Supplementary Materials:

Table S1. Modeling of isotherm result for PPAC, PPAC-MS 25, PPAC-MS 50, and PPAC-MS 100.

Pollutants	Langmuir Parameter			Frendlich Parameter				Experiment
	q_L	K_L	R^2	q_F	K_p	n	R^2	q_{exp}
PPAC	174.774	0.023	0.983	97.431	38.778	4.246	0.894	165
PPAC-MS 25	363.438	0.005	0.901	85.549	12.806	2.060	0.866	220
PPAC-MS 50	386.556	0.006	0.965	103.784	15.964	2.090	0.936	285
PPAC-MS 100	367.601	0.022	0.956	185.766	55.714	3.249	0.998	369

Table S2. Comparison of Cu(II) adsorption capacities between PPAC, PPAC-MS 100 and other absorbents.

Adsorbents	Initial pH	Q_{max} (mg g^{-1})	References
Nitrogen-Functionalize GO	5	34.4	[1]
MgO (precipitation and calcination)	3–4	593	[2]
$Mg(OH)_2$/GO	5	216	[3]
Activated carbon cloth	5	15.3	[4]
PPAC	4.5	165	This study
PPAC-MS 100	4.5	369	This study

Table S3. Modeling of Kinetic result for PPAC, PPAC-MS 25, PPAC-MS 50 and PPAC-MS 100.

Cu Removal	Pseudo-First-Order Model			Pseudo-Second-Order Model			
0 M NaCl	K_1(min^{-1})	*Slope*	R^2	K_2(min^{-1})	V_0	R^2	Q_{eq}
PPAC	0.0264	0.0115	0.5409	0.0004	19.1843	0.972	225.450
PPAC-MS 25	0.0177	0.0077	0.8731	0.0003	21.1844	0.995	256.859
PPAC-MS 50	0.0161	0.0070	0.7980	0.0003	22.4362	0.984	284.257
PPAC-MS 100	0.0192	0.0084	0.7177	0.0005	57.0002	0.996	338.041
0.01 M NaCl							
PPAC	0.023	0.010	0.941	0.0010	23.710	0.995	153.066
PPAC-MS 25	0.021	0.009	0.303	0.0005	15.638	0.991	184.616
PPAC-MS 50	0.016	0.007	0.734	0.0004	16.257	0.983	213.899
PPAC-MS 100	0.017	0.007	0.850	0.0005	29.110	0.994	241.733
0.1 M NaCl							
PPAC	0.021	0.009	0.896	0.0005	10.239	0.972	147.246
PPAC-MS 25	0.018	0.008	0.698	0.0007	12.813	0.993	137.088
PPAC-MS 50	0.015	0.007	0.821	0.0005	14.073	0.982	175.348
PPAC-MS 100	0.016	0.007	0.907	0.0004	17.659	0.986	199.550

Table S4. Isotherm result for PPAC-MS 100 for As, Zn, Al, Fe and Mn removal.

Pollutants	Langmuir Parameter			Frendlich Parameter				Experiment
	q_L	K_L	q_{exp}	q_F	K_p	n	R^2	q_{exp}

Zn (II)	487.563	0.006	0.931	120.819	15.331	1.895	0.962	373
Al (III)	330.431	0.008	0.968	102.695	18.801	2.304	0.919	244
Mn (II)	315.539	0.008	0.957	94.551	14.671	2.100	0.904	234
Fe (II)	1367.727	0.002	0.997	105.954	5.559	1.327	0.974	562
As (V)	167.039	0.022	0.955	80.073	19.829	2.803	0.902	191

Table S5. Pore characteristic of PPAC, PPAC-MS 25, PPAC-MS 50, and PPAC-MS 100.

Sample	PPAC	PPAC-MS 25	PPAC-MS 50	PPAC-MS 100
Total surface area(m^2 g^{-1})	1,099.80	992.97	910.32	772.10
BET surface area (m^2 g^{-1})	1,207.70	1,056.8	966.87	831.7
Microspore surface area (m^2 g^{-1})	966.55	684.87	620.8	650.1
Total pore volume(cm^3 g^{-1})	0.54	0.537	0.489	0.470
Microspore volume (cm^3 g^{-1})	0.38	0.28	0.256	0.263

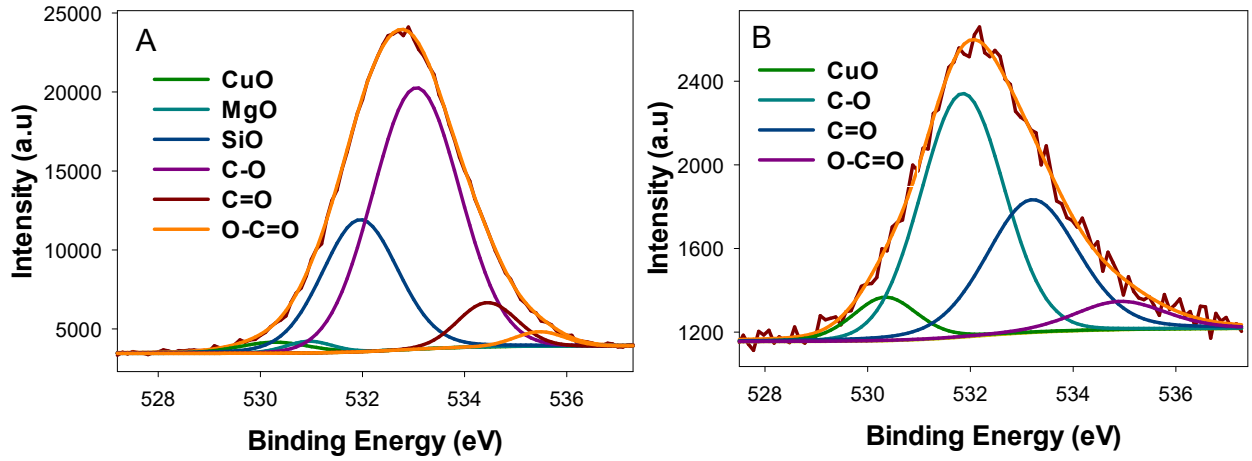

Figure S1. XPS analysis binding energy after adsorption (A) PPAC-MS 100 and (B) PPAC.

References for Supporting Information

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