Supporting information for the article:

A sensitive electrochemical sensor with Hf-MOF@activated Ketjen black/calix[4]arene composite for the detection of 2,2'-methylenebis(4-chlorophenol) in environmental water

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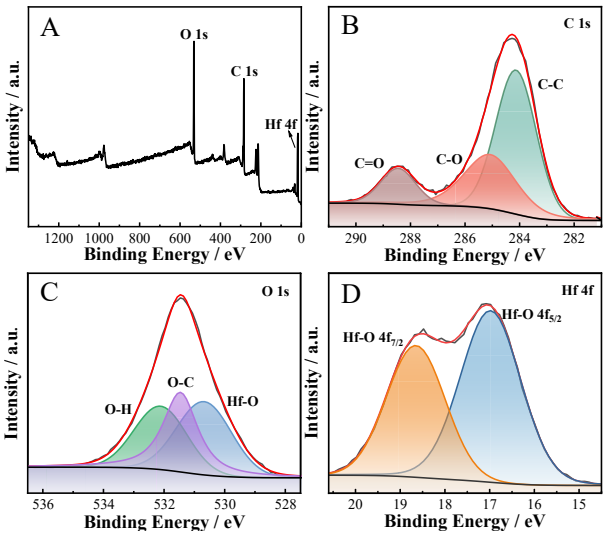

Fig. S1. XPS analysis of Hf-MOF@a-KB/Calix: (A) Survey scan, (B) C 1s, (C) O 1s, and (D) Hf 4f spectra.

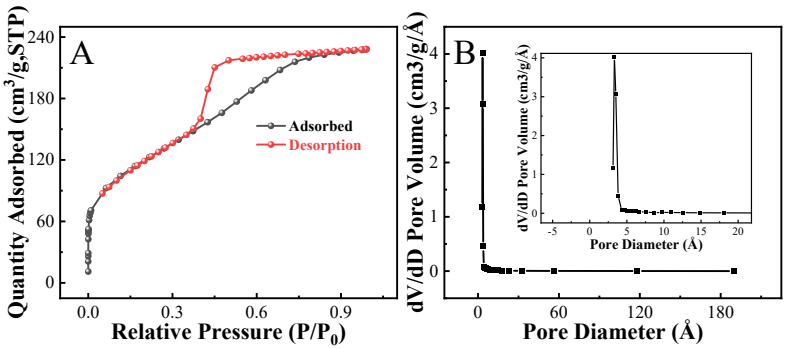

Fig. S2. N_2 adsorption-desorption isotherm (A) and pore size distribution (B) of Hf-MOF@a-CB/Calix/GCE

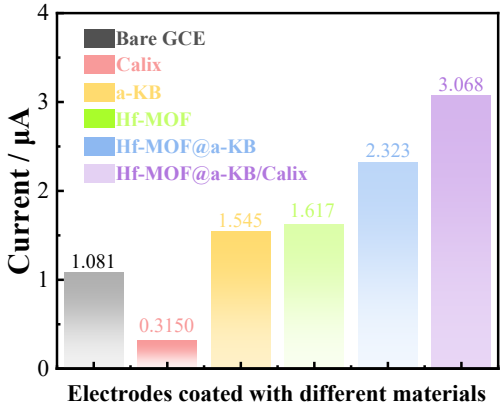

Fig. S3. The bar chart of the CV response curve of bare GCE, Calix/GCE, a-KB/GCE, Hf-MOF/GCE and Hf-MOF@a-KB/Calix/GCE

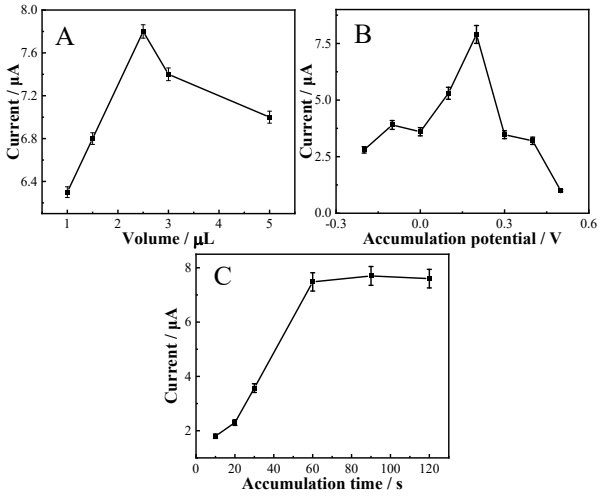

Fig. S4. (A) Effect of different modification volumes of Hf-MOF@a-KB/Calix material in 0.1 M PBS (pH 7.0), Effects of (B) accumulation potential and (C) accumulation time on the detection of 10 μM Dcp.

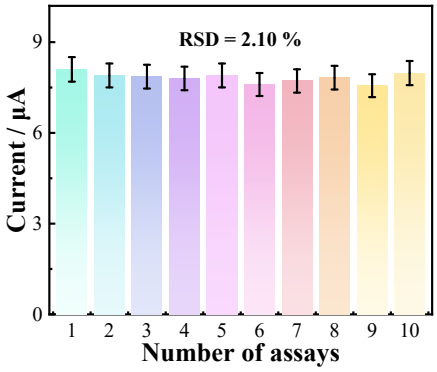

Fig. S5. SWV responses of 10 consecutive determinations of 10.0 μM Dcp

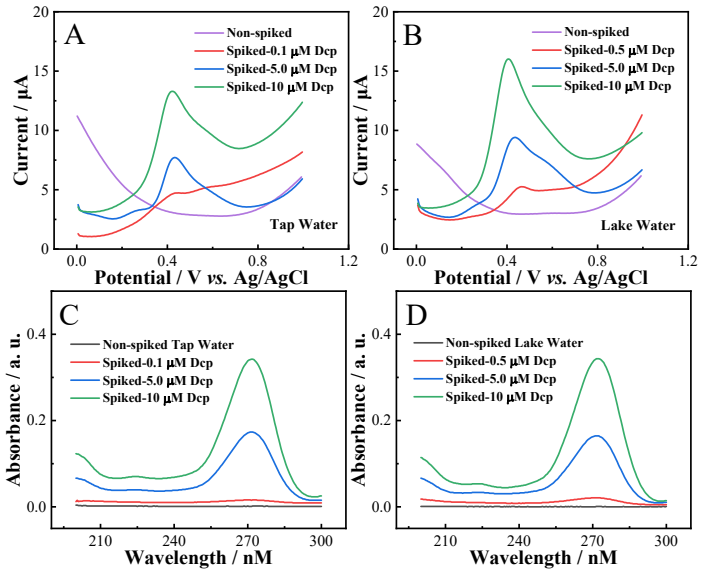

Fig. S6. The SWV curves of Hf-MOF@a-CB/Calix/GCE in tap water (A) (spiked with 0.1, 5.0, and

10 μM Dcp) and lake water (B) (spiked with 0.5, 5.0, and 10 μM Dcp) under non-spiked and spiked conditions, and the corresponding UV-Vis absorbance spectra of the same samples in lake water (C) and tap water (D).

Table S1. BET surface area and pore structure parameters of Hf-MOF@a-KB/Calix.

Sample	S_{BET}/m^2 g^{-1}	V_{total}/cm^3 g^{-1}	D_{avg} / nm
Hf-MOF@a-KB/Calix	422.36	0.353	3.34

Table S2. R_s, R_{ct} and k_s values for different modified electrodes simulated from equivalent circuits.

Electrode	R_s (Ω)	R_{ct} (Ω)	k_s(cm/s)
Bare GCE	28.23	1355	6.94×10^{-9}
Calix/GCE	52	2395	3.93×10^{-9}
Hf-MOF/GCE	29.55	276.4	3.40×10^{-8}
a-KB/GCE	26.86	174	5.41×10^{-8}
Hf-MOF@a-KB/Calix/GCE	13.43	157.9	5.96×10^{-8}

Table S3 The matrix effect evaluation of the sensor in tap water and lake water samples (n=3)

Added (μM)	I_{PBS} (μA)	$I_{Tap\ water}$ (μA)	$I_{Lake\ water}$ (μA)	$ME_{Tap\ water}$ (%)	$ME_{Lake\ water}$ (%)
0.5	1.18	1.29	1.25	105.2	101.6
5.0	4.03	3.35	4.73	83.1	117.3
10	7.44	6.18	7.54	83.0	101.3