

Supporting information

Instrumentation

Scanning electron microscopy (SEM, Zeiss Sigma300, UK) and elemental analysis (EDS) were used to detect the morphology and surface elements before and after adsorption. Powder X-ray diffractometer (PXRD, D/max-2500, Japan) was used to detect the morphology and structure of the material before adsorption and the loaded ion composition after adsorption. The specific surface area and micropore analyzer (BET, ASAP 2020 HD88, USA) were used to detect the specific surface area of the materials. XPS, Thermo Scientific K-Alpha, USA were used to characterize the elemental composition of the material. Au concentration was determined by atomic absorption spectrometer (AAS, AA6880, Japan). The zeta potential of the material was detected by PALS instrument. The differential thermogravimetric analyzer (DS-TGA, STA 449 F5,DE) was used to detect the thermal stability of the materials, and the Fourier infrared spectrometer (FT-IR, Avatar 370, USA) was used to detect the structural groups of the materials.

Figure caption:

Figure S1. The SEM-EDS analysis of N-TPCOP

Figure S2. Adsorption of gold ions by N-TPCOP at different concentrations of hydrochloric acid

Figure S3. Adsorption of low concentration gold by N-TPCOP

Figure S4. The N-TPCOP was compared before and after adsorption and desorption

Figure S5. Infrared comparison of N-TPCOP before adsorption, after adsorption and after desorption



Figure S1. The SEM-EDS analysis of N-TPCOP

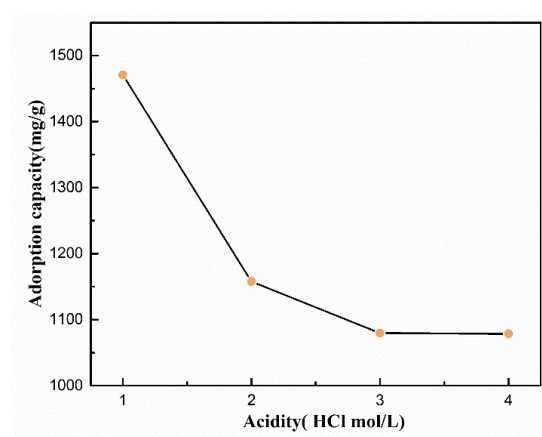


Figure S2. Adsorption of gold ions by N-TPCOP at different concentrations of hydrochloric acid

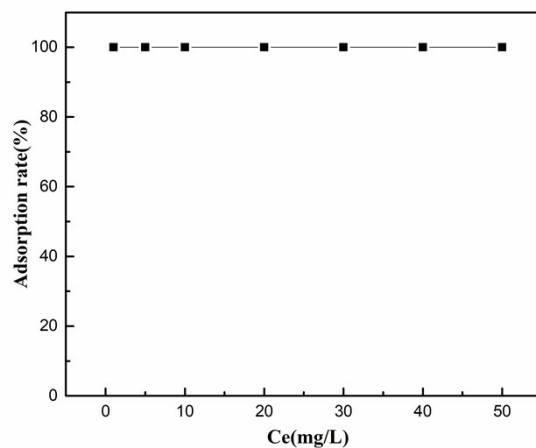


Figure S3. Adsorption of low concentration gold by N-TPCOP

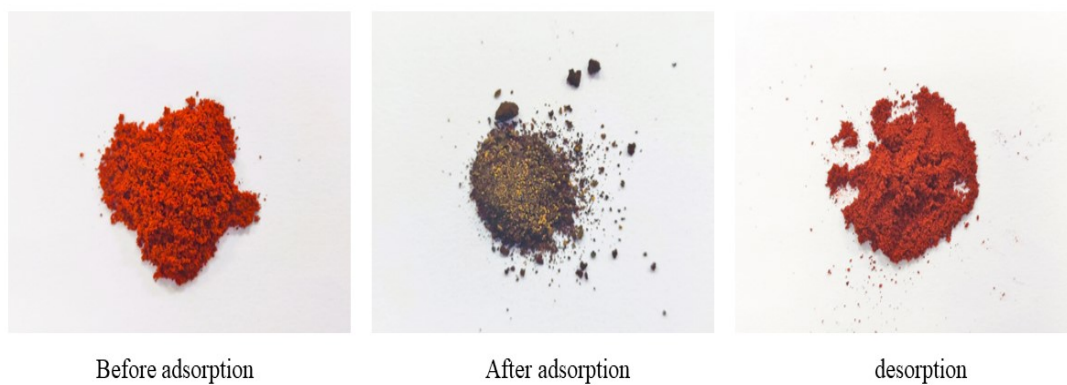


Figure S4. The N-TPCOP was compared before and after adsorption and desorption

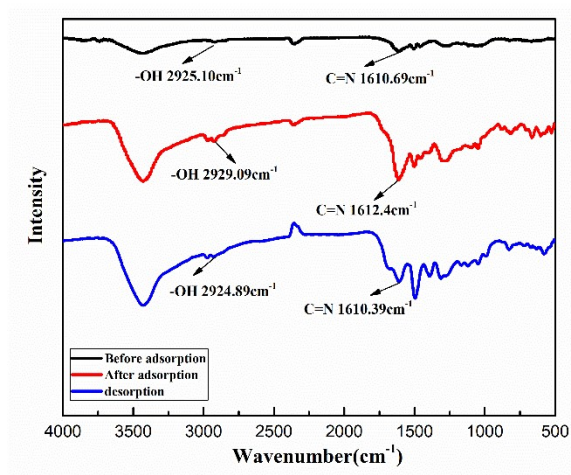


Figure S5. Infrared comparison of N-TPCOP before adsorption, after adsorption and after desorption

Table caption:Table S1 K_Q and K values of N-TPCOP for mixed ions

Table S2 Compare with previously reported material

Table S1 K_Q and K values of N-TPCOP for mixed ions

Metal ions	K_Q(mg/L)	K
Au ³⁺	282.74	---
Pb ²⁺	0.31	914.4978
Cu ²⁺	0.047	5952.75
Ni ²⁺	0.017	16273.6
Co ²⁺	0.034	8185.688

Table S2 Compare with previously reported material

absorbents	q_{max}(mg/g)	Number of cycles	adsorption rate after the cycle(%)	Ref
N-TPCOP	3400.38	5	87.7	This work
CS-GTU	695.63	5	87.19	55
N-TPCOP	3400.38	4	90.6	This work
IM-TUCS	933.2	4	93	44
CS-MoS ₂ -1	2012.46	4	71.8	45
CS-MoS ₂ -2	2611.32	4	80.9	45
CS-MoS ₂ -3	3108.79	4	86.4	45
N-TPCOP	3400.38	3	99.8	This work
N-containing polymer	1073	3	94	54
Tannin resins	343	3	81	56
IXOS-AuC	1334	3	98	57