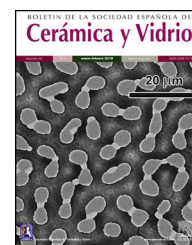




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## Original

# Effect of Nd<sup>3+</sup> ions on radiation attenuation properties of PbF<sub>2</sub>-TeO<sub>2</sub>-WO<sub>3</sub> glass system for shielding applications

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### ABSTRACT

This study aims to investigate the utility of using 15PbF<sub>2</sub>-(60x)TeO<sub>2</sub>-25WO<sub>3</sub>-xNd<sub>2</sub>O<sub>3</sub> (0.1 ≥ x ≥ 1.5) glasses in the nuclear shielding applications for mixed radiation fields at energies ranging from 15 keV to 15 MeV. The effect of Nd<sup>3+</sup> ions on gamma attenuation properties of the present glass system was discussed in detail. The radiation attenuation features were investigated for the present glass system by using Monte Carlo radiation transport simulation via Geant4 toolkit. The simulation results were theoretically approved by using Phy-X approach over the entire considered energy range. The obtained results indicate that the values of Z<sub>eff</sub> and N<sub>eff</sub> were both highest in the in the τ/ρ dominated energies due to the atomic number dependence of the cross sections of the τ/ρ absorption processes. Moreover, FNRC values were 0.1152, 0.1152, 0.1153, and 0.1153 cm<sup>-1</sup> for PWTN1, PWTN2, PWTN3, and PWTN4 respectively. Finally, an extensive comparative study is also presented between the studied glass system and standard traditional shielding materials. The study suggests PWTN4 is the best photon shield amongst the studied PWTN-glasses.

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### Efecto de los iones Nd<sup>3+</sup> sobre las propiedades de atenuación de radiación del sistema de vidrio PbF<sub>2</sub>-TeO<sub>2</sub>-WO<sub>3</sub> para aplicaciones de blindaje

### RESUMEN

Este estudio tiene como objetivo investigar la utilidad del uso de vidrios 15PbF<sub>2</sub>-(60x)TeO<sub>2</sub>-25WO<sub>3</sub>-xNd<sub>2</sub>O<sub>3</sub> (0,1 ≥ x ≥ 1,5) en las aplicaciones de blindaje nuclear para campos de radiación mixtos a energías que van desde 15 keV hasta 15 MeV. Se discute en

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 Atenuación

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