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On the synthesis of LuAG:Ce fine powders by molten salts methods and spectroscopic properties of the products.

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Streszczenie

$Lu_3Al_5O_{12}$:Ce (LuAG:Ce) powders were synthesized at temperatures as low as 450–550 °C by means of a molten salts technique with eutectic mixtures of $NaNO_2$ and KNO_2or $NaNO_2$, KNO_2 and Na_2CO_3. Addition of sodium carbonate allowed getting phase pure cubic LuAG:Ce even at 450 °C while without it the needed temperature was 500 °C. The powders had well defined morphology with particles sizes reaching 200–250 nm or 150–250 nm when Na_2CO_3 was used. The spectroscopic properties of the materials were characterized in the 17–700 K range of temperatures. The ratio of the two Ce^{3+} related excitation bands located at 345 and 450 nm were found to increase significantly between 17 K and 350 K while above that range of temperatures it was quite constant. This ratio was shown to vary strongly depending on the atmosphere of synthesis. Heating at 1150 °C in air reduced the efficiency of the excitation into the 345 nm very significantly, which was ascribed to formation of defects, among them also appearance of Ce^{4+}, whose competing absorption overlapping the 345 nm excitation band effectively reduced its contribution to the luminescence compared to the 450 nm band. Decay times were pretty constant in the 17–300 K range of temperatures and also were independent on the atmosphere of post-fabrication heat-treatment.

Słowa kluczowe

LuAG:Ce, Molten salts synthesis, photoluminescence, Luminescence kinetics

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