

Managing the properties of $\text{Lu}_2\text{O}_3\text{:Tb,Hf}$ storage phosphor by means of fabrication conditions.

Autorzy

Dagmara Kulesza

Eugeniusz Zych

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Streszczenie

$\text{Lu}_2\text{O}_3\text{:Tb,Hf}$ ceramics prepared at 1700 °C were found as an efficient storage phosphor with the main TL band around 250 °C composed of three overlapping components. Their respective trap depths are of 1.37, 1.35, and 0.86 eV. The latest, although rather shallow, gave TL at the highest temperature (around 300 °C) due to a very low frequency factor of $6 \times 10^6 \text{ s}^{-1}$. The most efficient thermoluminescence was observed from material containing 0.1% of Tb and 0.2% of Hf and prepared in a vacuum. Analogous compositions made in air or forming gas also stored energy, and their glow curves were very similar in shape. The glow band faded at ambient conditions by about 50% within 5 days, much faster than predicted by the Arrhenius-type behavior. Thermoluminescence and optically stimulated luminescence (with 400–440 nm light) produced the green emission of Tb^{3+} ion, exclusively. High energy UV- or X-ray photons induced a broad band absorption in the range of 320–500 nm with maximum around 375 nm. This band could be bleached out by continuous irradiation into it or by heating. Isothermal decay traces consisted of three single-exponential components, whose parameters were consistent with the first-order kinetics of thermoluminescence and with the derived trap parameters.

Adres publiczny

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Strona internetowa wydawcy

<https://www.acs.org/content/acs/en.html>