Rapid visualization of latent fingerprints with Eu-doped $La_2Ti_2O_7$

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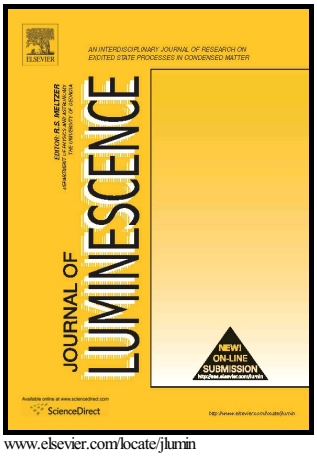

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Rapid visualization of latent finger prints with Eu-doped $La_2Ti_2O_7$

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Abstract

Fingerprints provide significant unique identification of individuals. Fingerprint technology requires luminescent materials with high contrast, high selectivity, low background interface and high efficiency. Herein, a novel red-emitting $La_2Ti_2O_7:Eu^{3+}$ phosphors are synthesized by a solvothermal reaction method for latent fingerprint application. The structural properties are investigated by the X-ray diffraction analysis, Rietveld refinement and Raman spectroscopy. The optical properties are studied by the measurement of diffused reflectance, excitation and emission spectra. The PLE spectra of $La_2Ti_2O_7:Eu^{3+}$ phosphor exhibits both host absorption and charge transfer bands along with f-f transitions of Eu^{3+} ions. The PL spectra exhibit an intense red emission due to the $^5D_0 \rightarrow {}^7F_2$ transition with the CIE chromaticity coordinates (0.614, 0.383). The latent fingerprints on the surface of various substrates are developed and exhibit excellent visualization with clear papillary ridges under the UV illumination of 254 nm. These results suggest that the $La_2Ti_2O_7:Eu^{3+}$ phosphors are promising luminescence materials for latent fingerprint technologies.