

Supporting Information for

## Quantifying the Coverage Density of Poly(ethylene glycol) Chains on the Surface of Gold Nanostructures

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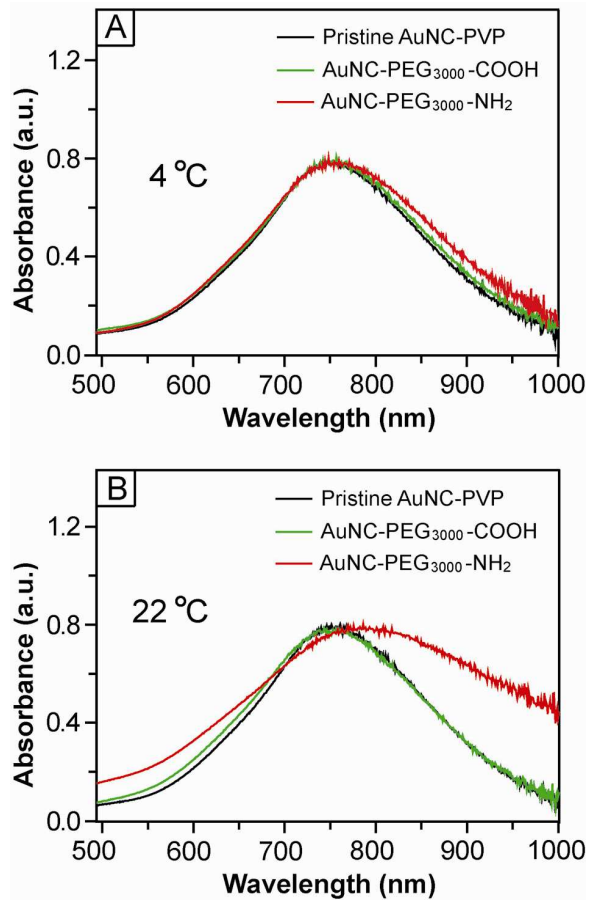
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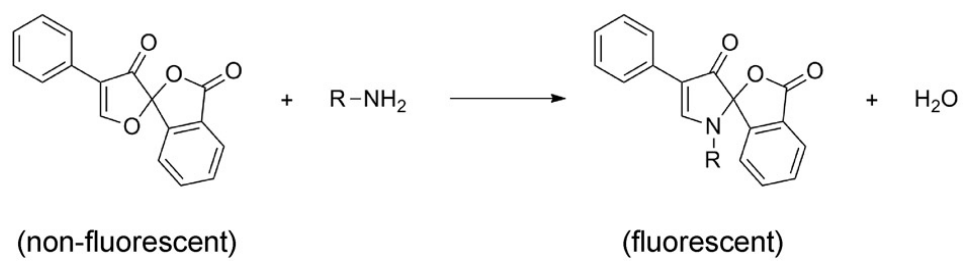
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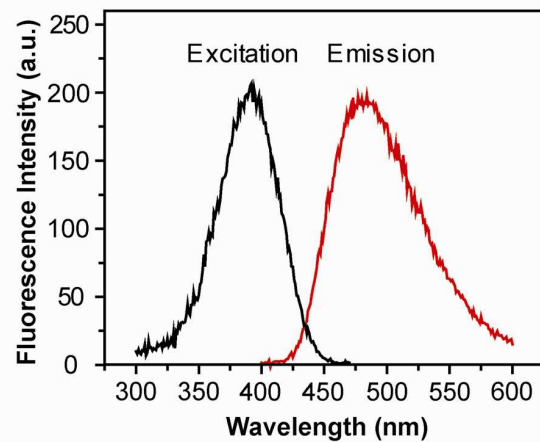
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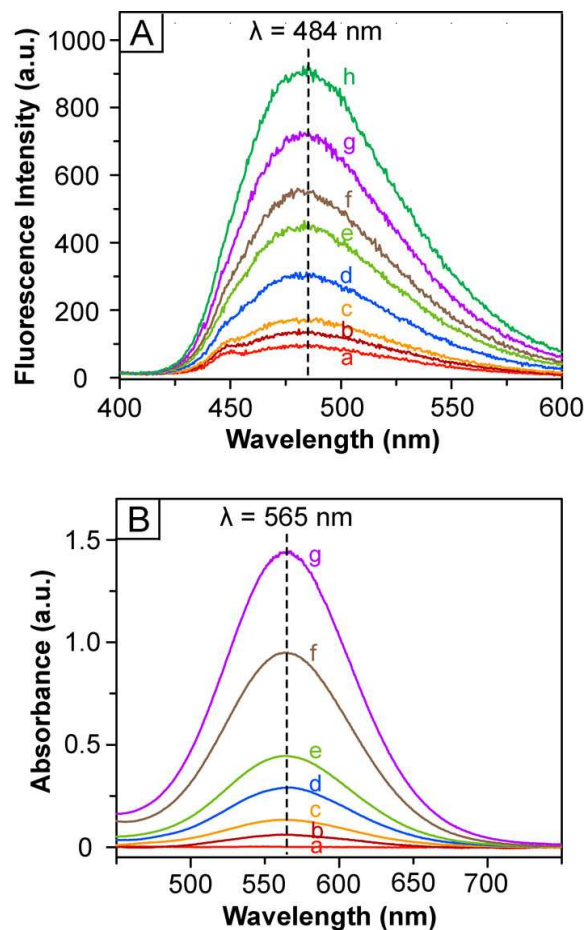
**Figure S1.** UV-vis spectra of 50-nm AuNCs before and after functionalization with HS-PEG<sub>3000</sub>-NH<sub>2</sub> or HS-PEG<sub>3000</sub>-COOH at two different temperatures: (A) 4 °C and (B) 22 °C.



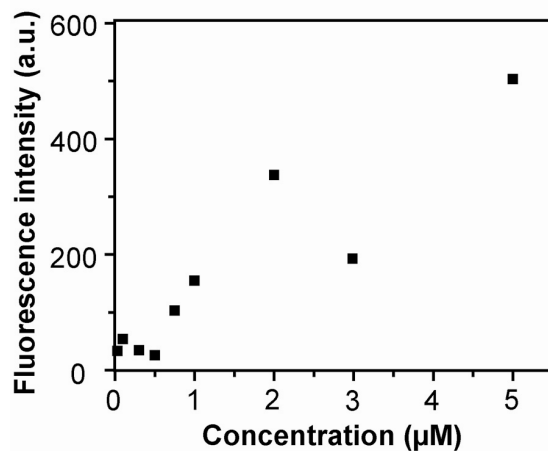
**Figure S2.** Scheme of the reaction between fluorescamine and a primary amine that generates a fluorescent product.



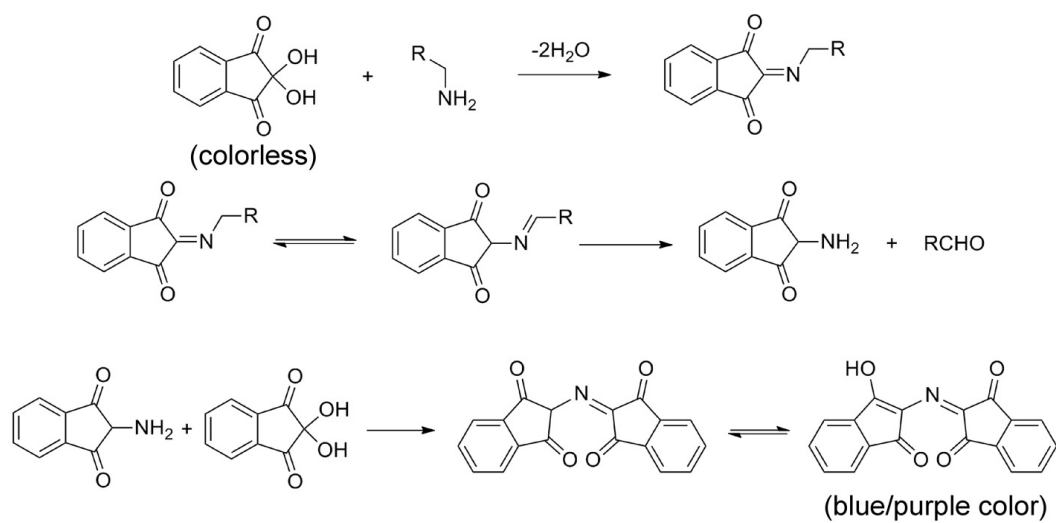
**Figure S3.** Typical excitation and emission spectra of the chromophore generated from the reaction between fluorescamine and HS-PEG<sub>5000</sub>-NH<sub>2</sub>.



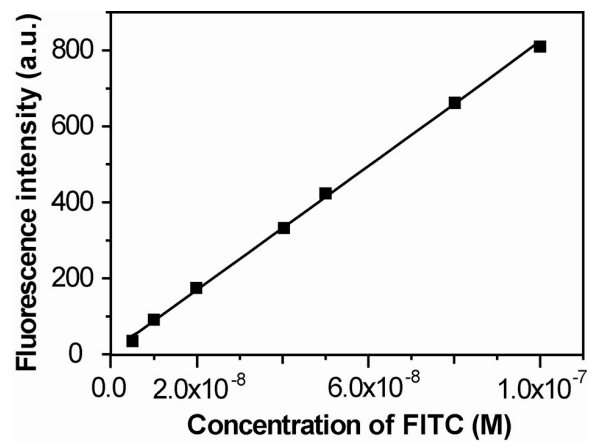
**Figure S4.** (A) Fluorescence spectra of the chromophore derived from fluorescamine by reacting with different concentration of HS-PEG<sub>5000</sub>-NH<sub>2</sub> at pH = 10: (a) 0.25, (b) 0.38, (c) 0.50, (d) 1.0, (e) 1.5, (f) 2.0 (g) 2.5, and (h) 3.0  $\mu$ M. By plotting the fluorescence intensity at 565 nm against the concentration of HS-PEG<sub>5000</sub>-NH<sub>2</sub>, we obtained the calibration curve shown in Figure 4A. (B) UV-vis spectra of the chromophore derived from ninhydrin by reacting with different concentrations of HS-PEG<sub>5000</sub>-NH<sub>2</sub>: (a) 0.5, (b) 5, (c) 10, (d) 20, (e) 33.3, (f) 66.7, and (g) 100  $\mu$ M. By plotting the absorbance at 565 nm against the concentration of HS-PEG<sub>5000</sub>-NH<sub>2</sub>, we obtained the calibration curve shown in Figure 5A.



**Figure S5.** Calibration curve for fluorescamine-based assay using HS-PEG<sub>5000</sub>-NH<sub>2</sub>, which was obtained by plotting the fluorescence intensity at 480 nm against the concentration of HS-PEG<sub>5000</sub>-NH<sub>2</sub> at pH = 6.5.

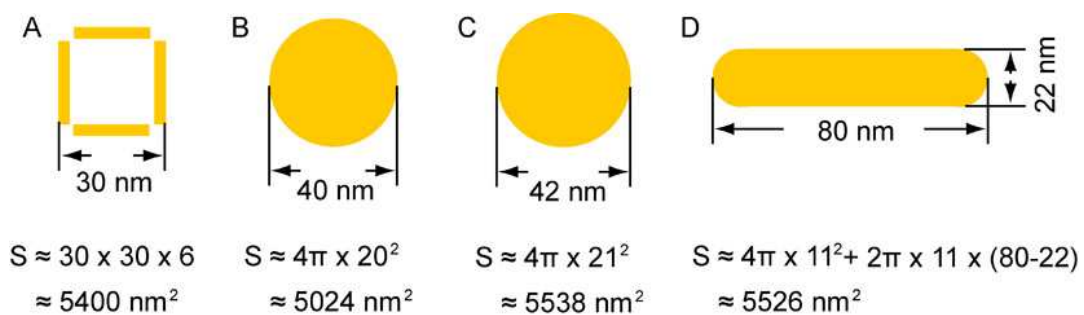


**Figure S6.** Scheme of the reaction between ninhydrin and a primary amine that generates a colored product.



**Figure S7.** Calibration curve for FITC that was obtained by plotting the fluorescence intensity at 520 nm against the concentration of FITC.





**Figure S8.** Calculations of surface areas ( $S$ ) for the four different types of Au nanostructures: (A) AuNC (only outer surface was considered in the calculation), (B) CTAC-capped AuNP, (C) citrate-capped AuNP, and (D) CTAB-capped AuNR. The sizes and morphologies were obtained from the TEM images shown in Figure 2, A, D, E, and F, respectively.

**Table S1.** Characterization of the 50-nm AuNCs with different surface coatings. PEGylation of AuNCs was conducted at 4 °C and 22 °C for each sample.

	Temperature	Hydrodynamic diameter (nm)	Polydispersity index	Zeta potential (mV)
AuNC-PVP	4 °C	96.1	0.188	-47.9
AuNC-PVP	22 °C	99.2	0.197	-57.1
AuNC-PEG <sub>3000</sub> -NH <sub>2</sub>	4 °C	108.1	0.241	20.3
AuNC-PEG <sub>3000</sub> -NH <sub>2</sub>	22 °C	190.6	0.296	14.6
AuNC-PEG <sub>5000</sub> -NH <sub>2</sub>	4 °C	130.7	0.226	11.7
AuNC-PEG <sub>5000</sub> -NH <sub>2</sub>	22 °C	204.9	0.287	-2.6
AuNC-PEG <sub>20000</sub> -NH <sub>2</sub>	4 °C	113.9	0.154	-35
AuNC-PEG <sub>20000</sub> -NH <sub>2</sub>	22 °C	115.6	0.143	-31.2
AuNC-PEG <sub>3000</sub> -COOH	4 °C	104.0	0.212	-40.4
AuNC-PEG <sub>3000</sub> -COOH	22 °C	101.9	0.206	-36.7