Electronic Supplementary Material (ESI) for Reaction Chemistry & Engineering.


# Facile synthesis of lanthanide doped yttria nanophosphors by a simple microplasma-assisted process

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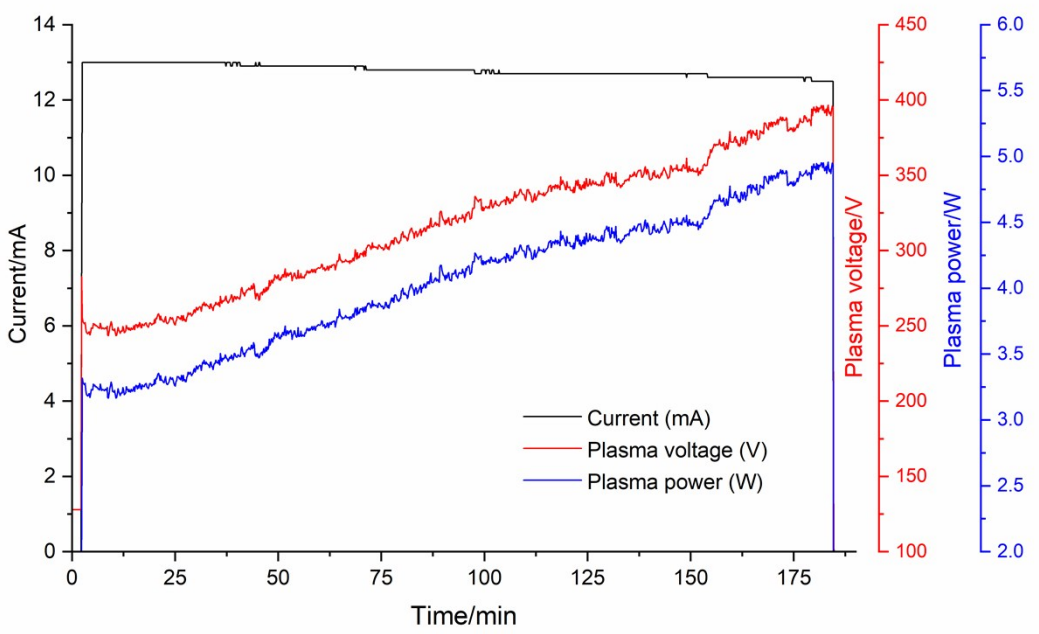


**Figure S1:** The evolution of current, voltage and plasma power during a typical plasma-liquid interaction process.

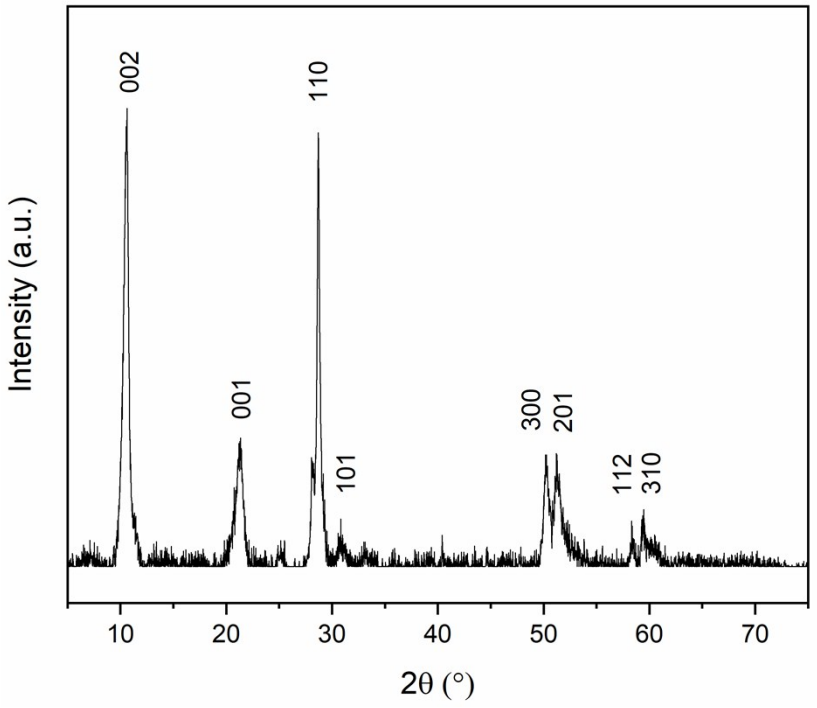


**Figure S2:** XRD result of the dried sediments obtained from the plasma-treated electrolyte solution

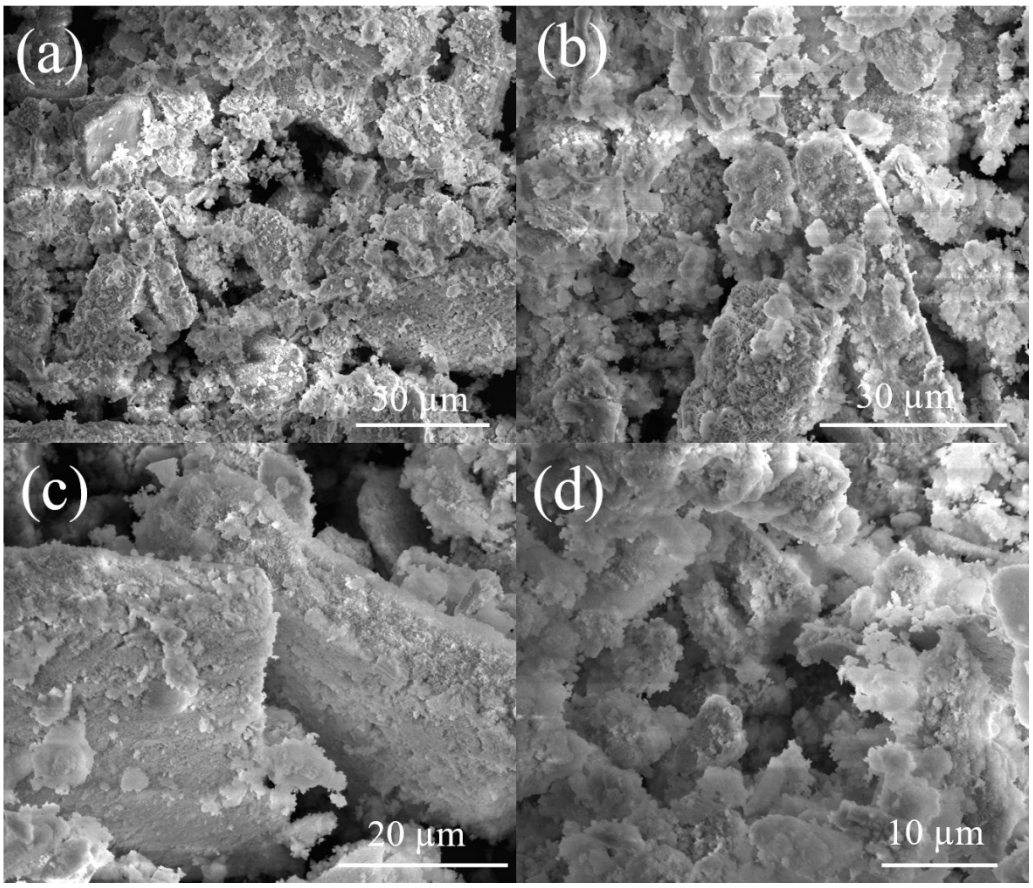


**Figure S3:** SEM images at different magnifications of the dried sediments obtained from the plasma-treated electrolyte solution

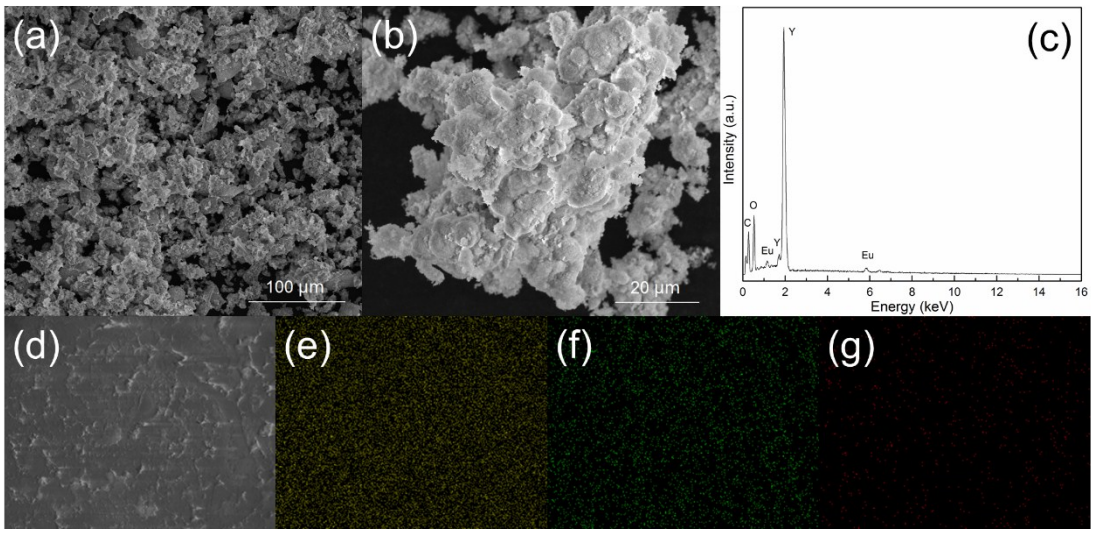


**Figure S4:** (a-b) SEM and (c) EDX images of $Y_2O_3$:5%$Eu^{3+}$ nanoparticles annealed at 600 °C; (d) the whole element mapping area, (e) Y map, (f) O map and (g) Eu map.

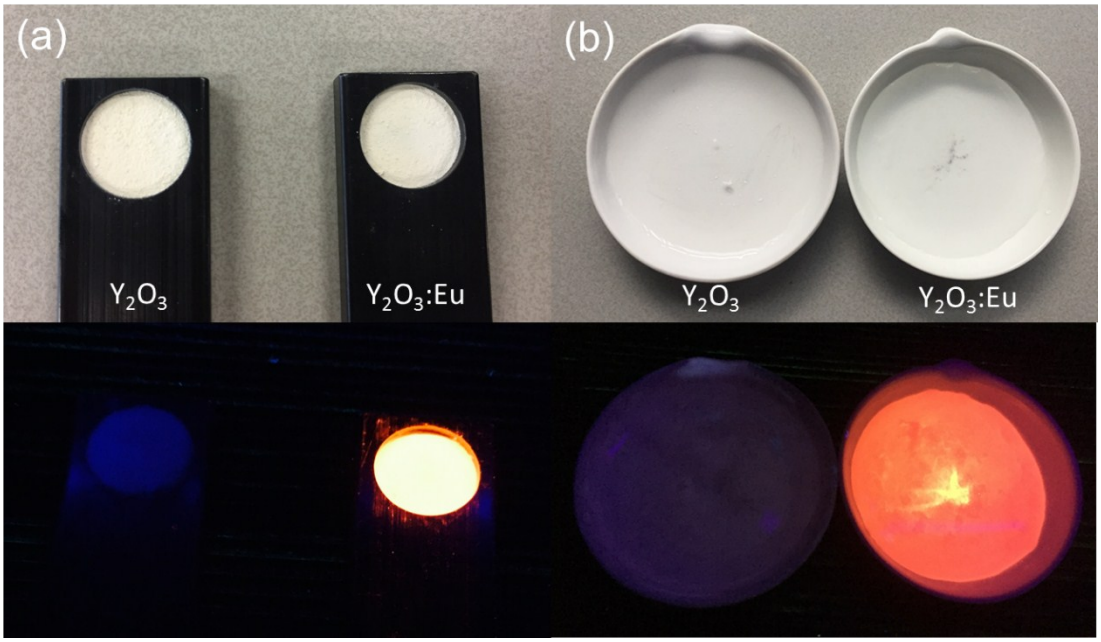


**Figure S5:** Typical photographs of the synthesized $Y_2O_3$ and $Y_2O_3$:5%Eu samples (a) in the solid form and (b) the aqueous solution under room light and UV irradiation (254 nm)

**Table S1.** Summary of optical emission lines recorded during the plasma-liquid interactions

| Species | System | Transition | Wavelength |
|---|---|---|---|
| OH | 3064 Å system | $A\ ^2\Sigma^+ \rightarrow X\ ^2\Pi$ | 306.6 nm, 308.9 nm |
| H | Balmer series | n→2s,2p | 486.0 nm ($H_\beta$), 657.2 nm ($H_\alpha$) |
| O | | $3p^5P \rightarrow 3s^5S$ | 777.2 nm |
| Ar | Ar I | 4p→4s | 696.5 nm ($1s_5$-$2p_2$), 706.7 nm ($1s_5$-$2p_3$), 738.4 nm ($1s_4$-$2p_3$), 750.4 nm ($1s_5$-$2p_1$), 763.5 nm ($1s_5$-$2p_6$), 772.4 nm ($1s_3$-$2p_2$), 794.8 nm ($1s_3$-$2p_4$), 826.5 nm ($1s_2$-$2p_2$), 842.5 nm ($1s_4$-$2p_8$) |

**Table S2.** The IR absorptions bands of the dried $Y(OH)_3$:(Eu) and $Y_2O_3$:(Eu) nanoparticles

| Wavenumber range ($cm^{-1}$) | | Assignment |
|---|---|---|
| $Y(OH)_3$:(Eu) | $Y_2O_3$:(Eu) | |
| 3602 | | O-H stretching |
| 1664 | | O-H deformation vibration |
| 1510 | 1510 | Carboxylate group |
| 1411 | 1411 | Carboxylate group |
| 1353 | | Nitrite ions |
| 1052 | | Carboxylate group |
| 819 | | Y-OH bending |
| 603 | | Y-OH bending |
| | 555 | Y(Eu)-O stretching |
| | 464 | Y(Eu)-O stretching |