Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary materials

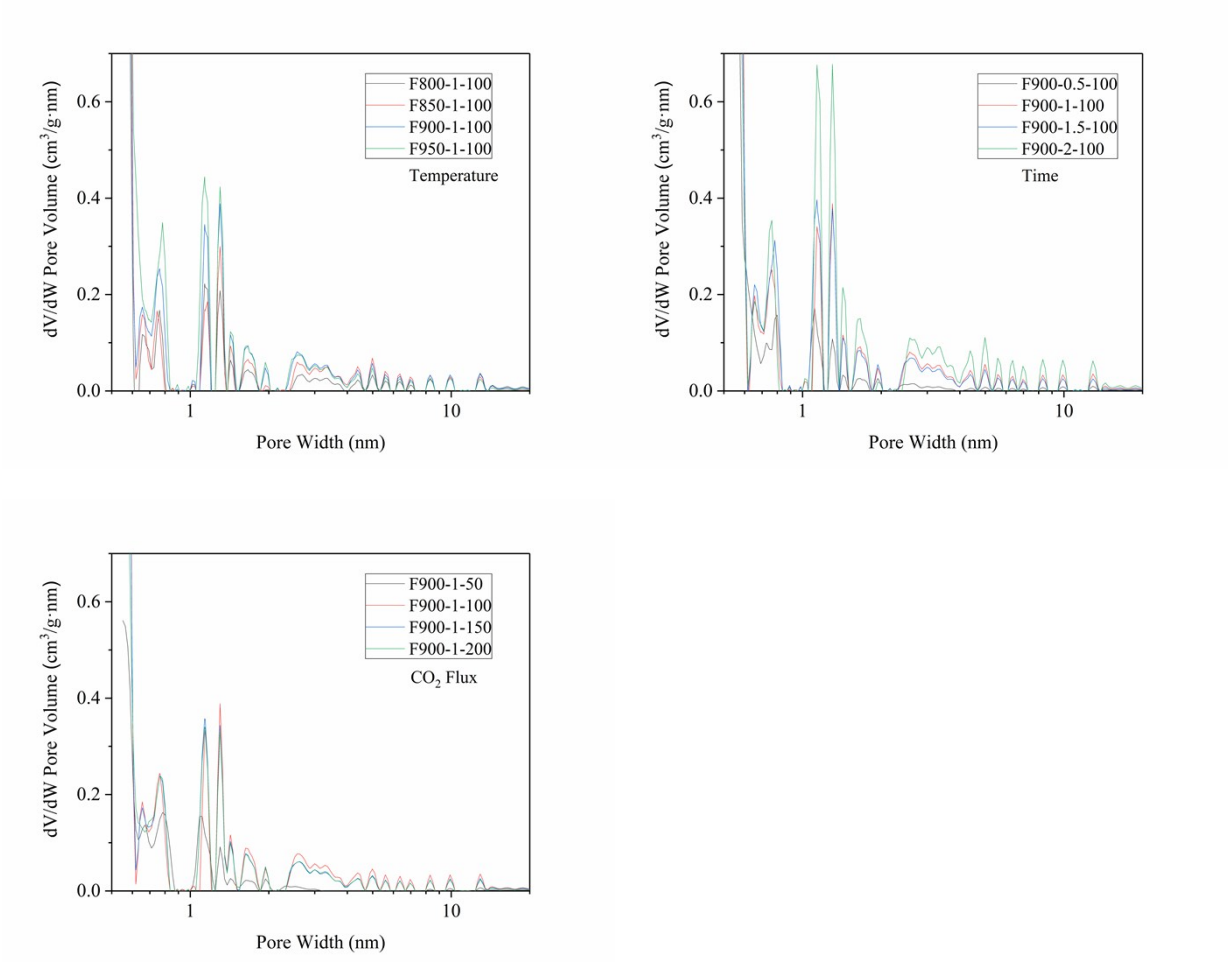

Fig. S1 Pore size distribution of different activated carbons.

According to the pore size distribution diagram Fig. S1, pore volume of 0.5-0.9 nm has no obvious regularity, so it is not main adsorption structure. Pore volume of 1-2 nm and 2.3-4.7 nm is consistent with phenol adsorption capacity trend, it can be regarded as main structure for adsorption. Pore volume of 4.7-10 nm is positively correlated with the trend of phenol adsorption capacity to some extent, and it is the functional transition of adsorption and channels.

Table S1 Peak parameters of XPS analysis.

Peak	Position (eV)	Area	Area ratio (%)	FWHM (eV)	%GL (%)
C graphite	284.4	51078.500	71.86	1.097	20
C-C/C-H	285.6	4332.204	6.09	0.791	20
C-O/C-S	286.5	6287.481	8.85	1.541	20
C=O	288.7	5227.449	7.35	2.300	20
Carbonate	290.9	4157.923	5.85	2.300	20

The high-resolution spectrum of C1s can be fitted into five main wide peaks. And table S1 shows the parameters of XPS analysis of C1s spectrum. The peak of C graphite occupies a major part of the peak area, so this is the main structure of the sample. The proportion of C=O peak is relatively small.

Table S2 Adsorption isotherm models fitting parameters.

AC	Langmuir			Freundlich			Redlich-Peterson			
F900-1-100	Q_0	K_L	R^2	K_F	n	R^2	A	B	n	R^2
	175.48	0.00141	0.9989	1.6587	1.6612	0.9887	0.26074	0.00247	0.93069	0.99883

Table S2 gives the fitting parameters of adsorption isotherm models. Langmuir model is the best fitting (R^2=0.9989), and the Redlich-Peterson model is better than Freundlich model. The parameter Q_0 of Langmuir has the meaning of saturated adsorption capacity. The parameter K_L in this table is different from the K_L used for thermodynamic calculation which needs unit conversion and dimensionless first.

Table S3 Adsorption kinetics models fitting parameters.

AC	Pseudo-first-order			Pseudo-second-order			Intraparticle diffusion					
F900-1-100	q_t	k_1	R^2	q_t	k_2	R^2	K_{WM1}	C_1	R^2	K_{WM2}	C_2	R^2
	123.32	0.1527	0.9579	143.15	0.00125	0.9836	28.1882	1.5098	0.99794	11.1783	57.2659	0.98891

Table S3 shows the fitting parameters of adsorption kinetics models. Intraparticle diffusion model is the best fitting, and the Pseudo second order model is better than Pseudo first order model. The parameter C_1 is the intercept of the curve of intraparticle diffusion model and y-axis. The curve of intraparticle diffusion model does not go through the origin. This is the need to pay attention, because it is difficult to visualize it from the figure.