Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting Information

"Functionalized Hybrid Nanoparticles for Mercury Scavenging"

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Determination of the scavenged mercury by the mesoporous N719/TiO_2 film

The mercury scavenging experiments were performed dipping the **N719/TiO_2** film (1 cm^2 area) in different mercury aqueous solutions ranging from 1 to 30 µM concentrations during 10 minutes.

In order to quantify colorimetrically the mercury remaining in the solution, after the scavenging process, we added 12μl from a 2 mM N719 stock solution in ethanol to 1 ml of the mercury aqueous solution. The UV-Visible spectrum of the mixture was measured. The results are shown in **Figure S1**.

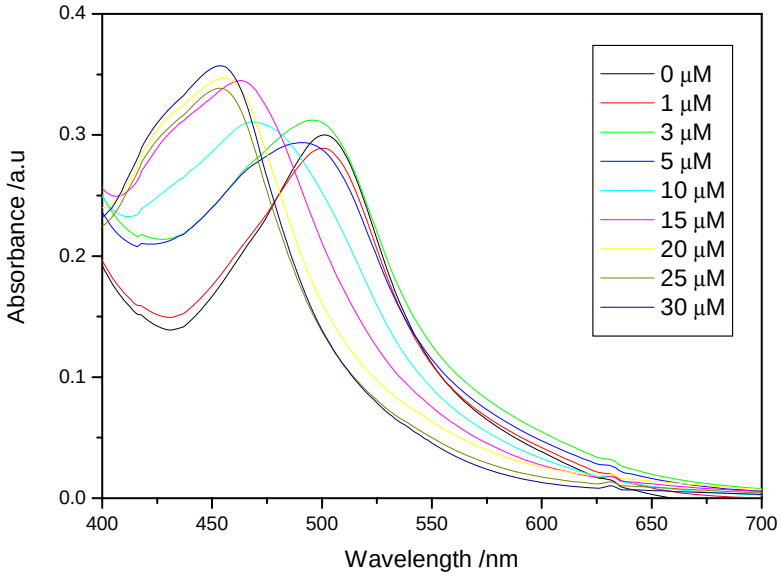

Figure S1. UV-Visible spectra upon addition of 12µl from a 2 mM N719 solution in ethanol to 1 ml of $HgCl_2$ aqueous solution. The inset shows the mercury concentration range used.

Using the data from **Figure S1** we can determine the mercury concentration left after the immersion of the scavenging film. To this end, we fitted the experimental data to a equation that relates the absorption changes upon mercury binding to the N719 molecule sin solution.

$$\mathbf{R = 1.76 + 0.03*[Hg^{2+}]}$$

Where $R = \frac{Abs_{\lambda 1}}{Abs_{\lambda 2}}$, λ_1 = 508 nm (maximum absorbance in the absence of Hg^{2+} ions) and λ_2 = 438 nm (maximum absorbance in the presence of Hg^{2+} ions). The linear fitting is illustrated in **Figure S2**. Using this calibration curve we can extrapolate the mercury concentration present in the aqueous solutions after the immersion of the scavenging TiO_2/N719 films.

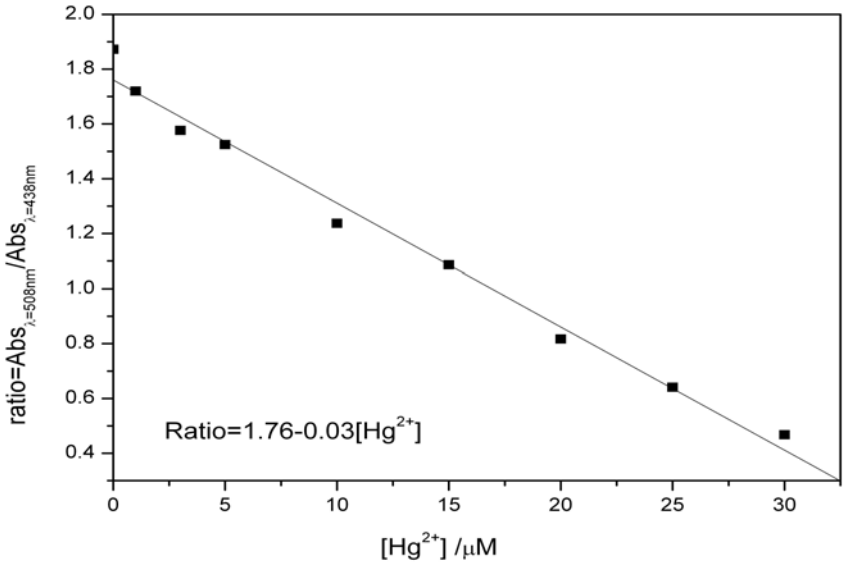

Figure S2. Calibration curve for the N719 solution chemosensor in ethanol.

The selectivity of the solution based mercury detection.

The colorimetric mercury sensing experiments, based upon the addition of 12μL of N719 in ethanol to the water based samples after immersing the scavenging film, were carried out for different samples containing other metal ions as shown in **Figure S3**. The aim was to illustrate the low response of other metal ions such as Cadmium or Lead to the N719 molecules.

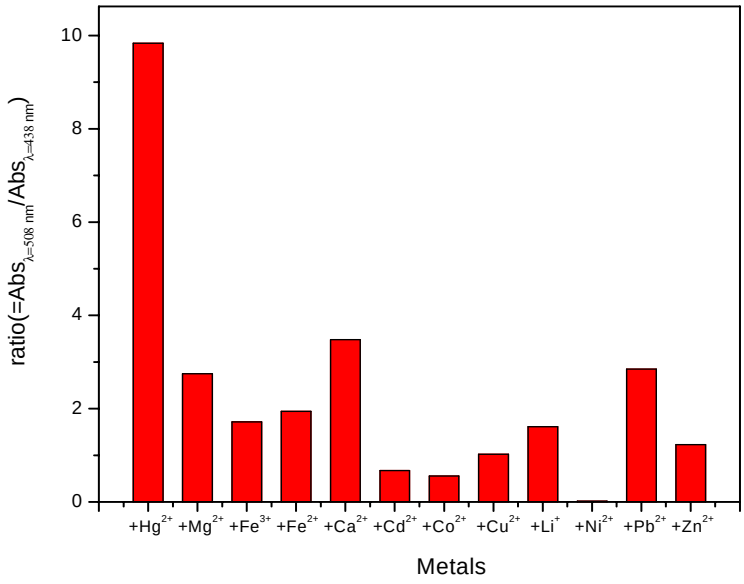

Figure S3. Changes on the absorption ratio (λ_1/λ_2) for several metal ions after the dipping of the **TiO_2/N719 films** into the aqueous solution containing different metal ions.