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Luminescence properties of pure and doped $CaSO_4$ nanorods irradiatedby 15 MeV e-beam

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Calcium sulfate ($CaSO_4$) doped with proper activators is a highly sensitive phosphor used in different fields mainly for radiation dosimetry, lighting and display applications. In this work pure and doped nanorods of $CaSO_4$ were produced by the co-precipitation technique. Samples from this material doped with Ag, Cu, Dy, Eu and Tb were exposed to different doses of 15 MeV e-beam and studied for their thermoluminesence (TL) and photoluminescence (PL) properties. Color center formation leading to PL emissions were investigated before and after e-beam irradiation. The samples doped with rare earths elements (i.e., Dy, Eu and Tb) were observed to have thinner nanorods than the other samples and have higher absorption in the UV region. The Ag and Tb doped samples have poor TL response to e-beam, while those activated by Cu, Dy and Eu have strong glow peaks at around 123°C. Quite linear response curves in the whole studied exposures i.e. 0.1-100 Gy were also observed in Cu and Dy doped samples. The PL results show that pure $CaSO_4$ nanorods have active color centers without irradiation, which could be enriched/modified by these impurities mainly rare earths and further enhanced by e-beam irradiation. $Eu^{3+} \rightarrow Eu^{2+}$ conversion is clearly observed in Eu doped sample after e-beam irradiation. These results show that these nanorods might be useful in lighting and display devices development.

Biography

Najlaa D Alharbi is an Associate Professor in the department of physics, King Abdulaziz University (KAU) at Saudi Arabia. She completed his fellowship at Center of Nanotechnology at KAU. Her research interests include nanomaterials (synthesis, characterization) fabrication of different inorganic nanomaterials, carbon nanostructures, and Interaction of ionizing radiations with nanomaterials, luminescence properties like thermoluminescence (TL), photoluminescence (PL) Dosimetric properties, structural properties such as X-ray diffraction (XRD), transmission electron microscope (TEM), scanning electron microscope (SEM), and optical properties like Fluorescence spectroscopy, UV-visible, Micro Raman, etc.

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