nanomaterials

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Supplementary Materials

Nanosensors Based on Structural Memory Carbon Nanodots for Ag^+ Fluorescence Determination

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Cytotoxicity test: Human uterine cancer cell (HeLa) was seeded into 96-well plates with Dulbecco's modified Eagle's medium (DMEM) for 24 h at a density of 10^4 cells/150 μL in an incubator (37 °C, 5% CO_2). And the culture medium was replaced DMEM containing C_{SM}-dots of different concentrations (0, 0.05, 0.1, 0.25, 0.5, 0.75 mg/mL) for another 24 h. Then, the cells were washed by 20 mL PBS buffer (pH 7.4) and incubated with MTT solution (5 mg/mL) for 4 h. After that, the culture medium was removed, followed by the addition of 150 μL DMSO and shaken for 10 min at room temperature. The optical density (OD) was measured by a microplate reader (ELx800, Biotek, USA) at 490 nm. The cell viability was estimated according to the following equation:

$$\text{Cell viability (\%)} = (OD_{treated}/ OD_{control}) \times 100\%$$

where $OD_{treated}$ was obtained in the presence of LGQDs, and $OD_{control}$ was obtained in the absence of C_{SM}-dots.

Cellular imaging analysis: The HeLa was first cultured in DMEM containing 10% fetal bovine serum (FBS) and 1% penicillin/streptomycin at 37 °C in 5% CO_2 for 12 h, followed by incubation with C_{SM}-dots (0.5 mg mL^{-1}) for another 6 h. Then, the cells were washed with Dulbecco's phosphate buffer saline (DPBS) three times (1.0 mL each) to remove the C_{SM}-dots. The Hela cells were harvest by fixed with 4% paraformaldehyde solution in DPBS at 4 °C for 30 min. The cellular imaging of the treated cells was performed on a Nikon Eclipse 90i microscope equipped with the Cool SNaP HQ2 CCD camera (Photometrics, AZ).

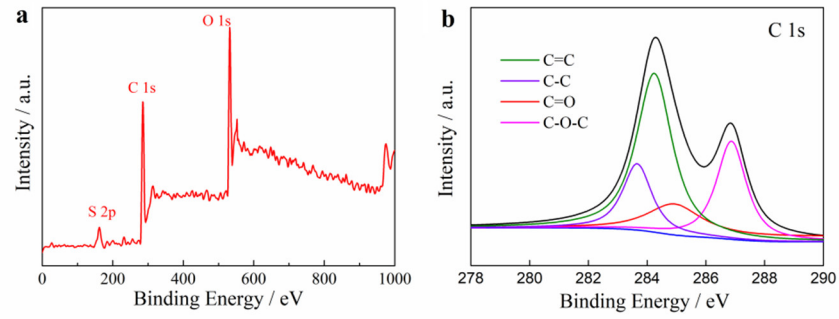

Figure S1. (**a**) The XPS spectra of lignin. (**b**) The high-resolution XPS spectra of C 1s in lignin.

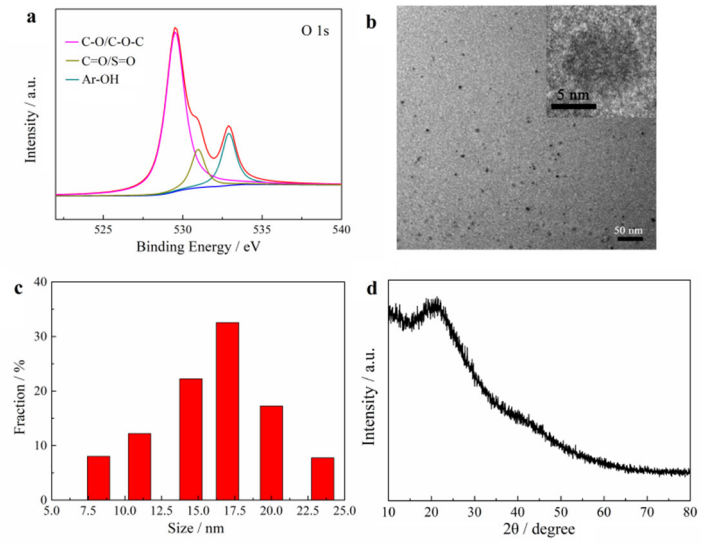

Figure S2. (**a**) The high-resolution XPS spectra of O 1s in Csm-dots. (**b**) TEM image of Csm-dots (The inset is HRTEM image of Csm-dots). (**c**) Size distribution of Csm-dots. (**d**) XRD pattern of Csm-dots.

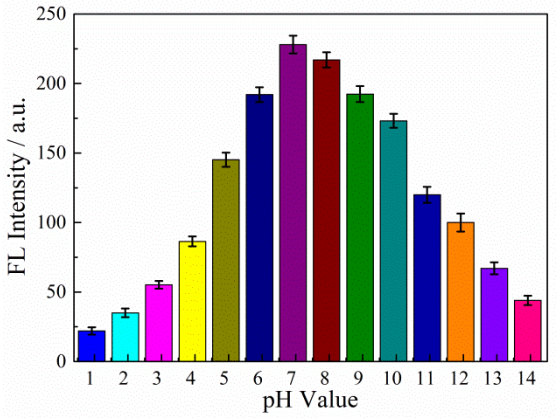

Figure S3. The effect of different pH value on the FL performance of Csm-dots.

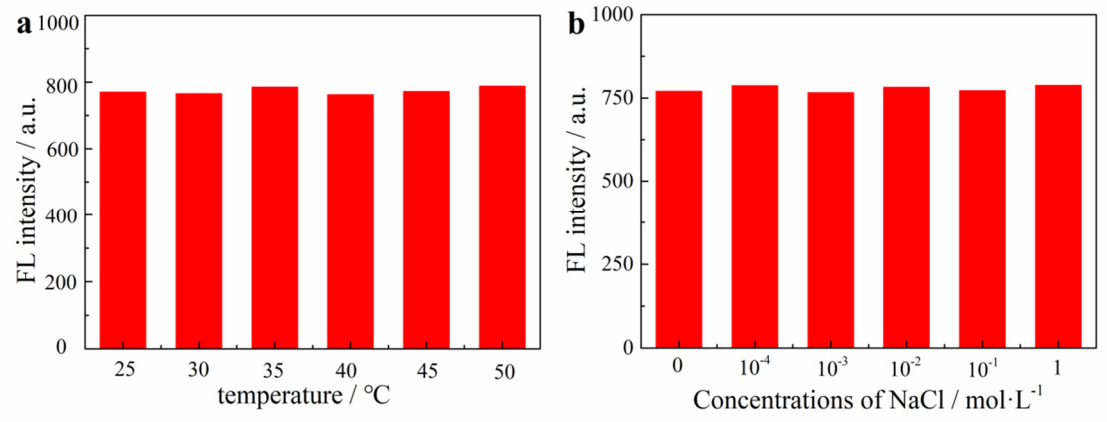

Figure S4. FL intensity variation of the CSM-dots as a function of temperature (**a**) and concentrations of NaCl (**b**).

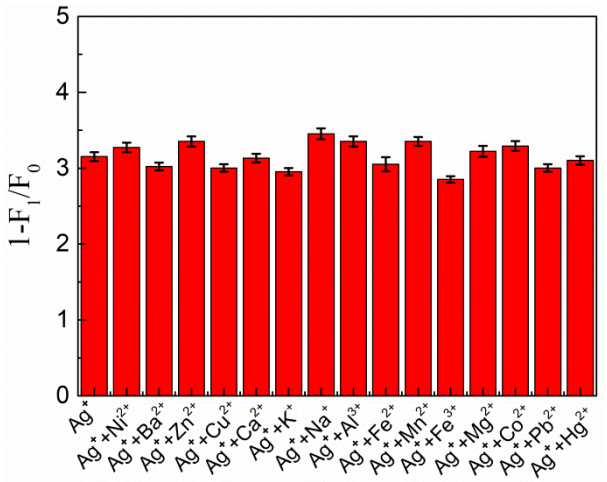

Figure S5. The selectivity for the detection of Ag^+ by CSM-dots in the presence of other metal ions. The concentrations of the interference ions were 4000 μM, which is ten time higher than that of Ag^+.

Table S1. Comparison of the reported probe for Ag^+ determination.

Precursor	Linear range (μM)	Detect limit (nM)	Ref.
Pyrrolo[2,1-a]isoquinoline	0-30	600	[1]
1,2,4-Triaminobenzene	0-30	660	[2]
Polyurethane foam	0-6	2800	[3]
azidoimidizole	0-20	480	[4]
Bis(5,6-dimethylbenzimidazole)	0-100	423	[5]
Lignin	5-290	500	This work

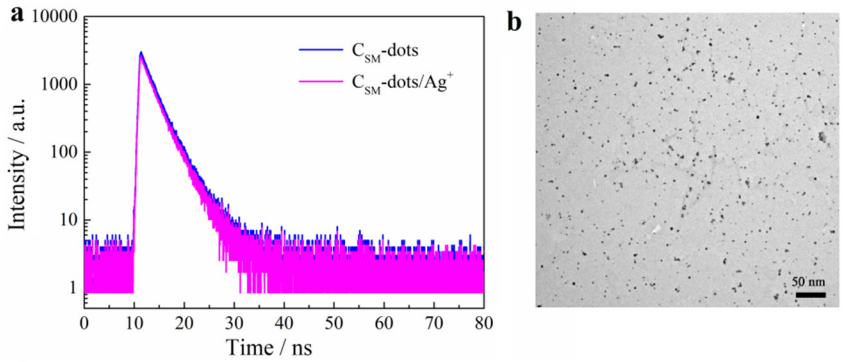

Figure S6. (**a**) FL decay spectra of Csm-dots and Csm-dots/Ag^+ system. (**b**) The TEM image of Csm-dots /Ag^+ composites.

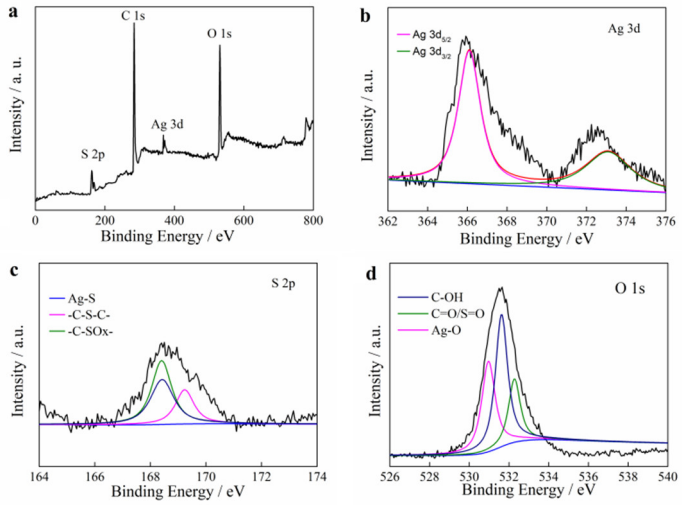

Figure S7. XPS spectrum of Csm-dots/ Ag NPs (**a**). The high-resolution XPS spectra of Ag 3d (**b**), S 2p (**c**) and O 1s (**d**) in Csm-dots/ Ag NPs.

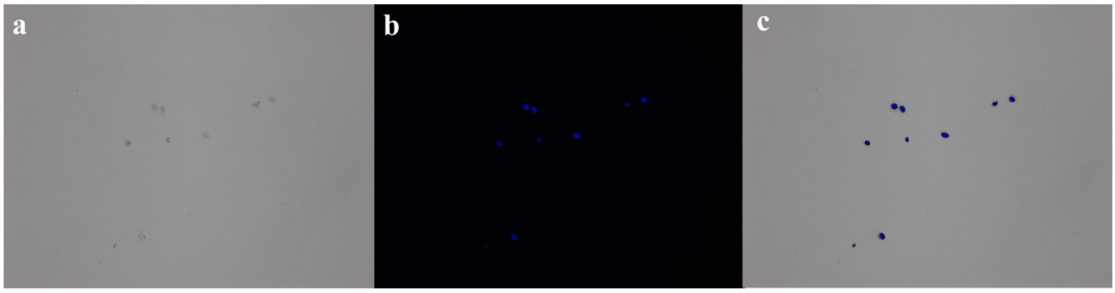

Figure S8. The fluorescence microscopy images of HeLa cells treated with Csm-dots, (**a**) the bright-field images, (**b**) the fluorescent images, (**c**) the merged images of (**a**) and (**b**).

References

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