## Supplementary data

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<th>Probe</th>
<th>Water samples test</th>
<th>Cell imaging</th>
<th>Detection limit/M</th>
<th>Reference</th>
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<td><img src="image1" alt="Probe 1" /></td>
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<td>No</td>
<td>1.4×10⁻⁵</td>
<td>Optical Materials, 2018, [57]</td>
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<td><img src="image2" alt="Probe 2" /></td>
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<td>No</td>
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<td>J. Photoch. Photobio. A, 2015,[59]</td>
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<td>Sens. Actuators B: Chem, 2018, [60]</td>
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<td>1.74×10⁻⁷</td>
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**Table S1** Comparison with other reported Ag⁺ fluorescence probes.
Supplementary data

Fig. S1. Absorbance spectra of probe PPN (10 μM) in the absence and presence of different metal ions (50 μM) in DMF/PBS buffer (v/v = 5/5, pH = 7.4).

Fig. S2. (A) Absorbance (at 360 nm) of probe PPN (10 μM) in the absence and presence of Cu$^{2+}$ (50 μM) in DMF/PBS solution (v/v = 5/5, pH = 7.4) with different pH values. (B) Absorbance (at 360 nm) of probe PPN (10 μM) in the presence of Cu$^{2+}$ (50 μM) in DMF/PBS solution (v/v = 5/5, pH = 7.4) with different response time.

Fig. S3. Fluorescence intensity ratios ($F_{515}/F_{432}$) of probe PPN (10 μM) in the presence of Ag$^+$ (100 μM) in DMF/PBS solution (v/v = 5/5, pH = 7.4) with different response time. $\lambda_{ex} = 340$ nm.

Fig. S4. Fluorescence spectra of probe PPN (10 μM) in the absence and presence of different metal ions (100 μM) in DMF/PBS buffer (v/v = 5/5, pH = 7.4).

Fig. S5. The fluorescence intensity of probe PPN (10 μM) with Ag$^+$ in DMF/PBS buffer (v/v = 5/5, pH = 7.4) at different time, $\lambda_{ex} = 340$ nm.

Fig. S6. (A) Job's plot for the determination of the stoichiometry of PPN and Ag$^+$. (B) Job's plot for the determination of the stoichiometry of PPN and Cu$^{2+}$.

Fig. S7. $^1$H NMR spectra of PPN (A) and in the presence of Ag$^+$ (B) and Cu$^{2+}$.

Fig. S8. HRMS-ESI spectra of PPN–Ag$^+$ (A) and PPN–Cu$^{2+}$ (B).

Fig. S9. Molecular orbitals (LUMO and HOMO) of compounds PPN and PPN–Ag$^+$.

Fig. S10. The linear relationship between the fluorescence intensity ratios ($F_{515}/F_{432}$) and Ag$^+$ concentration (1, 5, 10, 15, 20, 30 μM) in (A) lake water and (B) tap water and (C) distilled water samples. (D) Fluorescence intensity of probe PPN treatment with Ag$^+$ (1, 5, 10, 15, 20, 30 μM) in three water samples.
**Fig. S1.** MTT assay of Hela cells was incubated with 0.1, 1, 10, 20 and 50 μM probe PPN for 48 h.
Fig. S2

Fig. S3
**Fig. S4**

**Fig. S5**
Fig. S6
Fig. S10

Fig. S11