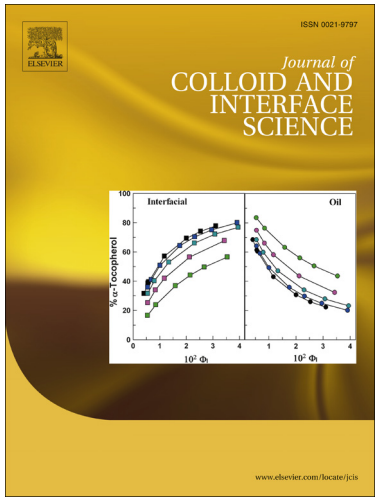

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Effective fingerprint recognition technique using doped yttrium aluminate nano phosphor material

GP Darshan[1, 2], H B Premkumar[3*], H Nagabhushana[4*], S C Sharma[5], S C Prashanth[6], B. Daruka Prasad [7]

[1]Department of Physics, Acharya Institute of Graduate Studies, Bangalore 560 107, India
[2]Research and Development Center, Bharathiar University, Coimbatore 641046, India
[3]Department of Physics, Dayananda Sagar Academy of Technology and management, Bangalore 560082, India
[4]Center for Nano Research (CNR), Tumkur University, Tumkur 572 103, India
[5]**Dayananda Sagar University,** Shavige Malleshwara Hills, Bangalore- 560078, India
[6]Department of Science, East West Institute of Technology, Bangalore 560 091, India
[7]Department of Physics, BMS Institute of Technology, VTU- affiliated, Bangalore-560 064, India

Abstract

First time the yttrium aluminate nanoparticles are used to improve the fingerprint quality. Eco-friendly green combustion process is used to synthesize $YAlO_3:Sm^{3+}$ (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 $\left({}^4G_{5/2} \rightarrow {}^6H_{J=5/2,\,7/2,\,9/2}\right)$ 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.

* Corresponding authors. Tel.: +91-9880433880, E-mail: premhb@gmail.com (HB Premkumar)
+91- 9945954010, E-mail: bhushanvlc@gmail.com (H. Nagabhushana)