

**Carbon aerogel as solid-phase microextraction fiber coating for extraction and
detection of trace tetracyclines residues in foods by coupling with high-performance
liquid chromatography**

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Figures

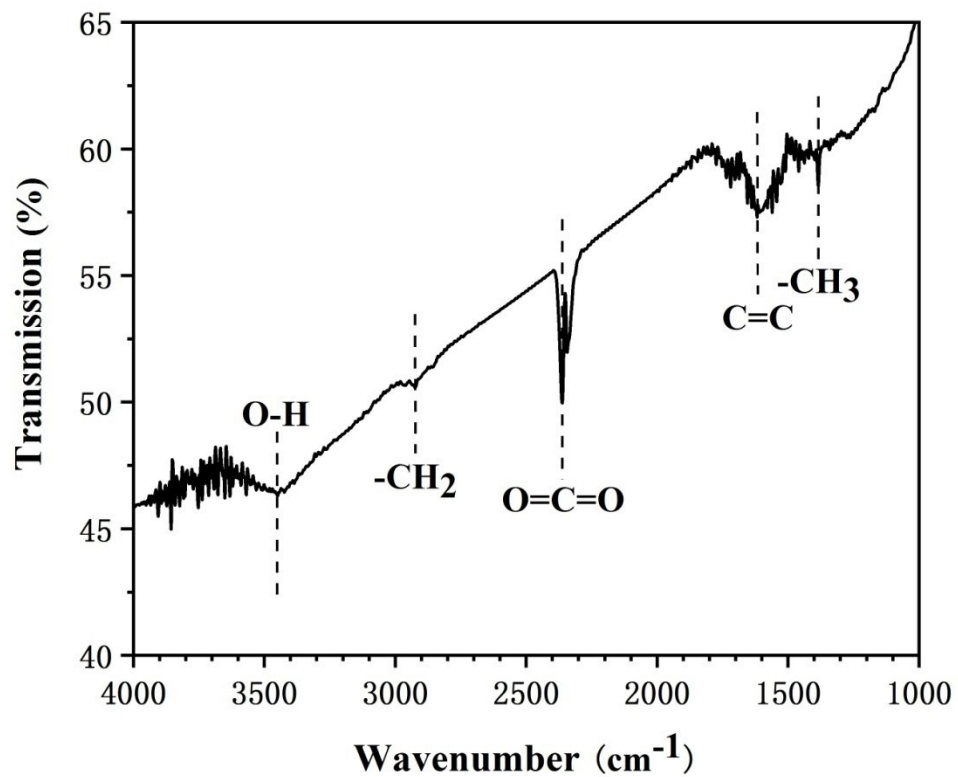


Fig. S1. FTIR spectra of CA.

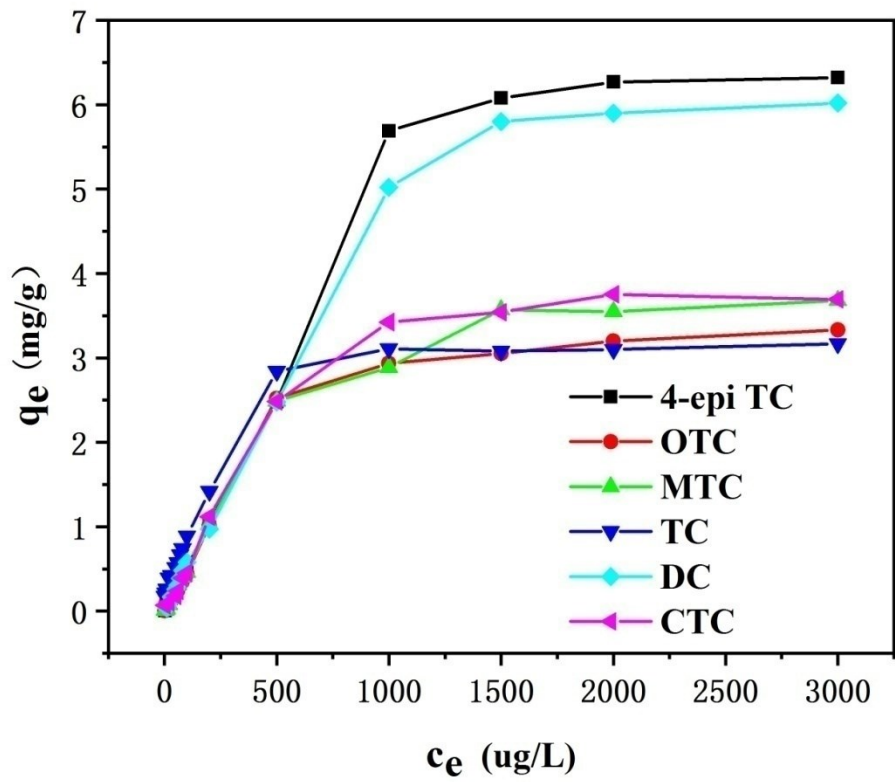


Fig. S2. The equilibrium adsorption fitting curves of CA fiber for TCs.

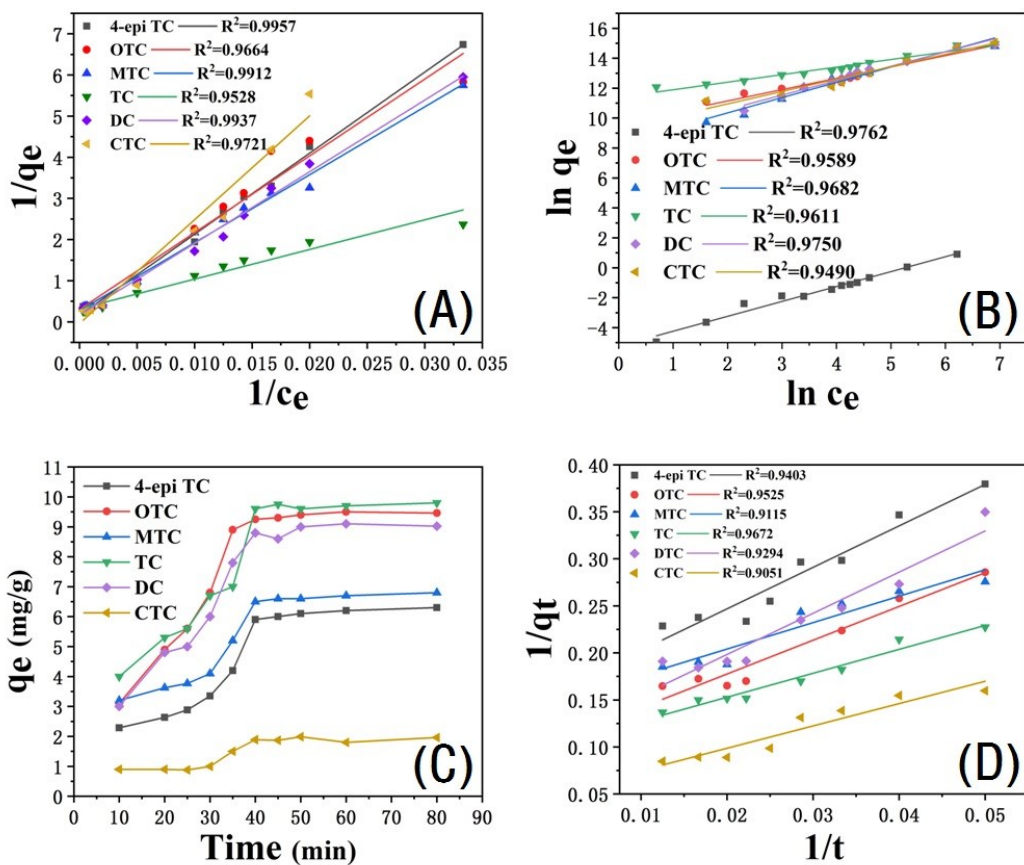


Fig. S3. The adsorption isotherms of Langmuir (A), Freundlich (B), and adsorption kinetics (C), the Pseudo-second order kinetics model for adsorption (D) of TCs on CA.

Tables:

Table S1: Factors, Coded Levels, and BBD Matrix.

Factors		Coded levels		
		Low (-1)	Central (0)	High (+1)
X ₁ :extraction temperature(°C)		30	45	60
X ₂ :extraction time(min)		40	60	80
X ₃ :salt concentration(wt%)		0	7.5	15
X ₄ :desorption time(min)		2	13.5	25

Standard order	Runorder	X ₁	X ₂	X ₃	X ₄
25	1	0	0	0	0
22	2	0	1	0	-1
12	3	1	0	0	1
19	4	-1	0	1	0
6	5	0	0	1	-1
23	6	0	-1	0	1
29	7	0	0	0	0
21	8	0	-1	0	-1
26	9	0	0	0	0
28	10	0	0	0	0
8	11	0	0	1	1
9	12	-1	0	0	-1
27	13	0	0	0	0
1	14	-1	-1	0	0
11	15	-1	0	0	1
14	16	0	1	-1	0
15	17	0	-1	1	0
3	18	-1	1	0	0
17	19	-1	0	-1	0
7	20	0	0	-1	1
2	21	1	-1	0	0
16	22	0	1	1	0
4	23	1	1	0	0
5	24	0	0	-1	-1
18	25	1	0	-1	0
10	26	1	0	0	-1
20	27	1	0	1	0
24	28	0	1	0	1
13	29	0	-1	-1	0

Table S2: Experimental BBD Matrix.

Standardorder	Run order	X ₁ (°C)	X ₂ (min)	X ₃ (wt%)	X ₄ (min)
21	1	45	40	7.5	2
16	2	45	80	15	13.5
26	3	45	60	7.5	13.5
5	4	45	60	0	2
23	5	45	40	7.5	25
11	6	30	60	7.5	25
27	7	45	60	7.5	13.5
14	8	45	80	0	13.5
3	9	30	80	7.5	13.5
10	10	60	60	7.5	2
2	11	60	40	7.5	13.5
25	12	45	60	7.5	13.5
18	13	60	60	0	13.5
15	14	45	40	15	13.5
1	15	30	40	7.5	13.5
19	16	30	60	15	13.5
9	17	30	60	7.5	2
24	18	45	80	7.5	25
6	19	45	60	15	2
13	20	45	40	0	13.5
22	21	45	80	7.5	2
28	22	45	60	7.5	13.5
20	23	60	60	15	13.5
17	24	30	60	0	13.5
29	25	45	60	7.5	13.5
7	26	45	60	0	25
12	27	60	60	7.5	25
8	28	45	60	15	25
4	29	60	80	7.5	13.5

Table S3: Parameters of Langmuir, Freundlich adsorption isotherms, Pseudo-firstorder

and Pseudo-second order model for analytes on CA-coated fiber.

Analyte ^s	Langmuir			Freundlich			Pseudo-first order			Pseudo-second order		
	K_L (L mg ⁻¹)	q_m (m g g ⁻¹)	R ²	K_F (L mg ⁻¹)	1/n	R ²	K_1 (min ⁻¹)	q_e (m g g ⁻¹)	R ²	K_2 (g mg ⁻¹ min ⁻¹)	q_e (m g g ⁻¹)	R ²
4-epi TC	0.000803	6.32	0.995 7	0.0053 4	0.9 9	0.976 2	-9.36	4.84	0.233 0	0.00571	6.30	0.940 3
OTC	0.00161	3.33	0.966 4	10891	0.7 6	0.958 9	-9.52	8.12	0.456 2	0.00311	9.46	0.952 5
MTC	0.00165	3.68	0.991 2	4050	1.0 2	0.968 2	-9.14	5.54	0.246 7	0.00779	6.76	0.911 5
TC	0.00442	3.17	0.952 8	88370	0.5 0	0.961 1	-9.32	8.12	0.337 6	0.00410	9.80	0.967 2
DC	0.000954	6.02	0.993 7	5690	0.9 6	0.975 0	-9.50	7.57	0.420 8	0.00280	9.02	0.929 4
CTC	- 0.000174	-22.73	0.972 1	10891	0.8 3	0.949 0	-9.12	1.53	0.165 4	0.11039	1.96	0.905 1

Table S4: Analytical results for the determination of the six TCs residues compounds in real food samples.

Analytes	Concentration (µg L ⁻¹)		Spiked concentration (µg L ⁻¹)	Recovery (%)		RSDs(%)	
	Egg	Milk		Egg	Milk	Egg	Milk
4-epi TC	NQ ^a	ND ^b	100	94.99	88.54	3.23	5.02
OTC	NQ	ND	100	88.93	96.40	4.21	1.74
MTC	ND	ND	100	91.84	102.26	5.01	2.20
TC	ND	ND	100	107.33	108.56	3.03	3.16
DC	ND	ND	100	85.61	82.56	8.74	5.78
CTC	ND	ND	100	93.56	86.34	10.52	11.82

^aNQ: Not quantified.

^bND:

Not

detected

