Supporting information

Inkjet Fabrication of Highly Efficient Luminiscent Eu-Doped ZrO_2 Nanostructures

Aleksandra D. Furasova[1], Aleksandr V. Yakovlev[1], Vladimir Ivanovski[2], Valentin A. Milichko[1], Vladimir V. Vinogradov[1] and Alexandr V. Vinogradov[1]

[1]ITMO University, St. Petersburg, Russia
[2]Ss. Cyril and Methodius University in Skopje, Skopje, Republic of Macedonia

Table S1-Comparison of $^5D_0$-$^7F_2$ peak intensity depending on duration of synthesis

sample	λex , nm	$^5D_0$-$^7F_2$, nm	Intensity, a.u.
2 days	240	612	977
3 days	240	612	967
6 days	240	611	1000
ZrO_2mixedEu	250	614	113

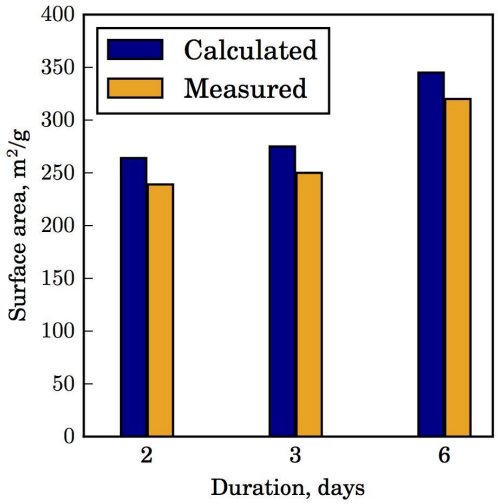

Figure S1 - Specific surface area (SSA) of powders obtained after the synthesis, depending on the duration of treatment. The calculated SSA was performed for spherical particles via $SSA_{calculated} = 6/(d_{xrd} \times \rho_p)$, where d_{xrd} is diameter of individual NP savailable from XRD data and ρ_p is the density of tetragonalphaseZrO_2, 6.1 g/cm^3.The measured surface area (SSA_{BET}) was obtained from BET results. Assuming monodisperse spherical particles, the BET

equivalent average particle diameter, d_{BET}, is calculated by $d_{BET} = 6/(\rho_p \times SSA_{BET})$, where ρ_p is the density of ZrO_2, (6.1 g/cm^3).

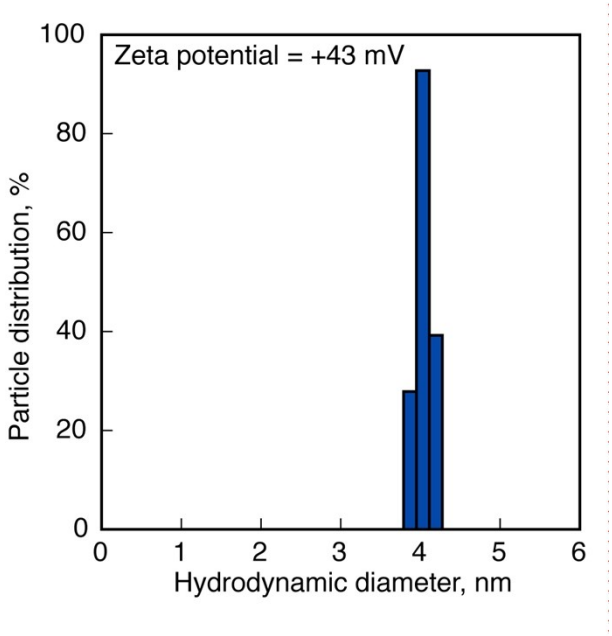

Figure S2 - Dynamic light scattering particle size distribution and zeta-potential of Eu-doped ZrO_2 NPs in water after acidic treatment.

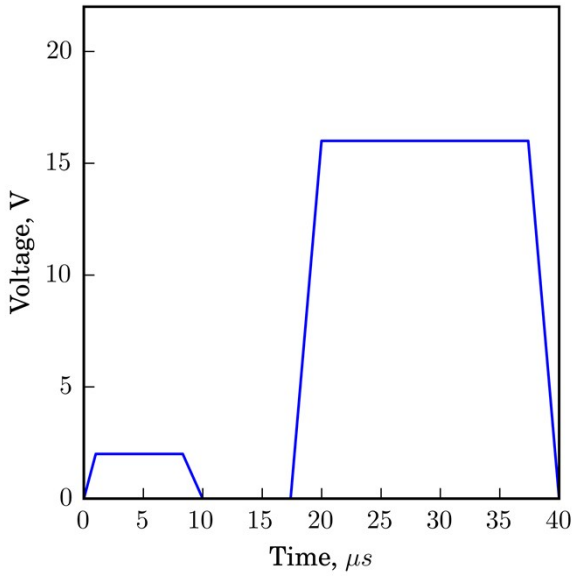

Figure S3- Voltage Curve on printing head in Dimatix Material Printer.

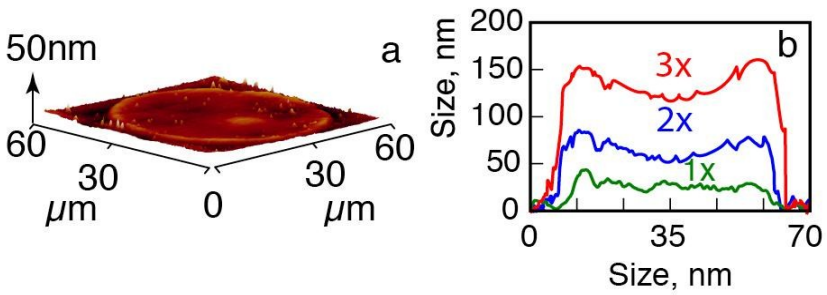

Figure S4 - a) Atomic Force Microscopy topography of Eu-doped zirconia inkjet printed drops on glass surface; b) Thickness progression with applied layers on glass.

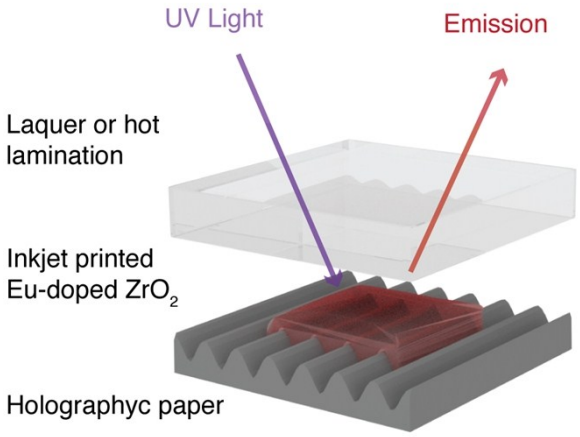

Figure S5 - Monolayer luminescent-protected holography principle. Inkjet printing on holographic paper Eu-doped ZrO_2 and masking by low refractive index layer.

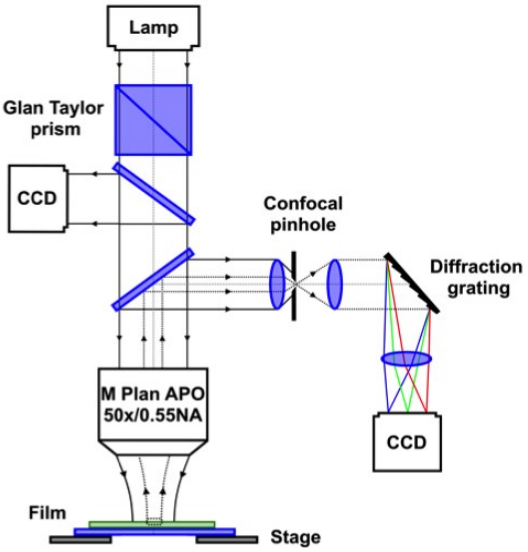

Figure S6 - Reflectance spectroscopy setup for optical characterization of a inkjet printed Eu-doped zirconia doped thin film.