

Thermoluminescence Study of Cu Doped Lithium Tetra Borate Samples Synthesized by Water/Solution Assisted Method

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Abstract : In this paper the lithium tetra borate (Li₂B₄O₇) was prepared by used water/solution assisted synthesis method. Once finished the synthesization, Copper (Cu) were used to doping material with Li₂B₄O₇ in order to enhance its thermo luminescent properties. The heating temperature parameters were 750°C for 2 hr and 150°C for 2hr. The samples produced by water assisted method were doped at different doping percentage (0.02%, 0.04%, 0.06%, 0.08%, 0.12%, 0.5%, 0.1%, and 1%) of Cu. The characteristics and identification of Li₂B₄O₇ (undoped and doped) were determined in four tests. They are X-ray diffraction (XRD), Scanning electron microscope (SEM), Photoluminescence (PL), Ultra violet visible spectroscopy (UV Vis). As it is evidence from the XRD and SEM results the obtained Li₂B₄O₇ and Li₂B₄O₇ doping with Cu was confirmed and also confirmed the chemical composition and their morphologies. The obtained lithium tetraborate XRD pattern result was verified with the reference data of lithium tetraborate with tetragonal structure from JCPDS. The glow curves of Li₂B₄O₇ and Li₂B₄O₇ : Cu were obtained by thermo luminescence (TLD) reader (Harshaw 3500). The pellets were irradiated with different kind of dose (58mGy, 100mGy, 500mGy, and 945mGy) by using an X-ray source. Finally this energy response was also compared with TLD100. The order of kinetics (b), frequency factor (S) and activation energy (E) or the trapping parameters were calculated using peak shape method. Especially Li₂B₄O₇: Cu (0.1%) presents good glow curve in all kind of doses. The experimental results showed that this Li₂B₄O₇: Cu could have good potential applications in radiation dosimetry. The main purpose of this paper is to determine the effect of synthesis on the TL properties of doped lithium tetra borate Li₂B₄O₇.

Keywords : dosimetry, irradiation, lithium tetraborate, thermoluminescence

Conference Title : ICMPPR 2017 : International Conference on Medical Physics, Radiation Protection and Radiobiology

Conference Location : London, United Kingdom

Conference Dates : May 25-26, 2017