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## Structural Characterization of $\gamma$ Irradiated GdBO<sub>3</sub>/Silica Composite Obtained by Sol Gel Process

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### Abstract

Samples of GdBO<sub>3</sub>/Silica composite were prepared by the sol gel process. After elaboration, the samples were irradiated at room temperature with  $\gamma$ -rays using a cobalt (<sup>60</sup>Co) radioisotope source in the dose range from 1 to 5 kGy. The irradiation effects on the structural properties of the synthesized powders were investigated before and after  $\gamma$ -irradiation using several techniques. DSC analysis reveals that the characteristic temperature of crystallization ( $T_c$ ) increases as  $\gamma$  dose increases up to 2 kGy and then, decreases with  $\gamma$ -ray dose up to 5 kGy but remains higher than the temperature reached by an un-irradiated sample. XRD and TEM results reveal that  $\gamma$ -ray irradiation reduces the crystallite size from 55 nm to 30 nm. Moreover, it is found from the FTIR study that the absorption bands intensity assigned to structural groups containing BO<sub>4</sub> and BO<sub>3</sub> units as well as the banding of Si–O–Si bond increases with  $\gamma$ -ray dose up to 5 kGy. From these results, it is concluded that the  $\gamma$ -ray irradiation up to a dose of 5 kGy improves the structural properties of the synthesized material.

Keywords: Sol gel,  $\gamma$  irradiation, composite, DSC, DRX, TEM, FTIR.

### Country/Organization invited to participate

Algeria

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