

# Supporting information to Luminescence enhancement of self-assembled $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$ thin film-coated porous alumina membrane

N. Abdellaoui<sup>1</sup>, A. Pereira<sup>1</sup>, T. Kandri<sup>1</sup>, E. Drouard<sup>2</sup>, M. Novotny<sup>3</sup>, B. Moine<sup>1</sup>, A. Pillonnet<sup>1</sup>

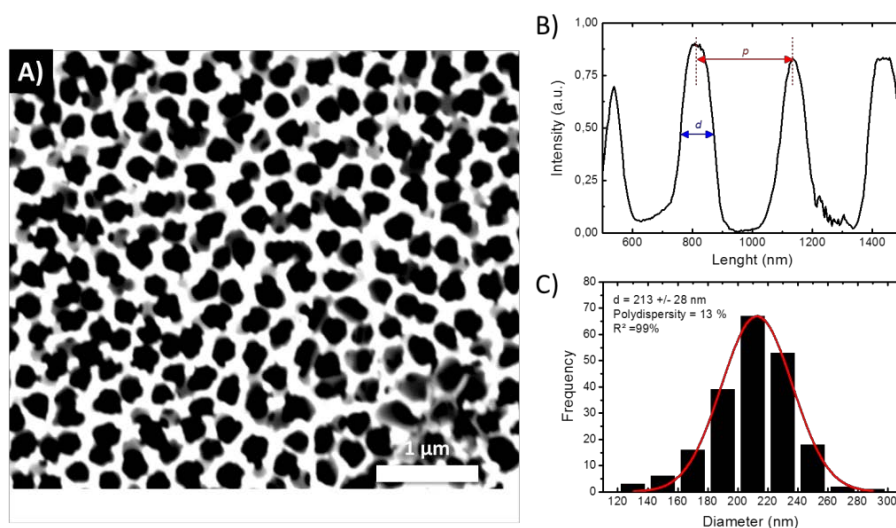
<sup>1</sup> Institut Lumière Matière - Université de Lyon, Université Lyon 1, CNRS UMR5306, Villeurbanne F-69622, France

<sup>2</sup> Institut des Nanotechnologies de Lyon - Université de Lyon, UMR 5270 - CNRS, Ecole Centrale de Lyon, 36 avenue Guy de Collongue, F-69134 Ecully cedex, France

<sup>3</sup> Institute of Physics, Academy of Sciences of the Czech Republic, Na Slovance 2, 182 21 Prague, Czech Republic

## 1. Procedure to estimate the structural parameters of $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$ films deposited on PAMs

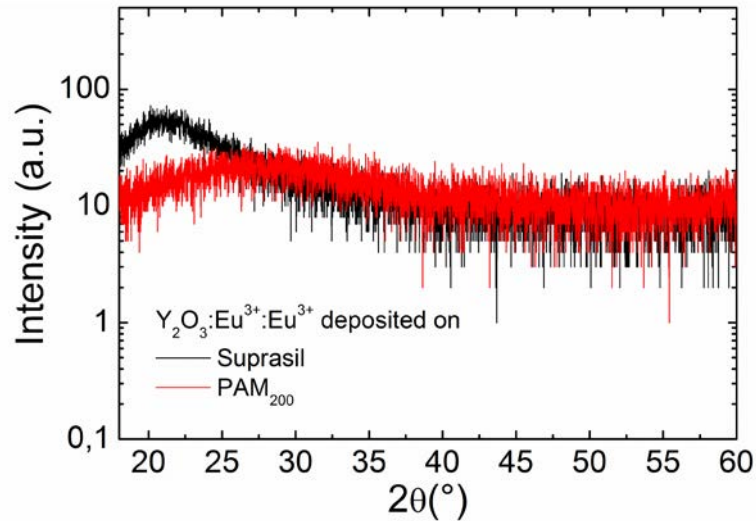
The SEM images were analyzed using ImageJ software to determine the average pore diameter ( $d$ ), the average interpore distance ( $p$ ) and the porosity ( $P$ ) of  $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$  films deposited on PAMs. From the SEM image (figure SI.1a), the intensity distribution is plotted as a function of the distance allowing us to determine the interpore distance (figure SI-1b). The pore diameter distribution (figure SI-1c) as well as the porosity was determined after image flattening and cleaning using filters and various tools available in ImageJ.



**Figure SI-1** - SEM image of a 60-nm thick  $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$  film deposited on PAM<sub>200</sub> and analyzed using ImageJ software.

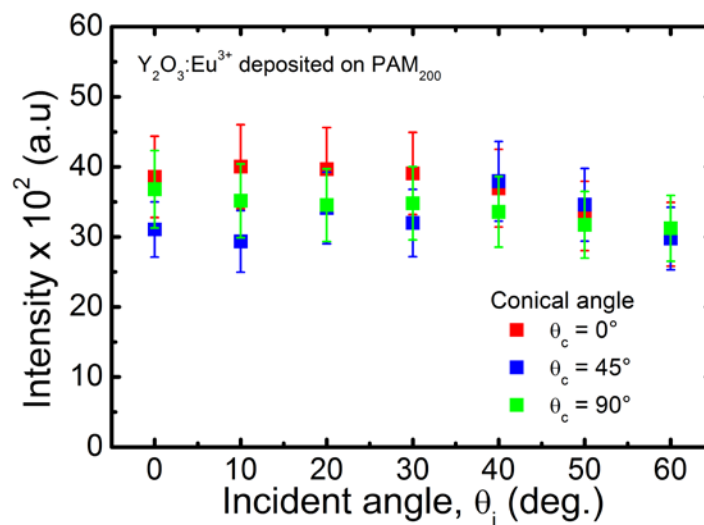
## 2. X-ray diffraction measurements

X-ray characterizations were performed using a Rigaku SmartLab diffractometer with a  $\text{CuK}_{\alpha 1}$  radiation ( $\lambda = 1.5406 \text{ \AA}$ ) in the  $\theta$ - $2\theta$  Bragg-Brentano configuration. Diffractograms were carried out with a  $0.01^\circ$  step size and a scan speed of  $1^\circ/\text{min}$ . According to the diffractograms shown below, both deposited films appear amorphous, as no diffraction lines are detected.



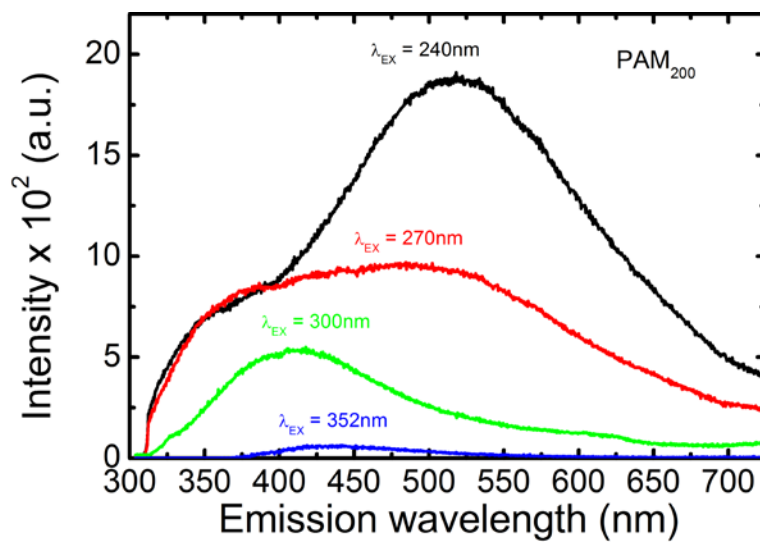
**Figure SI-2** - X-ray diffractograms of annealed  $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$  thin film (60 nm-thick) deposited on Suprasil and  $\text{PAM}_{200}$ .

## 3. Effect of the structure orientation (incident angle as well as conical angle) on the emission spectra of $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ deposited on $\text{PAM}_{200}$ .



**Figure SI-3** - Emission intensity as a function of the incident angle ( $\theta_i$ ) as well as the conical angle ( $\theta_c$ ) for  $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$  deposited on  $\text{PAM}_{200}$ . The measurements were performed in an integrating sphere.

#### 4. Emission spectra of the porous alumina membrane PAM<sub>200</sub>.



**Figure SI-4** - Emission spectra of PAM<sub>200</sub> under various excitation wavelengths.