Supporting Information

A novel electrochemical sensing based on amino-functionalized MXene for the rapid and selective detection of Hg^{2+}

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Fluorescamine validation NH_2-$Ti_3C_2T_x$

The NH_2-$Ti_3C_2T_x$ (5 mg/mL) was dissolved with NaOH (0.02 mol/L) and fluorescamine (0.1 g/L) was dissolved in acetone. Then, 40 μL of NH_2-$Ti_3C_2T_x$, 80 μL of fluorescamine, and 200 μL of PBS (0.01 mol/L) were mixed, and the reaction was carried out for 10 min under protection from light. Fluorescence spectra were recorded by using F-7100 fluorescence spectrophotometer.

Adsorption experiment

5 mg of NH_2-$Ti_3C_2T_x$ was added into the Hg^{2+}(115 μmol/L) solution and shaken for 24 h. Secondly, the supernatant was centrifuged and filtered through a 0.22 μm filter. Then the atomic fluorescence was used to detect the Hg^{2+} concentration after adsorption. In order to better demonstrate its adsorption capacity, the concentration of Hg^{2+} solution without NH_2-$Ti_3C_2T_x$ was also tested under the same conditions.

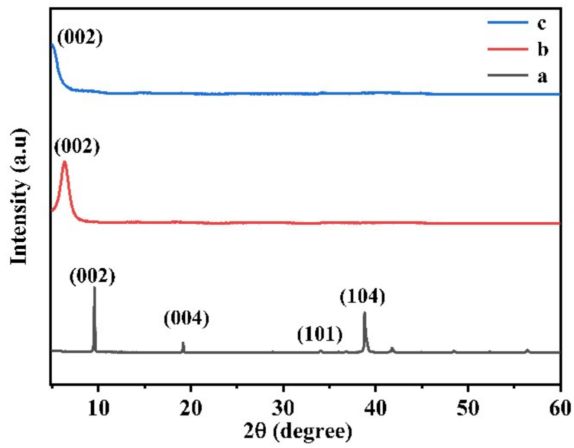

Fig.S1 XRD spectra of Ti_3AlC_2 (a), $Ti_3C_2T_x$ (b) and NH_2-$Ti_3C_2T_x$ (c).

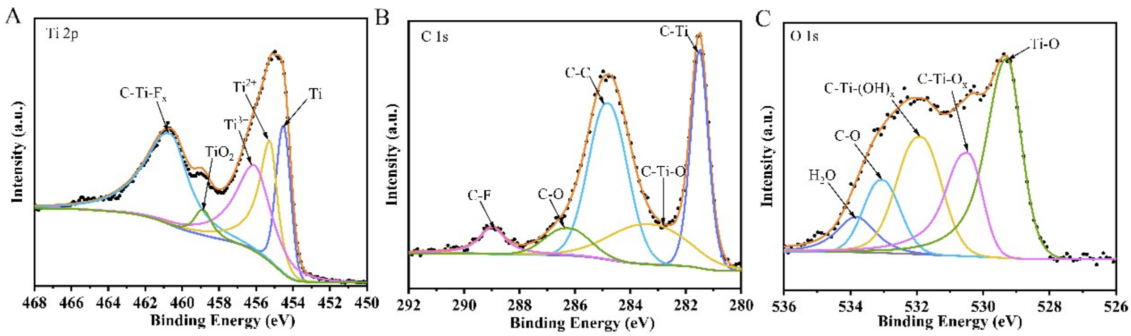

Fig.S2 High-resolution XPS spectra of Ti 2p (A), C 1s (B), O 1s (C) of $Ti_3C_2T_x$.

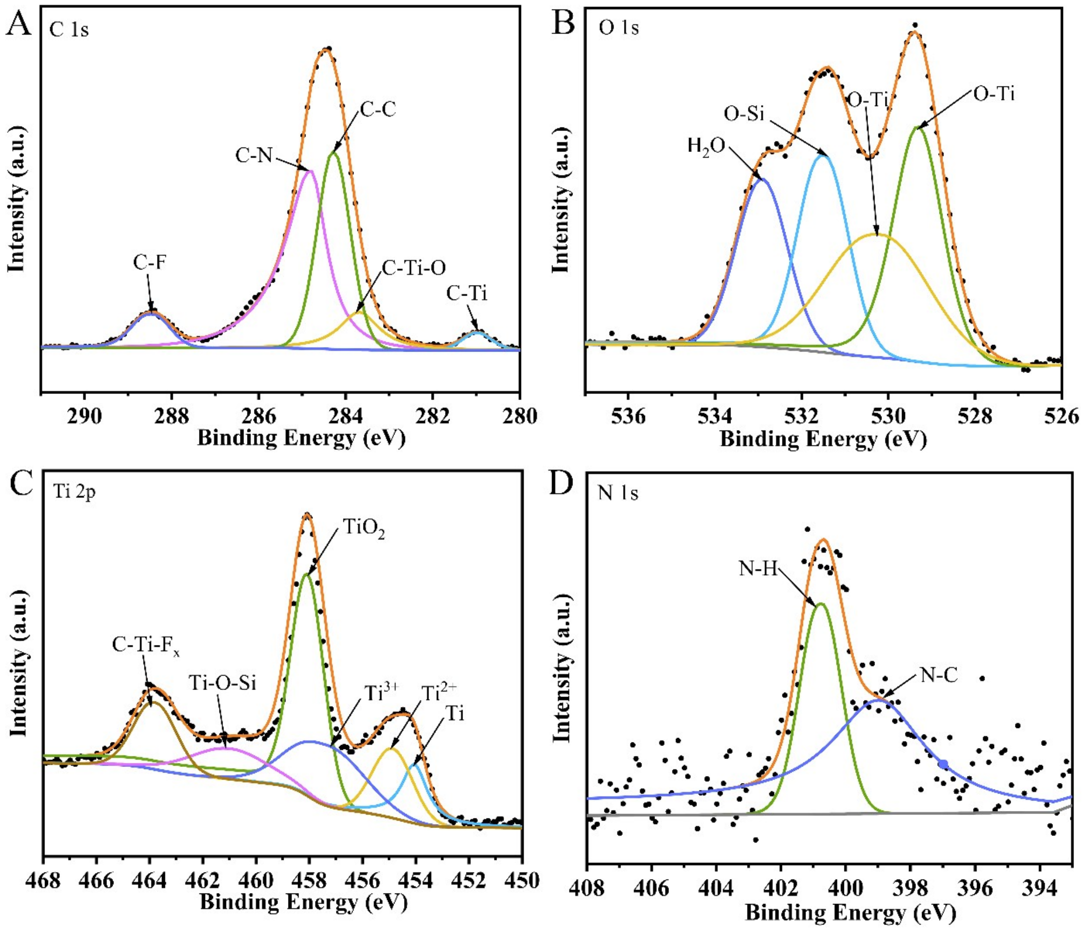

Fig.S3 High-resolution XPS spectra of C 1s (A), O 1s (B), Ti 2p (C), N 1s(D) of NH_2-$Ti_3C_2T_x$.

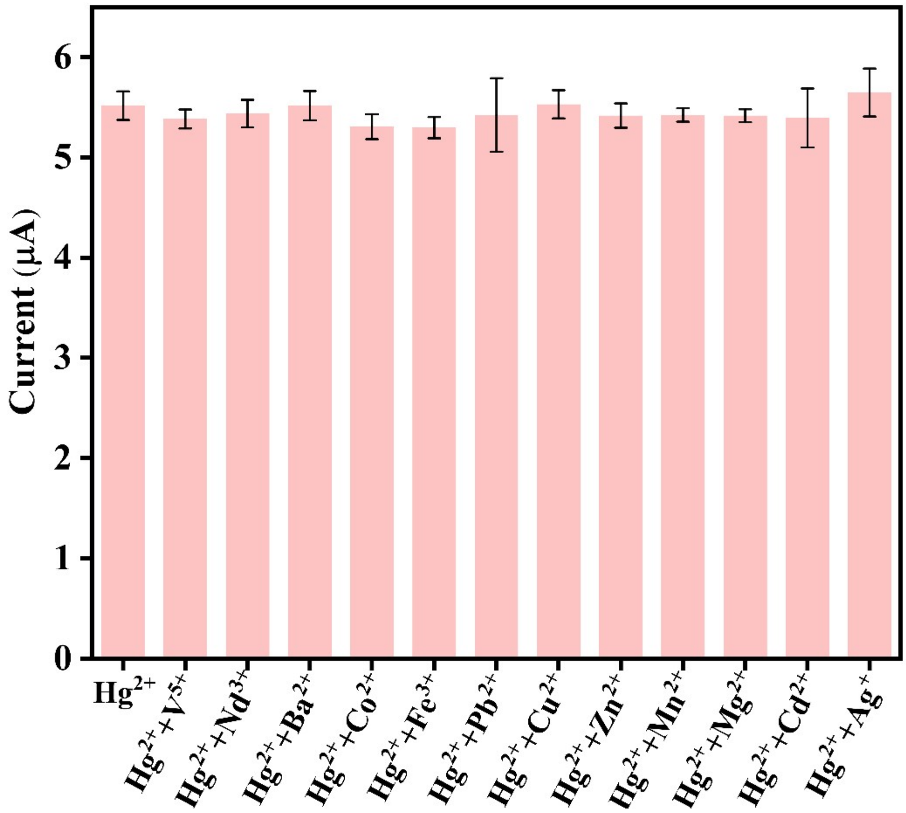

Fig.S4 The selectivity of propose electrochemical sensing for detection Hg^{2+}. All the data were presented three independent measurements (n = 3).

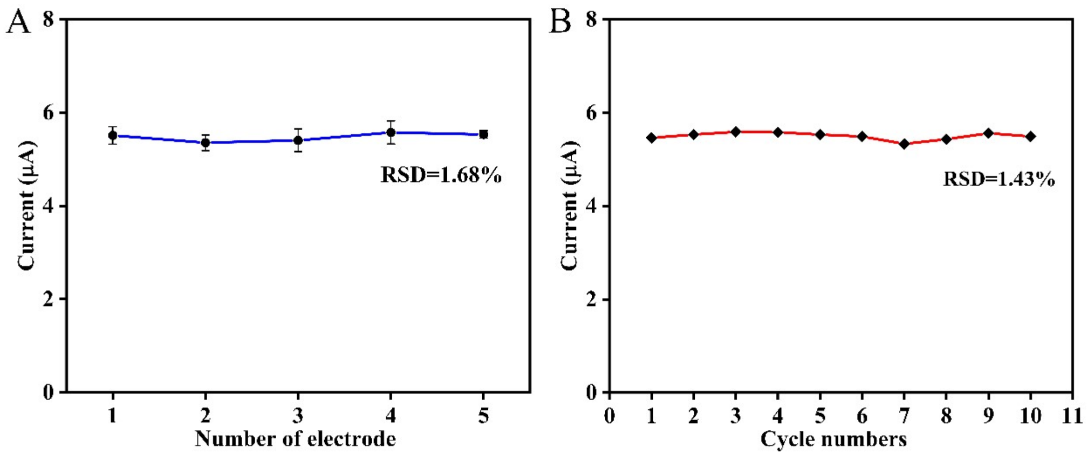

Fig.S5 (A) The peak current values of 1.0 μmol/L Hg^{2+} at five independently NH_2-$Ti_3C_2T_x$/GCE; (B) the peak current of 1.0 μmol/L Hg^{2+} was detected continuously for ten times under the same condition.

Table S1 The adsorption experiment AFS detected Hg^{2+} results

	Average (μmol/L)	RSD (%)
Hg^{2+}	116.22	0.64
Hg^{2+}+NH_2-$Ti_3C_2T_x$	16.34	3.14

Table S2 Comparing different sensor platforms to detect Hg^{2+}

Material	Detection method	Linear range (μmol/L)	LOD (μmol/L)	Reference
Thiazoline-isophorone	Fluorescence	0-60	7.22	[1]
Carbon Quantum Dots	Fluorescence	0-50	0.934	[2]
gallium oxide	Electrochemical	0.3-80	0.13	[3]
NMO-GR	Electrochemical	0.7-6.7	0.027	[4]
Silver Nanowires/HPMC/Chitosan/Urease	Electrochemical	5-25	3.94	[5]
Alk-Ti_3C_2 MXene	Electrochemical	0.1-1.5	0.13	[6]
NH_2-$Ti_3C_2T_x$	Electrochemical	0.5-50	0.02	This work

References

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