Supporting information

Improving Barium Ions Adsorption on Two-Dimensional Titanium Carbide by Surface Modification

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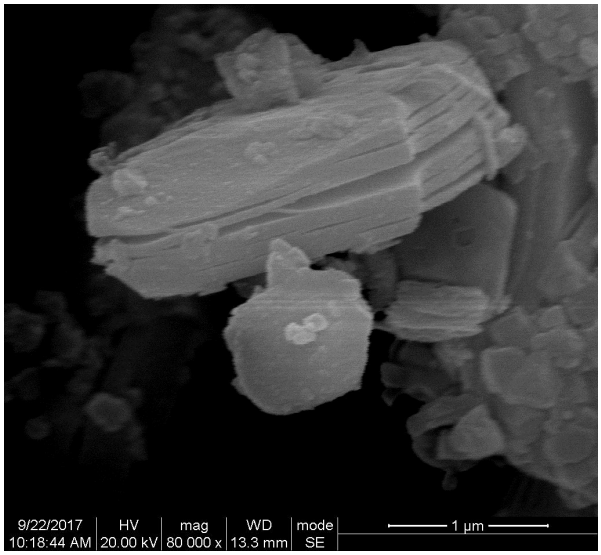

Fig.1.SEM images of prince $Ti_3C_2T_x$

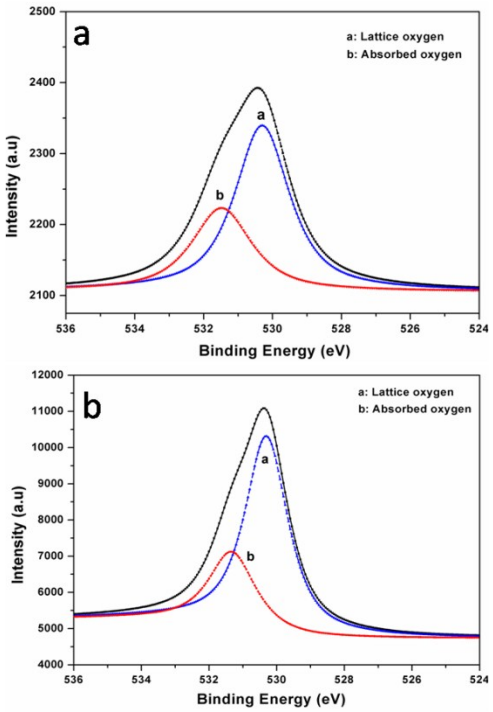

Fig.2. O 1s binding energy changing before (a) and after (b) NaOH treatment

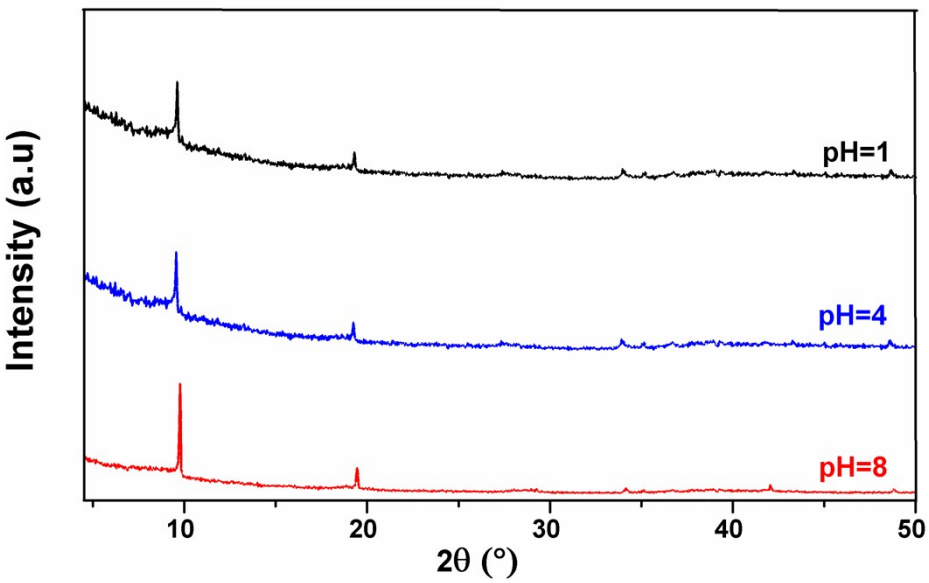

Fig.3. XRD pattern ofAlk-$Ti_3C_2T_x$ after soaking in solutions with different pH

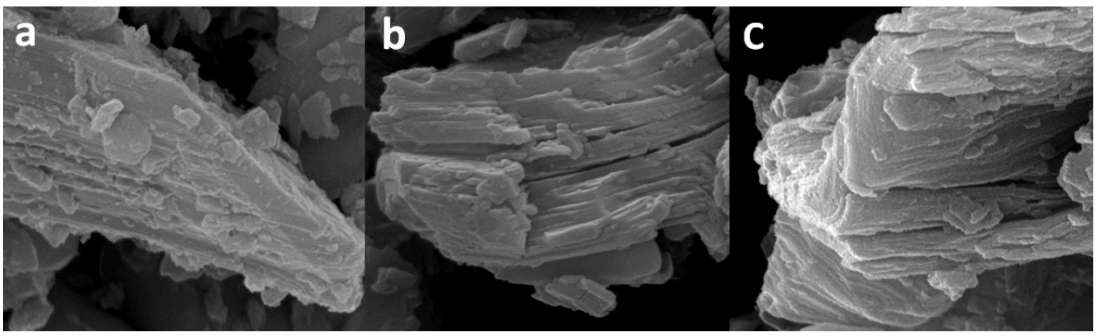

Fig.4. SEM images of Alk-Ti3C2Tx after soaking in solutions with different pH

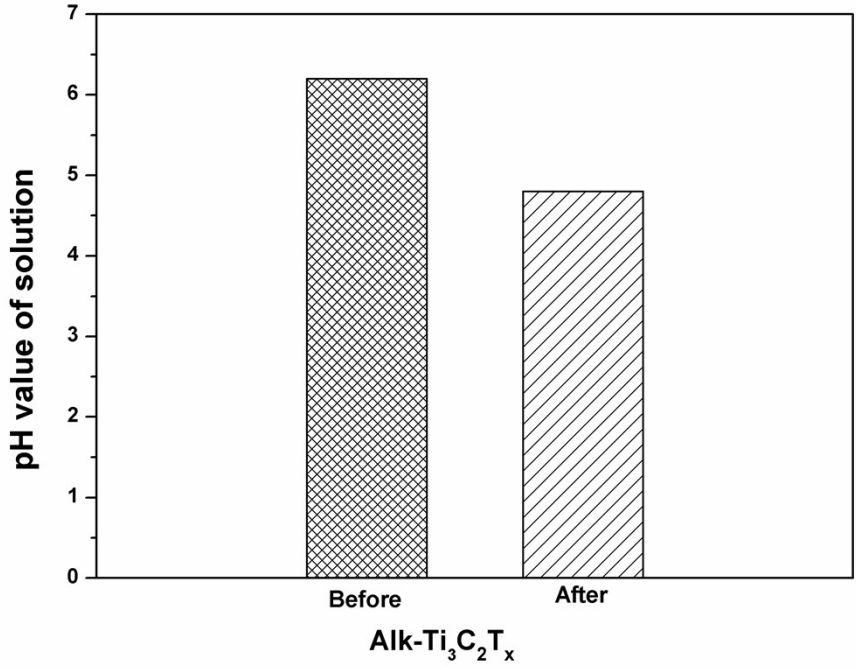

Fig.5. pH change of solution before and after Ba^{2+} adsorption by Alk-$Ti_3C_2T_x$

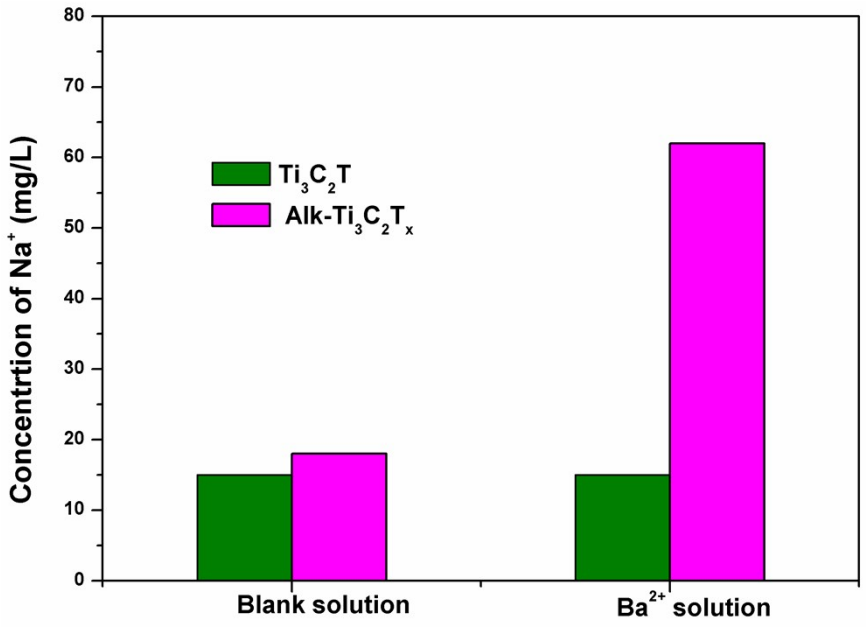

Fig.6. Na^+ ions concentration of solution before and after Ba^{2+} adsorption by Alk-$Ti_3C_2T_x$

Table caption

Table1 kinetic parameters for Ba^{2+} sorption onto（T=293 K）

Model	Parameters	Alk-$Ti_3C_2T_x$	$Ti_3C_2T_x$
Experiment	q_e(mg g^{-1})	47.23	11.96
Pseudo first-order	k_1(min^{-1})	0.0242	0.3421
kinetic model	q_e^{cal} (mg g^{-1})	48.32	11.42
	R^2	0.9643	0.9523
Pseudo second-order	k_2 (gmg^{-1} min^{-1})	0.3015	0.0915
kinetic model	q_e^{cal}(mg g^{-1})	46.37	12.13
	R^2	0.9998	0.9997

Table2 Equilibrium isotherm model parameters for Ba^{2+}adsorption on theTi$_3C_2T_x$and Alk-Ti$_3C_2T_x$（T=293 K）

Adsorption	Langmuir isotherm			Freundlich isotherm		
	q_m (mg g^{-1})	b (L mg^{-1})	R^2	n	k_f [mg g^{-1}(L/ g)$^{1/n}$]	R^2
$Ti_3C_2T_x$	46.16	0.34	0.9985	1.231	1.071	0.9654
Alk-$Ti_3C_2T_x$	11.28	0.25	0.9972	2.56	16.53	0.9543