

## Supporting Information

### **Sr<sup>2+</sup> sorption property of seaweed-like sodium titanate mats: effects of crystallographic properties**

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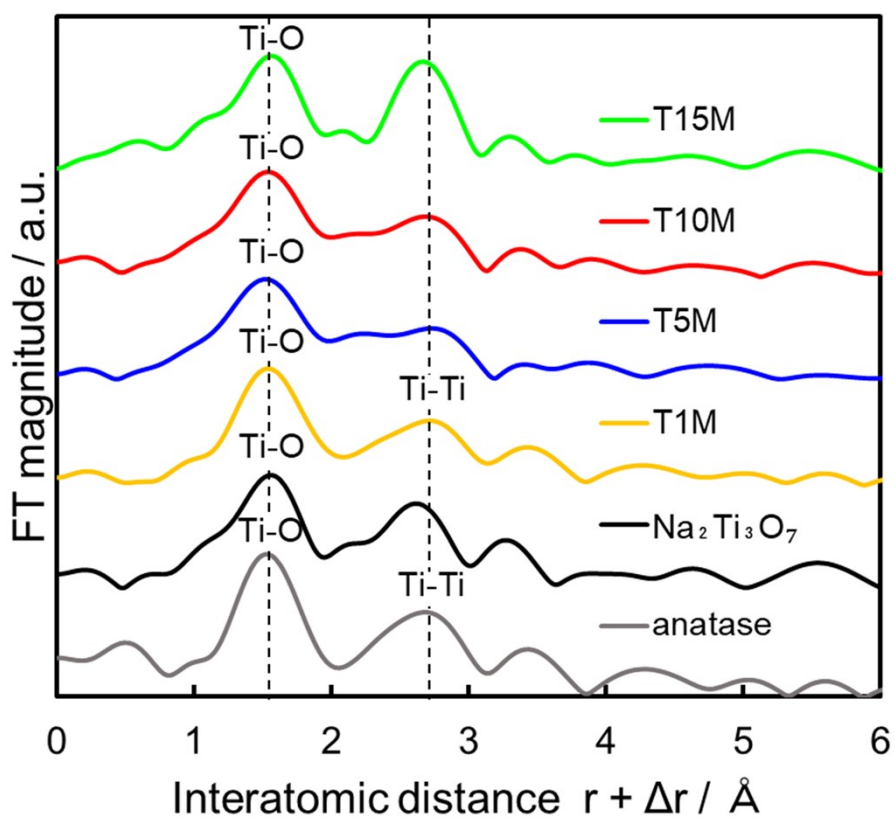
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## **Materials**

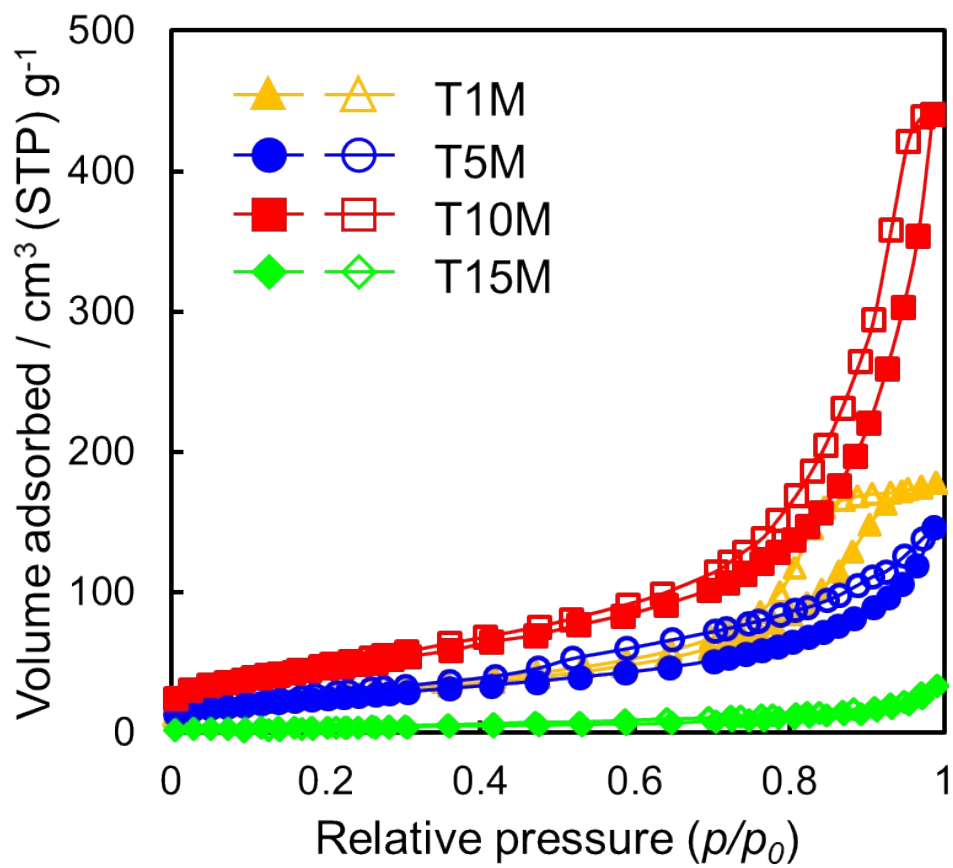
Titanium sulfate solution ( $\text{Ti}(\text{SO}_4)_2$ , 30 %), sodium hydroxide (NaOH, 97.0 %), titanium dioxide (anatase, 98.5 %), strontium chloride ( $\text{SrCl}_2$ , 95.0 %), and strontium carbonate ( $\text{SrCO}_3$ , 99.99 %) were purchased from FUJIFILM Wako Pure Chemical Corporation, Osaka, Japan. Sodium metatitanate ( $\text{Na}_2\text{Ti}_3\text{O}_7$ ) was obtained from Sigma-Aldrich Co. LLC., St. Louis, United States. All chemicals were used as received without further purification.

## **Preparation and Sr sorption test of protonated titanates**

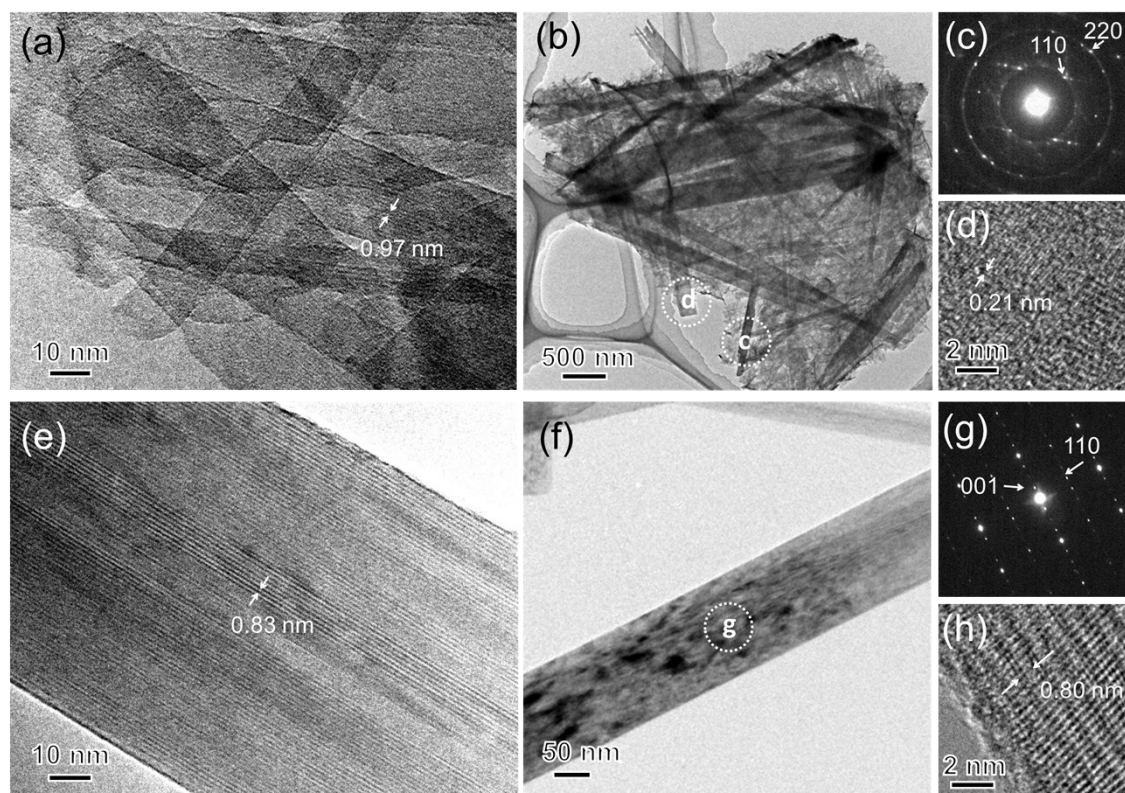
To investigate the effects of  $\text{H}^+$  on ion-exchange reaction of titanates, protonated titanates of T10M and T15M were prepared. T10M and T15M were well-washed using the 1M HCl shaking for 30 min. They were marked as T10M\_HCl and T15M\_HCl, respectively. After that, Sr sorption test was conducted by using the procedure described above.



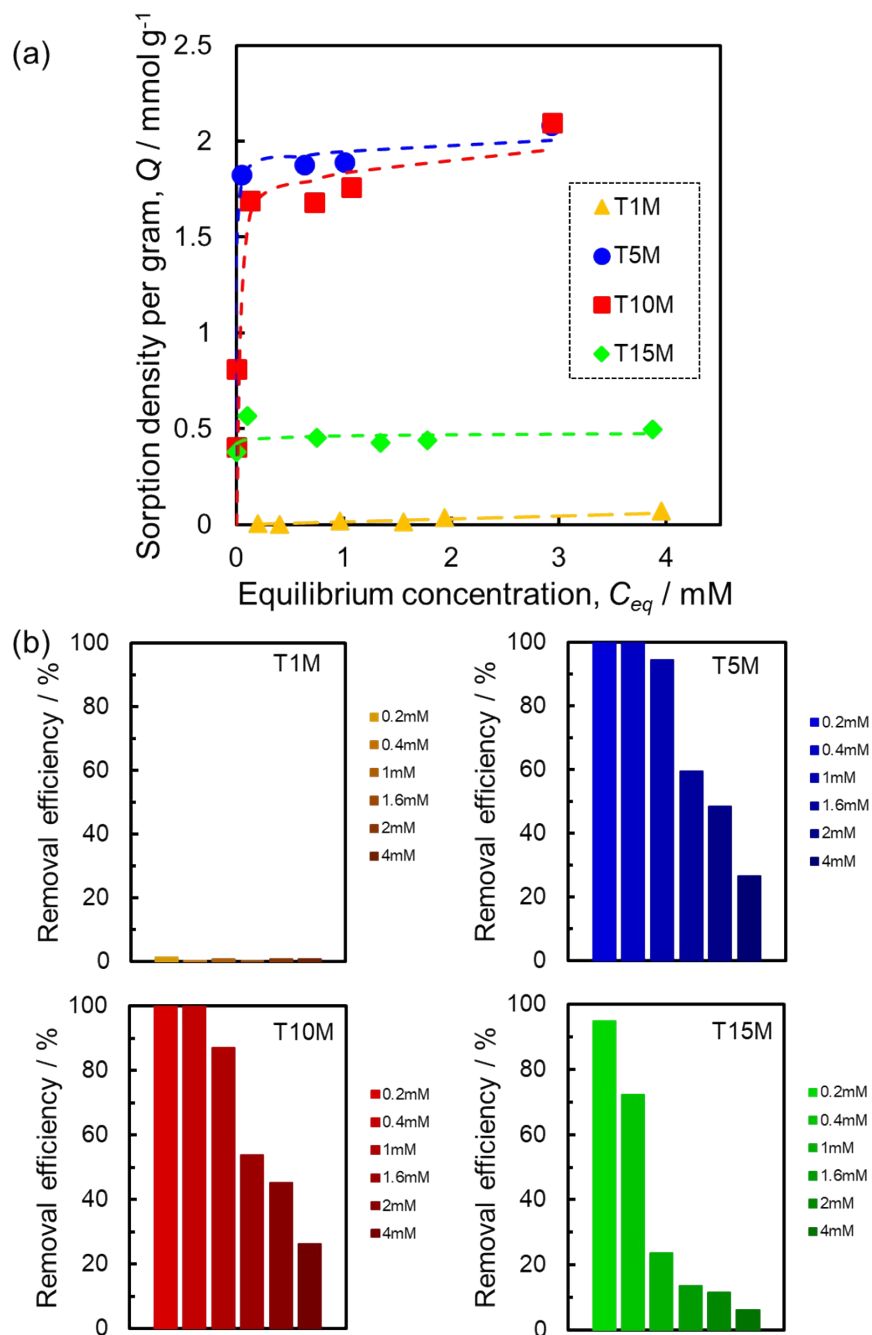
**Fig. S1** Ti K-edge FT-EXAFS spectra of the reference samples (anatase and  $\text{Na}_2\text{Ti}_3\text{O}_7$ ) and TXM samples.



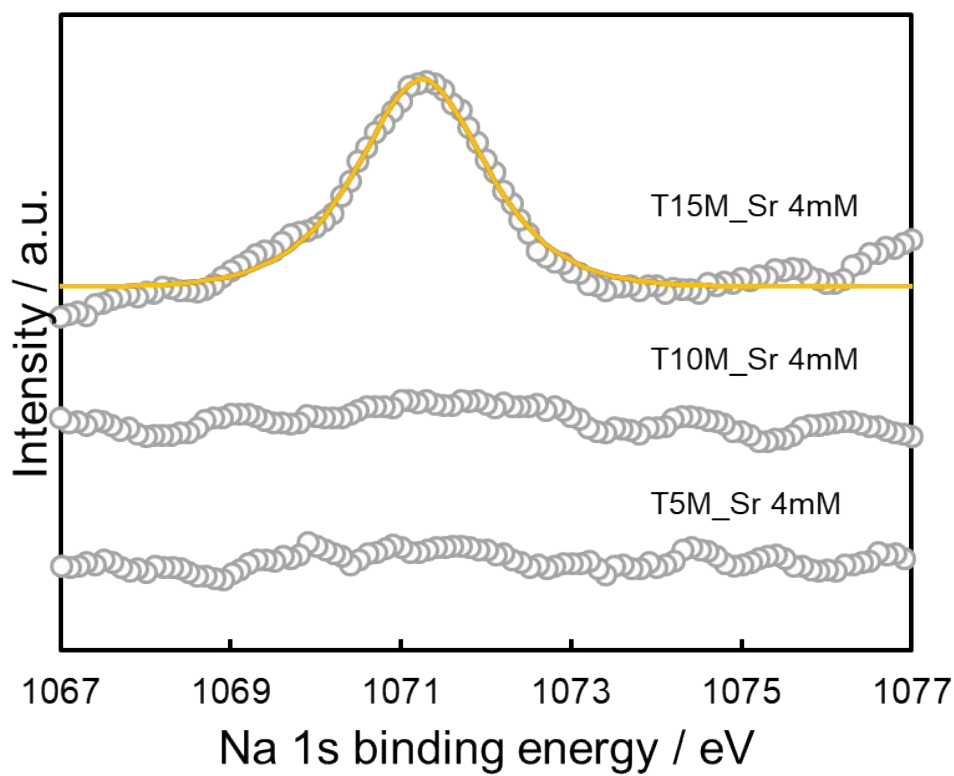
**Fig. S2** N<sub>2</sub> adsorption-desorption isotherms of TXM sample.



**Fig. S3** TEM images, SAED pattern, and HRTEM images of the (a-d) T5M and (e-h) T15M samples.

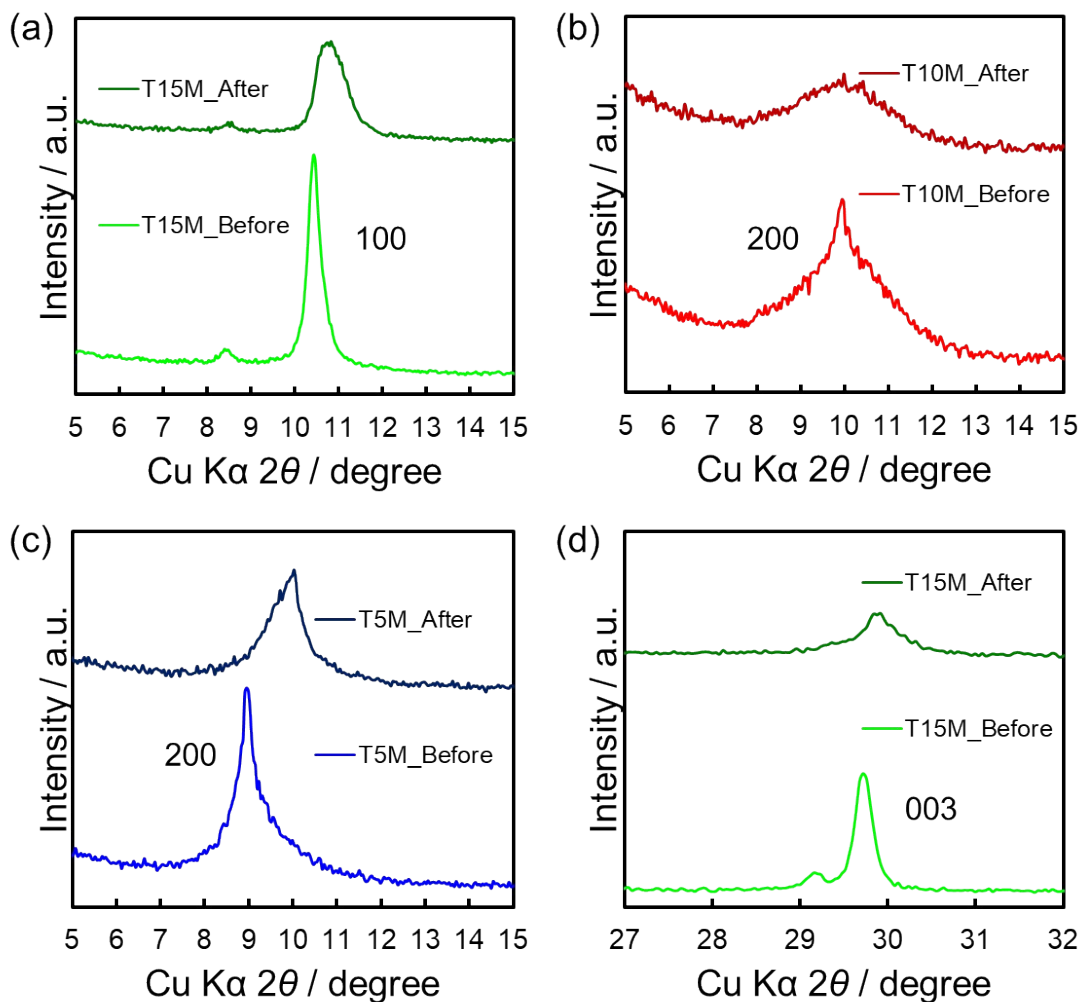


**Fig. S4** (a)  $Sr^{2+}$  sorption isotherms fitted with the Freundlich plot of TXM samples, and (b) removal efficiency of  $Sr^{2+}$  regarding initial concentration of each TXM sample.

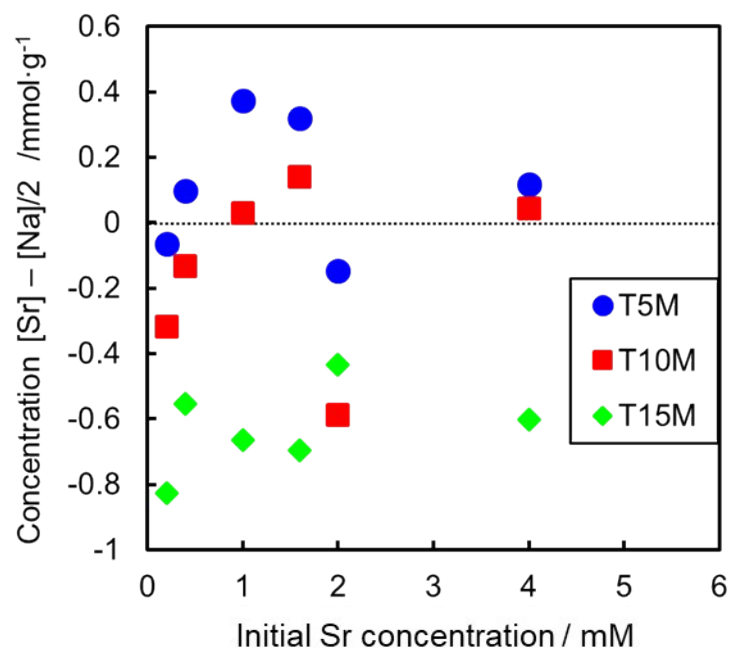


**Fig. S5** Na 1s XPS spectra of T5M, T10M and T15M after the sorption test using 4 mM SrCl<sub>2</sub> solution.

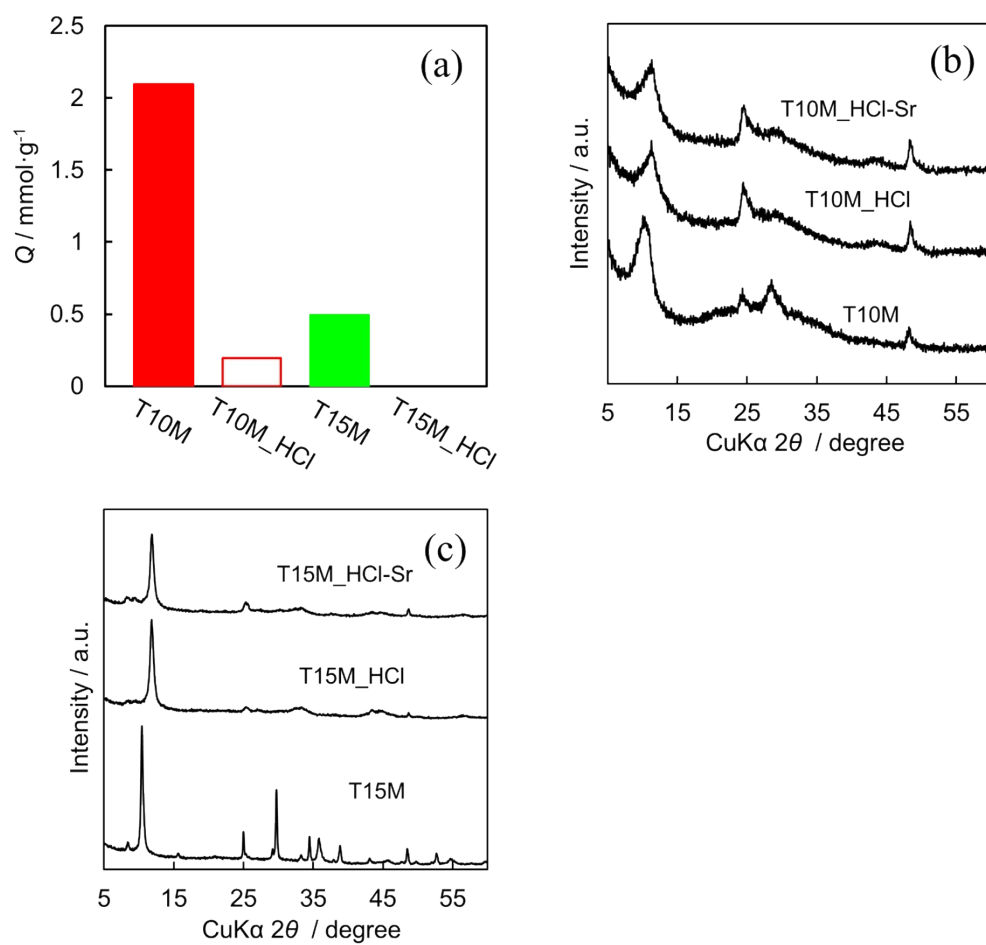




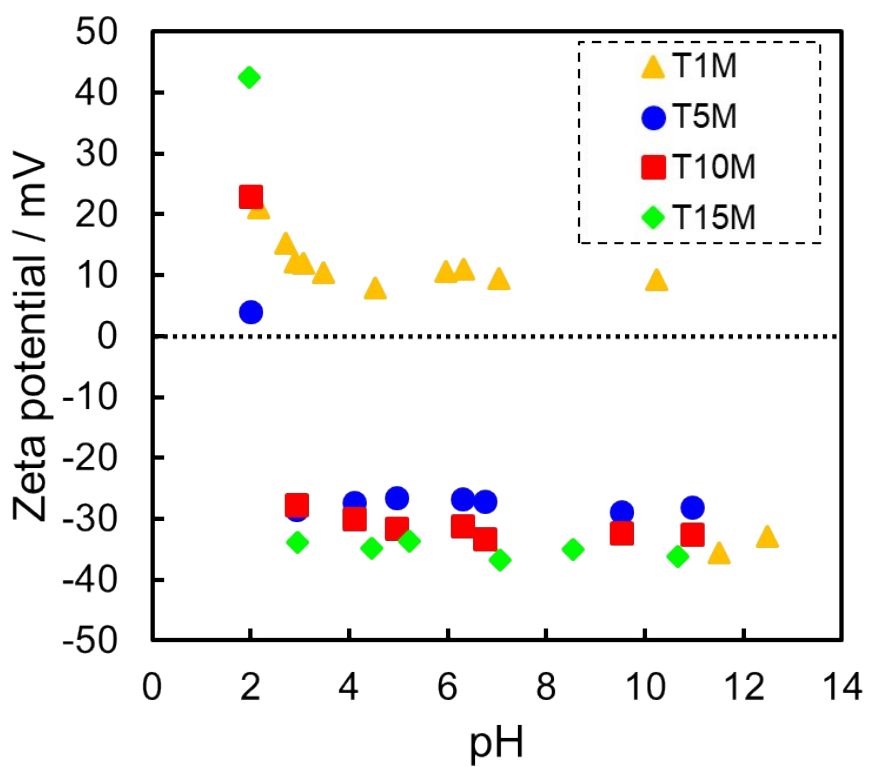
**Fig. S6** Enlarged XRD patterns of TXM samples before and after the sorption test using 4 mM SrCl<sub>2</sub> solution: (a) T15M in the range of 5° to 15°, (b) T10M in the range of 5° to 15°, (c) T5M in the range of 5° to 15°, and (d) T15M in the range of 27° to 32°.



**Fig. S7** Changes in the concentration of subtracted sorption [Sr] from released [Na]/2 against the initial Sr concentration after the sorption test.



**Fig. S8** (a) Sorption density of Sr on samples with or without HCl washing, and XRD pattern of (b) T10M and (c) T15M samples before and after Sr sorption test.



**Fig. S9** pH dependence of zeta potential of TXM samples. The pH of test solution was adjusted to 2-13 by additions of HCl and NaOH solutions.

**Table S1** Langmuir isotherm and Freundlich isotherm constants for Sr<sup>2+</sup> sorption on TXM Samples.

Sample	Langmuir			Freundlich		
	$Q_{max}$ (mmol/g)	$K$ (L/mmol)	$r^2$	$K_F$ (mmol/g(L/mmol) <sup>1/n</sup> )	$1/n$	$r^2$
T1M	-0.08	-0.12	0.09	0.01	0.98	0.77
T5M	2.08	34.58	1.00	1.95	0.03	0.67
T10M	2.09	14.99	0.99	1.83	0.06	0.59
T15M	0.49	14.01	0.99	0.46	0.02	0.10

**Table S2** The value of  $d_{200}$  of T5M and T10M, and  $d_{100}$  of T15M samples before and after Sr<sup>2+</sup> sorption test using 4 mM SrCl<sub>2</sub> solution.

Sample	$d_{h00}$ before <sup>a</sup> (Å)	$d_{h00}$ after <sup>a</sup> (Å)
T5M	9.87	8.93
T10M	8.88	8.87
T15M	8.40	8.34

<sup>a</sup> Calculated by the Bragg equation.