Fluorescent Mesoporous Silica Nanoparticles Embedded in an Inorganic-Organic PDMSUr Matrix

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Fluorescent mesoporous silica nanoparticles with rhodamine B (RhB) as fluorescent dye ($mSiO_2$:RhB) were synthesized according to Sokolov et al[1]. Images obtained by Scanning Electron Microscopy (SEM) of the $mSiO_2$:RhB particles showed spherical nanoparticles with size ranging from 50 to 70 nm. Aqueous dispersion of the particles showed maximum wavelength of excitation in 560 nm and maxium emission in 577 nm. The inorganic-organic urethanesil, hereafter named PDMSUr, was synthesized according Aguiar et al[2].Then, the $mSiO_2$:RhB particles dispersed in ethanol were added to the as-synthesized PDMSUr and films were obtained by casting method using Teflon® molds. The particles embedded in PDMSUr film showed maximum excitation in 565 nm and emission in 585 nm.

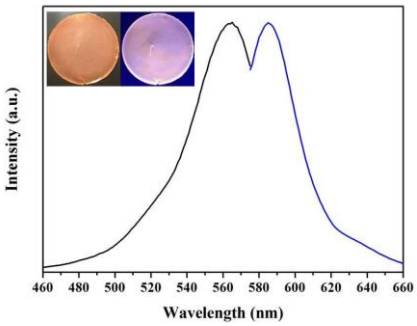

Figure 01: Fluorescence spectra of the PDMSUr films showing the maximum wavelength of excitation in 565 nm (black line) and the maximum wavelength of emission in 585 nm (blue line). Inset: digital photograph of the PDMSUr films under white lamp (left) and 365 nm UV lamp (right).

The line shapes for the absorption and emission spectra, as well as the emission intensities clearly indicate non-exciton formation of RhB, thus proving the aforementioned synthetic strategy as useful for flexible, self-adhesive or self-supported fluorescent film formation. This fluorescent film may present potential applications in photonics, including its utilization for random laser.

1. Cho, E.B.; Volkov, D. O.; Sokolov, I.; Adv. Funct. Mater. **2011**, 21, 3129.
2. Aguiar, K.R.; Santos, V.G.; Eberlin, M.N.; Rischka, K.; Noeske, M.; Tremiliosi-Filho, G.; Rodrigues-Filho, U.P.; RSC Adv. **2014**, 4, 24334.

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