

On energy storage of $\text{Lu}_2\text{O}_3\text{:Tb,M}$ ($\text{M}=\text{Hf, Ti, Nb}$) sintered ceramics : glow curves, dose-response dependence, radiation hardness and self-dose effect.

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Thermoluminescent properties and energy storage characteristics of $\text{Lu}_2\text{O}_3\text{:Tb,M}$ ($\text{M}=\text{Hf, Ti, Nb}$) sintered ceramics induced by ionizing radiation are presented and discussed. Dose-response dependence, radiation hardness and fading are studied. A linearity of the former exceeding seven orders of magnitude is confirmed for $\text{Lu}_2\text{O}_3\text{:Tb,Hf}$ and $\text{Lu}_2\text{O}_3\text{:Tb,Nb}$ ceramics. $\text{Lu}_2\text{O}_3\text{:Tb,Hf}$ shows the best TL performance and also its fading is the lowest reaching 15% over 7h and shows tendency to saturate. During the same period of time the $\text{Lu}_2\text{O}_3\text{:Tb,Ti}$, despite having TL at higher temperatures, losses about 25% of the stored energy and the TL signal of $\text{Lu}_2\text{O}_3\text{:Tb,Nb}$ fades by almost 40% over 7h. First order TL kinetics is confirmed for all three compositions. A self-dose effect in $\text{Lu}_2\text{O}_3\text{:Tb,Hf}$ due to a natural content of the radioactive isotope (2.6%) is proved to be important for long-time reading of low doses.

Słowa kluczowe

Energy storage materials, Radiation effects, Recombination and trapping, Luminescence, Dosimetry

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