Contribution ID: **348** Type: **Poster**

NANO-STRUCTURED MG2(B2O5) AND MG2(B2O5):DY THERMOLUMINESCENT MATRIXES AND THEIR POTENTIAL APPLICATIONS AS TLDS.

The thermoluminescence dosimeter (TLD) is a passive radiation detector whose response is proportional to the absorbed dose. Magnesium borate-based TLDs have an effective atomic number close to that of human tissue, making them useful in personal dosimetry. In the field of thermoluminescence dosimetry, the synthesis of new materials with a response to ionising radiation similar to that used in medical radiotherapy is important. Magnesium borates have the relevant physical and chemical properties, including a simple glow curve, low fading, high sensitivity, chemical and thermal stability, etc., which make them suitable for possible application as personal TLDs. This work focused on the synthesis of $Mg_2(B_2O_5)$ in both its pure form and doped with rare earth $Mg_2(B_2O_5) : Dy$ in nanometric sizes by hydrothermal synthesis. The concentration of Dy was varied from 0.01 to 1.5 molar. To determine the sensitivity of the material to gamma radiation, a Cs-137 source was used on different radiation doses. X-ray diffraction analysis determined that the samples had a pure phase of $Mg_2(B_2O_5)$ with a triclinic structure. The refinement Rietveld method indicates that the reported cell parameters a=6.149 Å, b=9.221 Å, c=3.121 Å, α=90.29o, β=92.230o, γ=104.3o changed by 0.1 to 0.7% as the Dy concentration increase. At the same time, the grain size varied from 15 to 25 nm. Finally, SEM and EDS techniques were used to obtain the morphology of nanoparticles and to determine their chemical composition. A dosimetric study and analysis of the thermoluminescence response will be carried out. The results of this research will provide a solution to improve the safety of medical personnel involved in the application of radiotherapy to cancer patients through the use of personal TLDs appropriate to the type of radiation used in this type of therapy.

Keywords

Nanostructures, thermoluminescence, dosimetry, magnesium borates, hydrothermal synthesis

Reference

J. Kumar,A. Yadav, P. A. Alvi, S. Kumar, & A. Vij, Combustion synthesis and thermoluminescence response of near ultra-violet irradiated Mg2B2O5 nanophosphors.
AIP Conference Proceedings 2093, 020025 (2019); https://doi.org/10.1063/1.5097094

This work was supported by

Unidad Académica de Física de la Universidad Autónoma de Zacatecas

Author approval

I confirm

Author will attend

I confirm

Author: SOLÍS DE ÁVILA, Natalia Elena (Unidad Académica de Física de la Universidad Autónoma de Zacatecas)

Co-authors: Dr TORRES CORTÉS, Carina Oliva (Unidad Académica de Física de la Universidad Autónoma de Zacatecas); Dr PÉREZ ARRIETA, María Leticia (Unidad Académica de Física de la Universidad Autónoma de Zacatecas)

Presenter: SOLÍS DE ÁVILA, Natalia Elena (Unidad Académica de Física de la Universidad Autónoma de Zacatecas)

Session Classification: NANOSTRUCTURES

Track Classification: Nanostructures