-phonon line of Yb^{3+} ions in absorption and emission spectroscopy at low temperature allows us to evidence three types of polyhedral around Yb^{3+} ions. Clear differences for cubic Yb^{3+}-doped both $La_2Mo_2O_9$ and mixed La_2MoWO_9 are observed as a result of the introduction of tungsten ions leading to greater disorder in the lattice. First translucent cubic ceramics have been successfully fabricated and the comparison turns out in favor of Yb^{3+}-doped mixed La_2MoWO_9.

Słowa kluczowe

Yb3+ ion, Structural probe, Monoclinic/cubic La2Mo2O9 molybdates, Cubic mixed La2MoWO9, Translucent optical ceramics

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