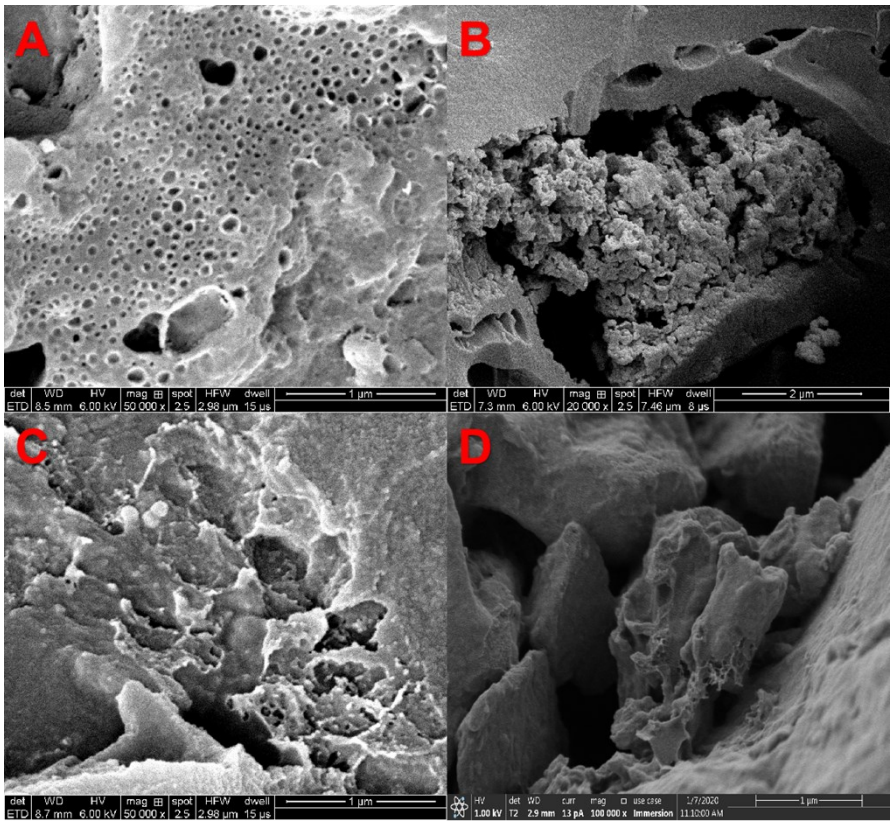

Fig. S1 SEM images of (A) PUPW-ACA (B) CS-ACA (C) PC-ACA (D) AT-ACA

1 g of AC was accurately weighed and mixed with 10 ml of 4 mol NaOH solution. The mixture was stirred and refluxed at 60 ℃ for 3 h. The experimental operating conditions were consistent with the nitric acid modification treatment. Finally, the pore structure and specific surface area of the adsorbent were determined. It can be seen from Table 5 that the pore structure and specific surface area of the adsorbent did not change much after the acid, base treatment. This indicates that the adsorbent prepared in this study has higher stability in environments with different pH values.

Table S1 Pore size information and specific surface area of PUPW-ACA, CS-ACA, PC-ACA, and AT-ACA after acid and alkali treatment.

ACA	S_{BET}[a] ($m^2\ g^{-1}$)	S_{mic} ($m^2\ g^{-1}$)	V_{total} [b] ($cm^3\ g^{-1}$)	S_{ave} [c] (nm)
Raw PUPW-ACA	1075	998	0.506	2.1
Raw CS-ACA	1155	1050	0.610	1.8
Raw PC-ACA	134	9	0.112	8.5
Raw AT-ACA	54	1	0.085	9.0
PUPW-ACA HNO_3 60 ℃	1082	1006	0.499	2.2
CS-ACA HNO_3 60 ℃	1150	1097	0.625	1.9
PC-ACA HNO_3 60 ℃	136	11	0.118	8.5
AT-ACA HNO_3 60 ℃	52	0.5	0.080	9.1
PUPW-ACA NaOH 60 ℃	1080	1001	0.510	2.2
CS-ACA NaOH 60 ℃	1148	1109	0.623	2.0
PC-ACA NaOH 60 ℃	138	10	0.115	8.6
AT-ACA NaOH 60 ℃	50	0.5	0.099	8.9

[a] S_{BET}: specific surface area using BET;

[b] V_{total}: total pore volume (at $P/P_o \cong 0.99$);

[c] S_{ave}: average pore size.;