

Synthesis, Characterization, EPR and Thermoluminescence Properties of CaTiO_3 Nanophosphor

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Abstract

Calcium titanate (CaTiO_3) nanophosphors were synthesized by three different routes namely solution combustion (SC), modified solid-state reaction (MSS) and solid-state (SS) methods. Rietveld refinement studies revealed the presence of an orthorhombic structure with traces of CaCO_3 . The crystallite sizes were found to be in the 43–45 nm range. TEM studies also confirm the nano size with well crystalline nature. EPR spectrum for SS method exhibits a broad resonance signal at $g = 2.027$ is attributed to $[\text{TiO}_6]^{9-}$ center, whereas in MSS sample the resonance signals are attributed to surface electron and hole trapping sites. The TL behavior has been investigated for the first time using γ -irradiation. TL glow peak at 169 °C were recorded in CaTiO_3 prepared by SC, MSS and SS methods. The trapping parameters such as activation energy (E) and order of kinetics (b) were estimated using peak shape method and results are discussed in detail.

Keywords

- A. Oxides
- B. Chemical synthesis
- C. X-ray diffraction
- D. Electronic paramagnetic resonance
- D. Luminescence