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# Spectroscopic Study of $Tb^{3+}$ Doped Calcium Aluminozincate Phosphor for Display and Solid-State Lighting Applications

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**Abstract :** In recent years, rare earth (RE) ions doped inorganic luminescent materials are seeking great attention due to their excellent physical and chemical properties. These materials offer high thermal and chemical stability and exhibit good luminescence properties due to the presence of RE ions. The luminescent properties of these materials are attributed to their intra-configurational f-f transitions in RE ions. A series of $Tb^{3+}$ doped calcium aluminozincate has been synthesized via sol-gel method. The structural and morphological studies have been carried out by recording X-ray diffraction patterns and SEM image. The luminescent spectra have been recorded for a comprehensive study of their luminescence properties. The XRD profile reveals the single-phase orthorhombic crystal structure with an average crystallite size of 65 nm as calculated by using DebyeScherrer equation. The SEM image exhibits completely random, irregular morphology of micron size particles of the prepared samples. The optimization of luminescence has been carried out by varying the dopant $Tb^{3+}$ concentration within the range from 0.5 to 2.0 mol%. The as-synthesized phosphors exhibit intense emission at 544 nm pumped at 478 nm excitation wavelength. The optimized $Tb^{3+}$ concentration has been found to be 1.0 mol% in the present host lattice. The decay curves show bi-exponential fitting for the as-synthesized phosphor. The colorimetric studies show green emission with CIE coordinates (0.334, 0.647) lying in green region for the optimized $Tb^{3+}$ concentration. This report reveals the potential utility of $Tb^{3+}$ doped calcium aluminozincate phosphors for display and solid-state lighting devices.

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