

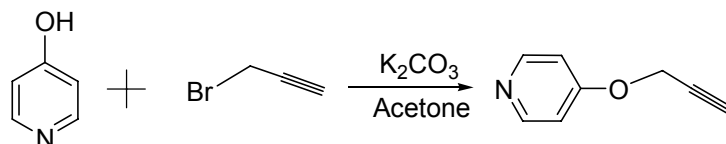
Triazole-ester modified silver nanoparticles : click synthesis and Cd^{2+} colorimetric sensing

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Fig. S1 General procedure for the synthesis of 4-(prop-2-ynyloxy)pyridine (PP)

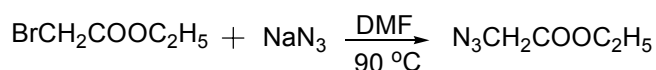
A suspension of 4-hydroxy pyridine (0.57 g, 6 mmol) and anhydrous potassium carbonate (1.66 g, 12 mmol) in acetone (20 mL) was stirred for 0.5 h at room temperature. Then a solution of 3-bromopropyne (1.3 mL, 12 mmol) dissolved in acetone (5 mL) was slowly added. The reaction mixture was stirred for 2 h at 50 °C. The cooled reaction mixture was filtered and washed with acetone. The filtrate were removed under vacuum and the residue was further purified by column chromatography eluting with ethyl acetate/methanol (v/v = 5:1); Yield: 90%. ^1H NMR(600 MHz, CDCl_3): δ 7.45 (d, $J=7.2$ Hz, 2H), 6.42 (d, $J=7.2$ Hz, 2H), 4.60 (s, 2H), 2.65 (s, 1H).



Scheme 1 Synthesis of 4-(prop-2-ynyloxy)pyridine

Fig. S2 General procedure for the synthesis of ethyl 2-azidoacetate

A suspension of ethyl bromoacetate (3.34 g, 0.02mol) and NaN₃ (2.60 g, 0.04 mmol) in DMF (20 mL) was stirred for 5 h at 50 °C. The mixture was cooled and then diluted with ethyl acetate (20 mL) and washed with water (3 × 10 mL). The organic phase was dried over magnesium sulphate, filtered and the solvent was removed under reduced pressure. The azide was sufficiently pure to use without further work up; IR 3442, 2110(-N₃), 1670(C=O), 1390, 1099 cm⁻¹.



Scheme 2 Synthesis of ethyl 2-azidoacetate

Fig. S3 The synthesized process of triazole-ester modified silver nanoparticles(TE-Ag NPs)

1.0 mL silver nitrate (10^{-2} mol/L) and sodium borohydride (12 mg) in the presence of 1.0 mL(10^{-3} mol/L) 4-(prop-2-ynyloxy)pyridine (1) solution in 100 mL pure water were stirred for 2h at room temperature. Finally, 4-(prop-2-ynyloxy)pyridine (PP) modified silver nanoparticle (PP-Ag NPs) were obtained. To PP-Ag NPs solution, 1.0 mL (10^{-3} mol/L) ethyl 2-azidoacetate was added and stirred for 10 mins. Then, to the above mixture, 0.1 mL mixture of copper sulfate (10 mmol/L) and ascorbic acid sodium(10^{-3} mol/L) were added for 2h at 60 °C. Finally, the synthesized triazole-ester modified silver nanoparticles (TE-Ag NPs) were purified by repeating centrifugation and redispersion in water.

UV-vis spectra: PP-NPs (394nm, 1.03), TE-Ag NPs (394nm, 1.05). IR: PP-Ag NPs (3066, 2927, 2133(*acetylene*), 1579, 1540, 1497 cm^{-1}), TE-Ag NPs (1635(C=O), 1595, 1320, 1028 cm^{-1}).

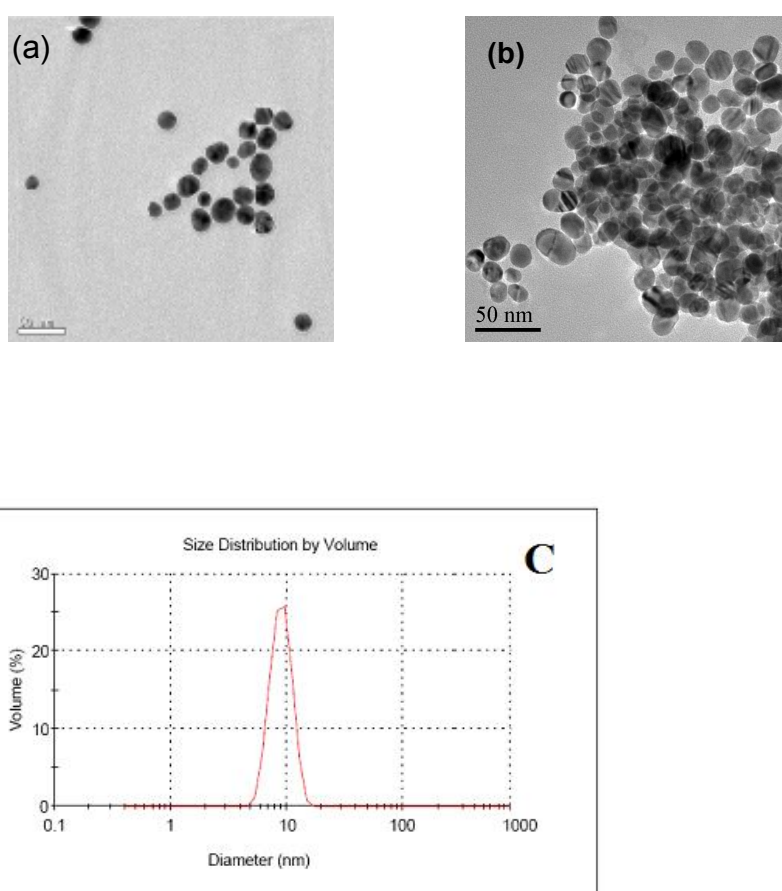


Fig. S4 TEM images of the TE-Ag NPs(a) before and (b) after addition of 10^{-4} M Cd^{2+}
(The scale bars are both 50 nm) and (c) the size distribution of TE-Ag NPs.

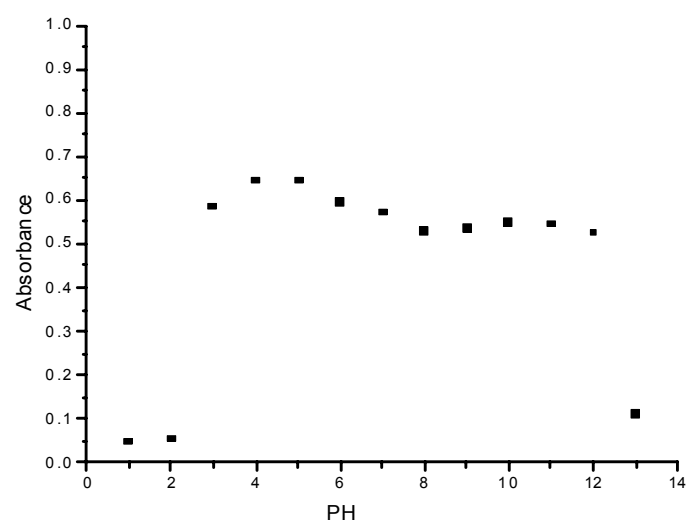


Fig. S5 Effect of pH on the triazole-ester modified Ag NPs solution

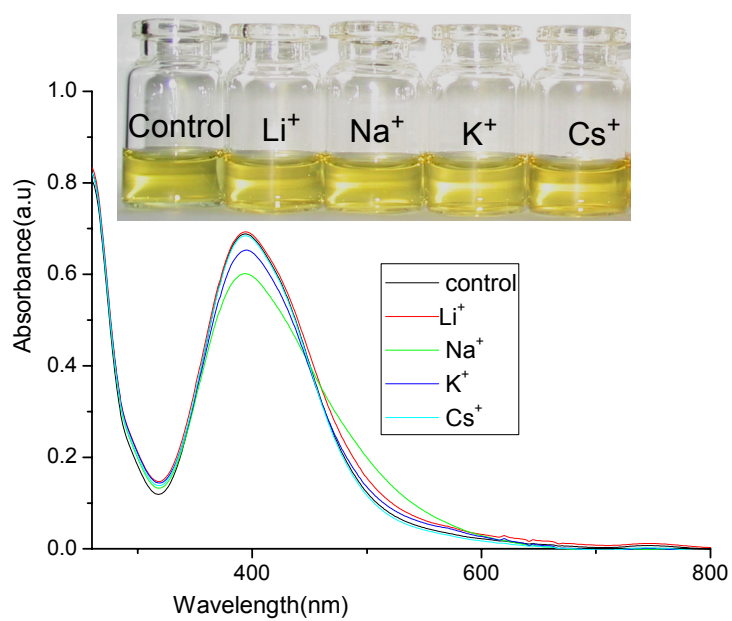


Fig. S6 The photographic images and UV-vis spectra of TE-Ag NPs solution in the presence of 0.1 mM different alkali metal ions.

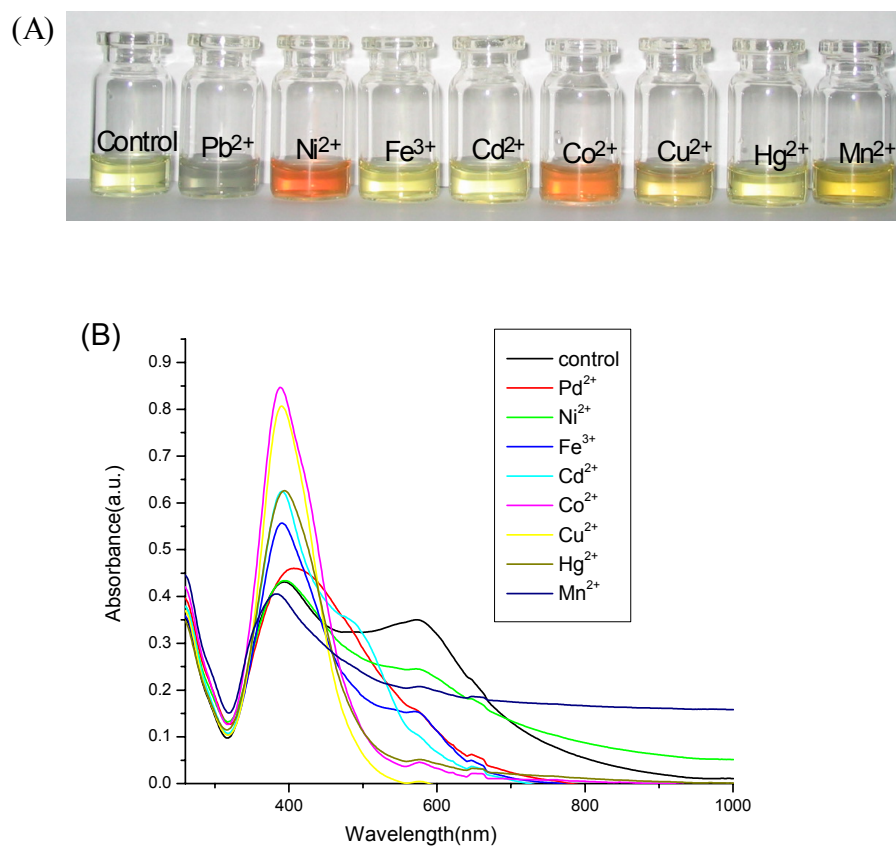


Fig. S7 The photographic image(A) and UV absorbance(B) of PP-Ag NPs solution after adding transition metal ions (10^{-4} M) for 5 mins.