

## **Thermoluminescence properties of nanostructured calcium borate as a sensitive radiation dosimeter for high radiation doses**

### **ABSTRACT**

The crystalline calcium tetraborate ( $\text{CaB}_4\text{O}_7$ ) nanoparticles were synthesized using a combination of facile co-precipitation and thermal treatment. The synthesized phosphor nanoparticles were found to possess a monoclinic nanostructure of particle size of about 8 nm. The thermoluminescence (TL) glow curve of the nanoparticles shows a single peak centred at about  $150^\circ\text{C}$ . The TL nanophosphor revealed an excellent dosimetric response with a respectable linearity in the dose range of 0.05 to 1000 Gy, which is wider than its counterparts prepared by non nanosynthesis methods. They exhibited good luminescence efficiency and wide range linearity, suggesting the present phosphor nanoparticles may be considered as a suitable candidate for the dosimetric applications.

**Keyword:** Calcium borate; Nanocrystal; Thermoluminescence; Co-precipitation; Radiation dose