Electronic Supplementary Information

Fabrication of Ce-doped DUT-52 as a sorbent for disperse solid phase extraction of estrogens in human urine samples

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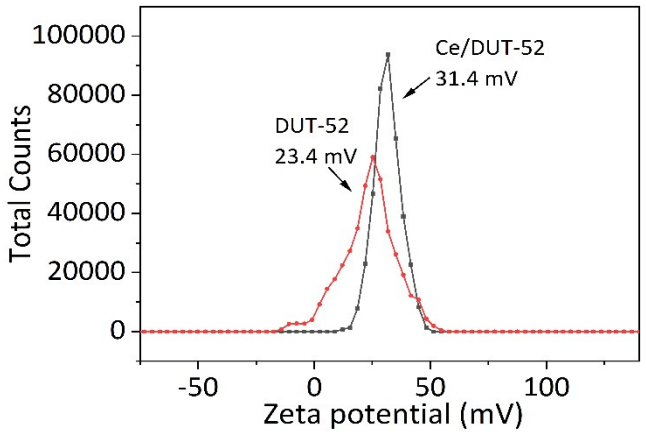

Fig.**S1** The Zeta potential of DUT-52 and Ce/DUT-52 in water

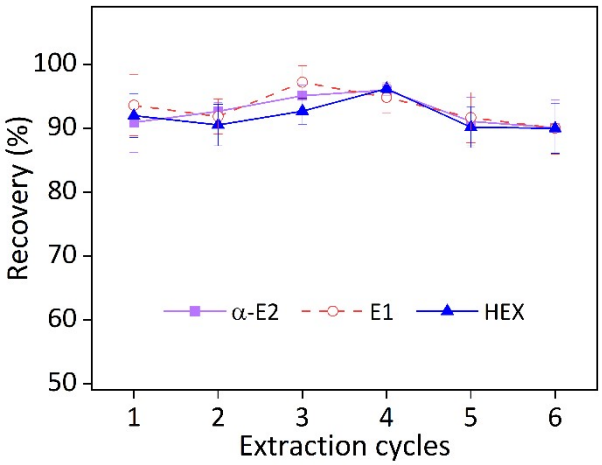

Fig.**S2** Effect of adsorption-desorption cycles on the recoveries of three estrogens (*n*=3)

XRD and FT-IR analysis were performed on the different batches of Ce/DUT-52. As shown in Fig. S3, the crystal phase and chemical structure of Ce/DUT-52 were in good agreement with different batches, indicating that the adsorbents synthesized from different batches had good reproducibility and stability.

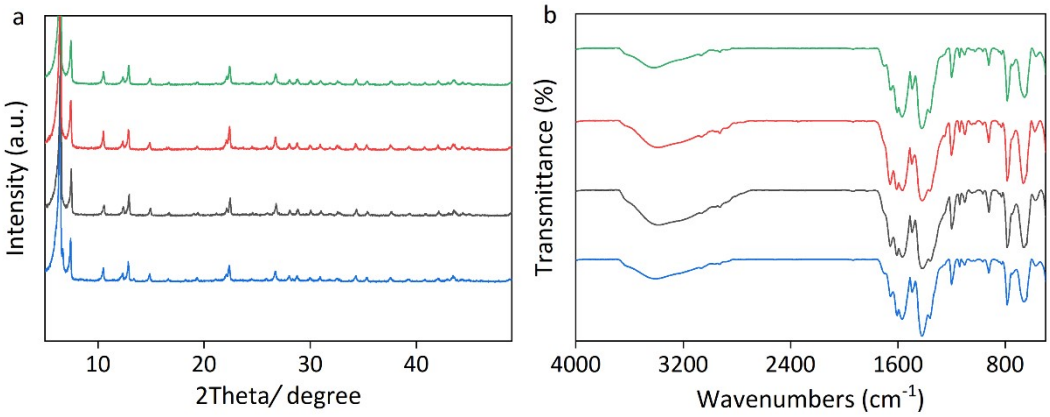

Fig.**S3** (a) XRD patterns and (b) FT-IR spectra on different batches of Ce/DUT-52

Table **S1** Analytical results for the determination of three estrogens in urine samples（*n*=3）

Type	Sample	Analyte	Found (ng/mL)	Spiked (ng/mL)					
				10		25		50	
				Recovery (%)	RSDs (%)	Recovery (%)	RSDs (%)	Recovery (%)	RSDs (%)
male	1	α-E2	4.2±0.2[a]	89.7	2.8	86.6	3.9	89.4	4.9
		E1	5.6±0.4	94.2	4.8	97.3	3.7	94.1	4.8
		HEX	n.d.[b]	91.2	3.5	90.7	3.5	96.3	3.4
	2	α-E2	n.d.	89.4	3.7	91.4	2.6	91.9	4.4
		E1	n.d.	96.7	4.7	99.5	4.1	101.4	6.4
		HEX	3.5±0.4	91.3	2.4	93.5	3.0	94.4	5.0
	3	α-E2	n.d.	95.4	5.4	98.0	5.1	99.7	7.8
		E1	4.6±0.7	95.6	4.1	98.3	3.2	100.0	5.2
		HEX	n.d.	88.5	3.5	90.5	2.3	90.8	4.1
	4	α-E2	n.d.	85.6	8.0	87.3	9.0	87.0	10.4
		E1	5.8±0.3	97.3	2.3	100.1	5.1	102.2	7.7
		HEX	n.d.	99.6	6.5	102.7	6.8	105.2	9.9
	5	α-E2	6.4±0.4	95.8	1.7	95.0	5.7	97.1	1.7
		E1	9.7±0.2	104.7	2.1	99.4	2.9	102.2	3.0
		HEX	4.3±0.3	96.3	2.2	91.6	2.5	98.2	2.5
female	6	α-E2	6.4±0.2	97.2	10.3	100.0	6.5	102.1	9.5
		E1	n.d.	93.6	6.6	96.1	8.9	97.4	8.9
		HEX	n.d.	91.4	1.9	93.6	5.9	94.5	5.5
	7	α-E2	5.3±0.3	93.1	2.6	95.5	6.9	96.7	6.7
		E1	6.7±0.5	94.8	8.9	97.4	6.3	98.9	6.0
		HEX	n.d.	92.5	2.8	94.9	5.9	96.0	5.6
	8	α-E2	4.9±0.4	88.0	3.1	89.9	6.3	90.1	5.9
		E1	n.d.	92.8	4.9	95.2	2.1	96.3	3.9
		HEX	n.d.	95.5	8.4	98.2	5.8	99.9	8.7

[a] mean ± standard deviation

[b] no detection