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Photophysical properties and tunable colour changes of silica single layers doped with lanthanide(III) complexes

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Supplementary informations

Film preparation: The molar composition of the solution employed for the silica layer deposition was: 1TEOS : 15EtOH : 0.1HCl : $3H_2O$. Film deposition was carried out in air at room temperature with a controlled withdrawal speed of about 10 cm min^{-1} using Herasil1 silica slides (Heraeus, Quarzschmelze, Hanau, Germany) as a substrate. Coatings were obtained by means of a multi-dipping process, up to 3 depositions, without any thermal treatment between them.

Spectroscopic measurements. Absorption spectra were recorded with a Perkin-Elmer λ40 spectrophotometer. Uncorrected emission spectra were obtained with an Edinburgh FLS920 spectrometer equipped with a peltier-cooled Hamamatsu R928 photomultiplayer tube (185-850 nm). An Edinburgh Xe900 450 W Xenon arc lamp was used as exciting light source. Corrected spectra were obtained *via* a calibration curve supplied with the instrument. Luminescence quantum yields (Φ_{em}) for liquid sample were obtained from spectra on a wavelength scale (nm) according to the approach described by Demas and Crosby[a] using air-equilibrated [$Ru(bpy)_3Cl_2$ in water solution Φ_{em} = 0.028][b] as standard. For solid samples Φ_{em} have been calculated by corrected emission spectra obtained from an apparatus consisting of a barium sulphate coated integrating sphere (6 inches), an He-Cd laser (λ_{exc}: 325 nm, 5mW) as light source and a CCD AVA-Spec2048 as signal detector, following the procedure described by De Mello et al.[c] The luminescence lifetimes in the microsecond-millisecond scales were measured by using a Perkin-Elmer LS-50B spectrofluorometer equipped with a pulsed xenon lamp with variable repetition rate and elaborated with standard software fitting procedures (Origin 6.1). Experimental uncertainties are

estimated to be ± 8% for lifetime determinations, ± 20% for emission quantum yields, ± 2 nm and ± 5 nm for absorption and emission peaks respectively.

a) Demas, J. N.; Crosby, G. A. *J. Phys. Chem.* **1971**, *75*, 991-1024.
b) Nakamaru, K. *Bull. Chem. Soc. Jpn.* **1982**, *55*, 2967.
c) J. C. deMello, H. F. Wittmann and R. H. Friend, *Adv. Mater.*, 1997, **9**, 230.