Supporting Information

Ultra-facile and rapid colorimetric detection of Cu$^{2+}$ with branched polyethyeneimine in 100 % aqueous solution

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Fig. S1 depicted the FTIR spectra of BPEI and BPEI-Cu$^{2+}$ complexes. In the FTIR curve of BPEI, the characteristic bands at 1577 and 1460 cm$^{-1}$ are attributed to the asymmetric and symmetric bending vibration of primary amines (-NH$_2$), respectively. The broad band centered at 3284 cm$^{-1}$ is assigned to the stretching vibration of primary amines.[1, 2] The bands observed at 2937 and 2812 cm$^{-1}$ are attributed to the stretching vibration of -CH$_2$. The band at 1300 cm$^{-1}$ is attributed to the stretching vibration of C-N.[3] The formation of BPEI-Cu$^{2+}$ complexes causes the red shift of the amine bands to 3352, 1598 and 1480 cm$^{-1}$.

![Fig. S1 FTIR spectra of BPEI and BPEI-Cu$^{2+}$ complexes.](image-url)
Fig. S2 (a) The absorption spectra of BPEI (43 mg·L⁻¹, Mw=10,000) upon addition of various concentrations of Cu²⁺ in 100 % aqueous solution. (b) Absorption intensity changes of BPEI at 278 nm in the presence of increasing concentrations of Cu²⁺. (Inset: a linear relationship of absorption intensity versus the concentration of Cu²⁺ over the range from 5 to 150 μM).

Fig. S3 (a) The absorption spectra of BPEI (BPEI 43 mg·L⁻¹, Mw=25,000) upon addition of various concentrations of Cu²⁺ in 100 % aqueous solution. (b) Absorption intensity changes of BPEI at 278 nm in the presence of increasing concentrations of Cu²⁺. (Inset: a linear relationship of absorption intensity versus the concentration of Cu²⁺ over the range from 5 μM to 150 μM).

Fig. S4 Photograph of the solution of FeCl₃ (left) and the BPEI with Fe³⁺ (right).
Fig. S5 Detection of Cu\textsuperscript{2+} in the tap water samples by colorimetric method. The concentrations of Cu\textsuperscript{2+} from (a) to (d) is 10, 20, 50 and 200 μM, respectively.

References