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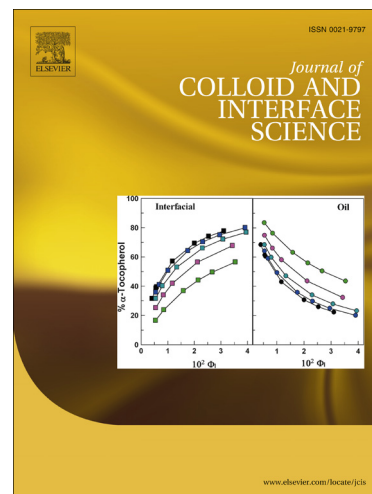
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Effective fingerprint recognition technique using doped yttrium aluminate nano phosphor material

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Abstract

First time the yttrium aluminate nanoparticles are used to improve the fingerprint quality. Eco-friendly green combustion process is used to synthesize $\text{YAlO}_3:\text{Sm}^{3+}$ (0.5 - 11 mol %) nanophosphor using green tea leaf extract as non-toxic and eco-friendly fuel. Powder X-ray diffraction study confirms the orthorhombic phase. The average sizes of the crystallites were found to be in the range 20 - 35 nm. The emission peaks centered at 564, 601 and 647 nm is attributed to $4f-4f$ (${}^4G_{5/2} \rightarrow {}^6H_{J=5/2, 7/2, 9/2}$) forbidden transitions of Sm^{3+} ions. Judd-Ofelt theory is applied to experimental data for providing qualitative support by determining J-O intensity parameters. The Commission International De I-Eclairage chromaticity co-ordinates are very close to National Television System Committee standard value of white emission ($x = 0.296$, $y = 0.237$). Further, correlated color temperature is found to be ~ 11900 K. A simple, fast, highly sensitive and low-cost method for the detection and enhancement of fingermarks in a broad range of surfaces is developed and constitutes an alternative to traditional luminescent powders.

Keywords: Nanophosphor; Photoluminescence; Fingerprint detection; Solution combustion.

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