INVESTIGATION OF THE LUMINESCENT PROPERTIES OF Gd3Ga5-2xMgxZrxO12:Cr3+ AND Gd3Ga5-2xZnxZrxO12:Cr3+ GARNETS SYNTHESIZED BY THE SOL-GEL METHOD

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Gadolinium gallium garnets (GGG) doped with Cr^{3+} ions have shown great promise as a material for near infrared (NIR) light emitting diodes (LEDs). Although these diodes are still emerging and under extensive investigation, they have already demonstrated potential in applications such as plant growth regulation, night vision, food quality testing and healthcare applications [1 – 4]. However, most NIR LEDs have exhibited low quantum efficiency and limited thermal stability – properties that must be improved for these LEDs to achieve practical, real-world applications [5].

It is known that improving the luminescence properties of a material can lead to enhanced quantum efficiency. The present study aims to investigate the effect of Mg/Zr and Zn/Zr substitution for Ga in Cr^{3+} doped GGG on the luminescent properties of the material. Moreover, to the best of our knowledge, obtaining these materials in a single-phase form remains challenging, and they are synthesized here using Sol-Gel chemistry method assisted by Molten-Salt Route.

The results will be presented in detail. The phase formation and purity of the synthesized materials were examined by X-ray diffraction (XRD). Photoluminescence excitation and emission properties, along with quantum efficiency, were systematically investigated. The morphology of the samples was characterized using scanning electron microscopy (SEM).

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