

Supporting Information

Mechanochemically Prepared Highly Conductive Na_{2.88}Sb_{0.88}W_{0.12}S₄-NaI Composite Electrolytes for All-Solid-State Sodium Battery

Takuma TAKAYANAGI,^a Akira NASU,^a Fumika TSUJI,^a Atsushi SAKUDA,^{a,§}
Masahiro TATSUMISAGO,^{a,§} and Akitoshi HAYASHI^{a,b,*§}

^a*Department of Applied Chemistry, Graduate School of Engineering, Osaka Prefecture University,
1-1 Gakuen-cho, Naka-ku, Sakai, Osaka 599-8531, Japan*

^b*Elements Strategy Initiative for Catalysts and Batteries, Kyoto University, Sakyo, Kyoto 606-8501, Japan*

*Corresponding author: hayashi@chem.osakafu-u.ac.jp

§ ECSJ Active Member

Table S1 Densities of pellets (d_1) and powders (d_2), and relative densities (d_1/d_2) of $\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot x\text{NaI}$ composites.

Sample	Densities of the pellets	Densities of the powders	Relative density
	d_1 (g cm ⁻³)	d_2 (g cm ⁻³)	d_1/d_2 (%)
$\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4$	2.418	2.932	82.5
$\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot 0.10\text{NaI}$	2.450	2.950	83.1
$\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot 0.20\text{NaI}$	2.627	2.910	90.3
$\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot 0.50\text{NaI}$	2.686	3.038	88.4
$\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot 0.75\text{NaI}$	2.562	3.016	84.9

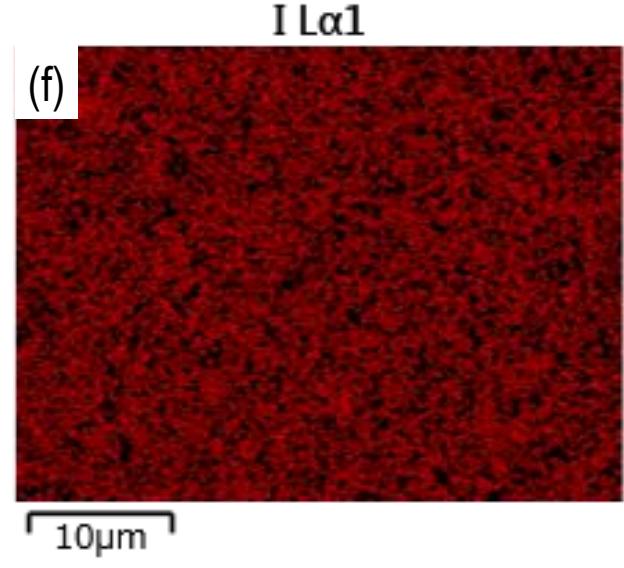
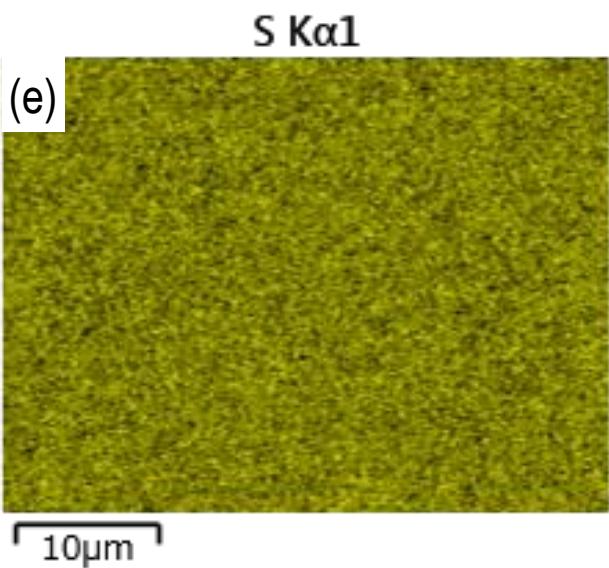
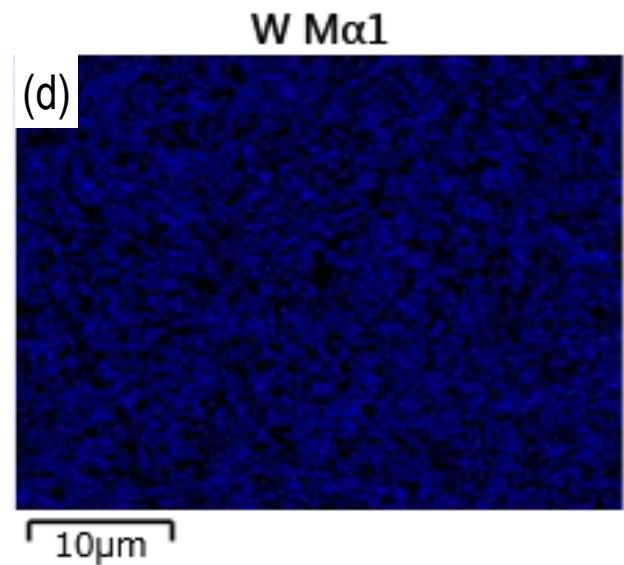
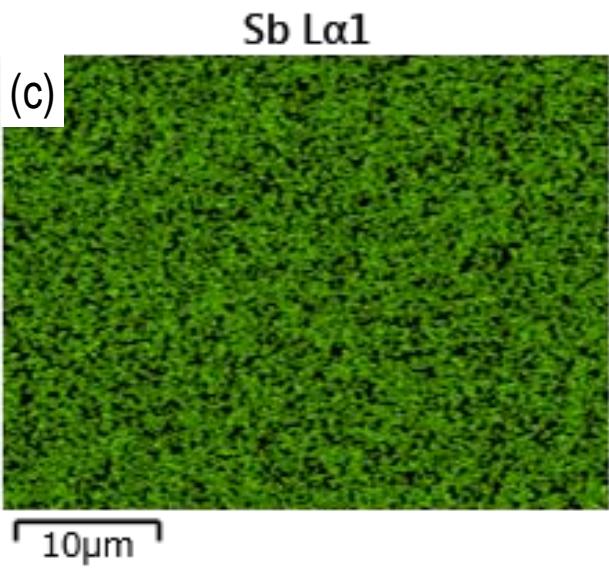
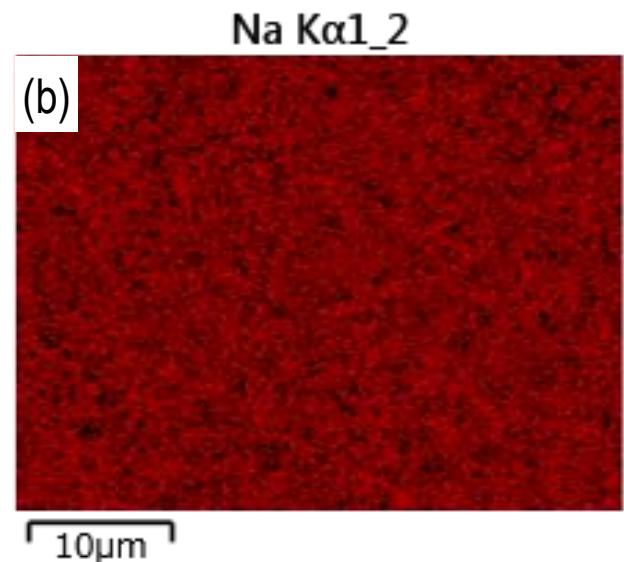
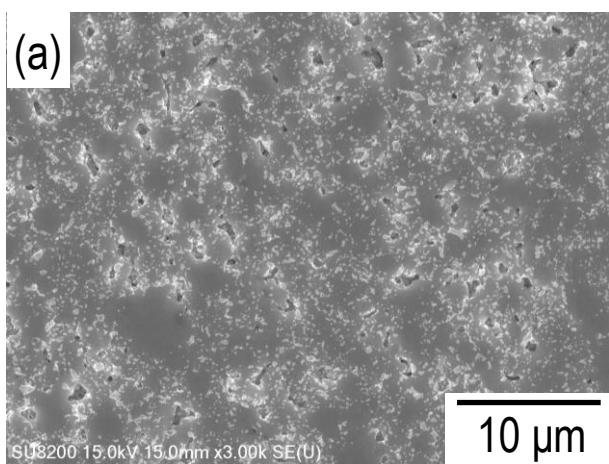


Fig. S1 (a) SEM image and (b) – (f) EDS mappings of $\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot 0.50\text{NaI}$ pellet.

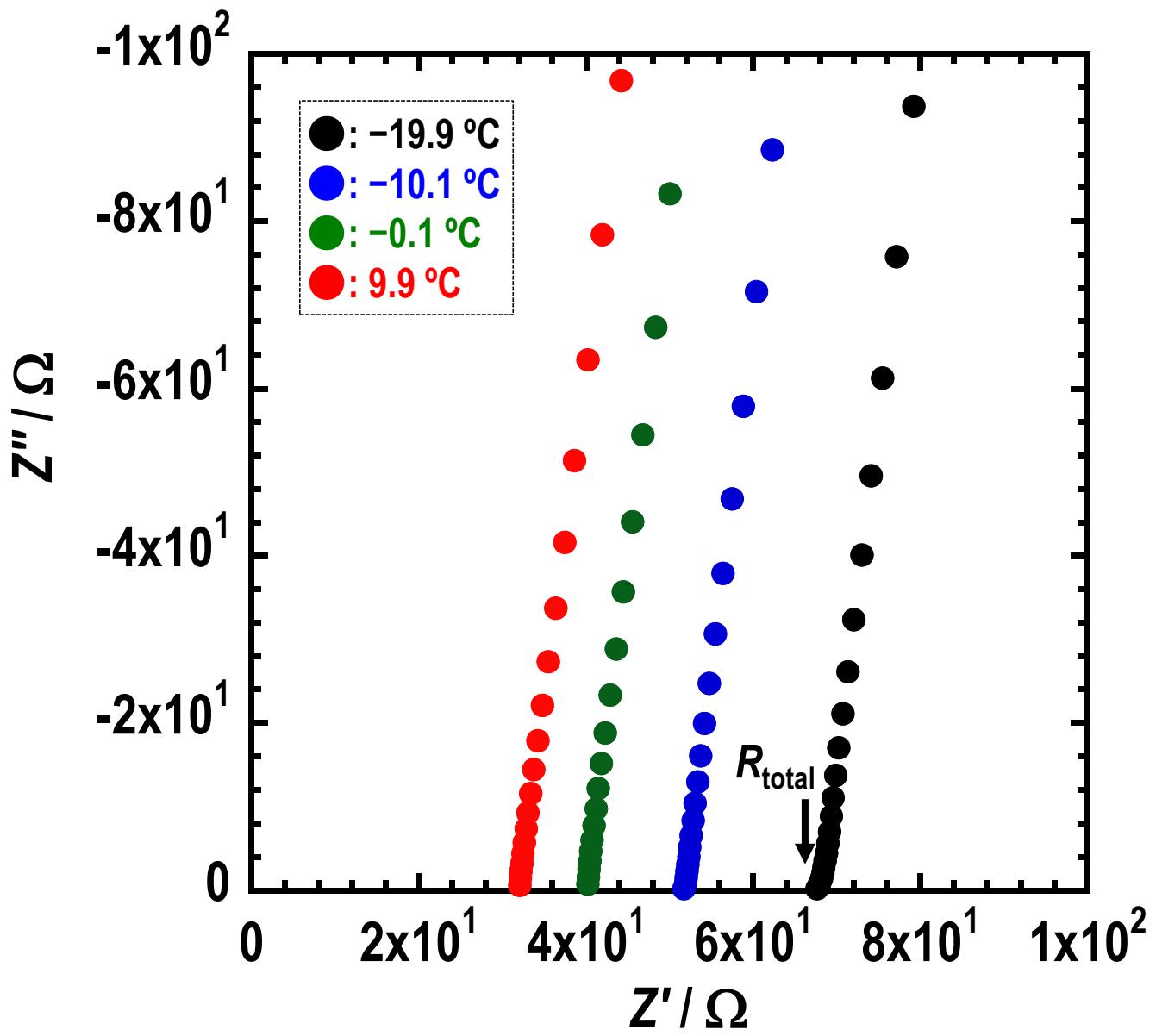


Fig. S2 Nyquist plots of $\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4\cdot0.50\text{NaI}$ measured at $-19.9\text{ }^\circ\text{C}$ (black), $-10.1\text{ }^\circ\text{C}$ (blue), $-0.1\text{ }^\circ\text{C}$ (green), and $9.9\text{ }^\circ\text{C}$ (red).

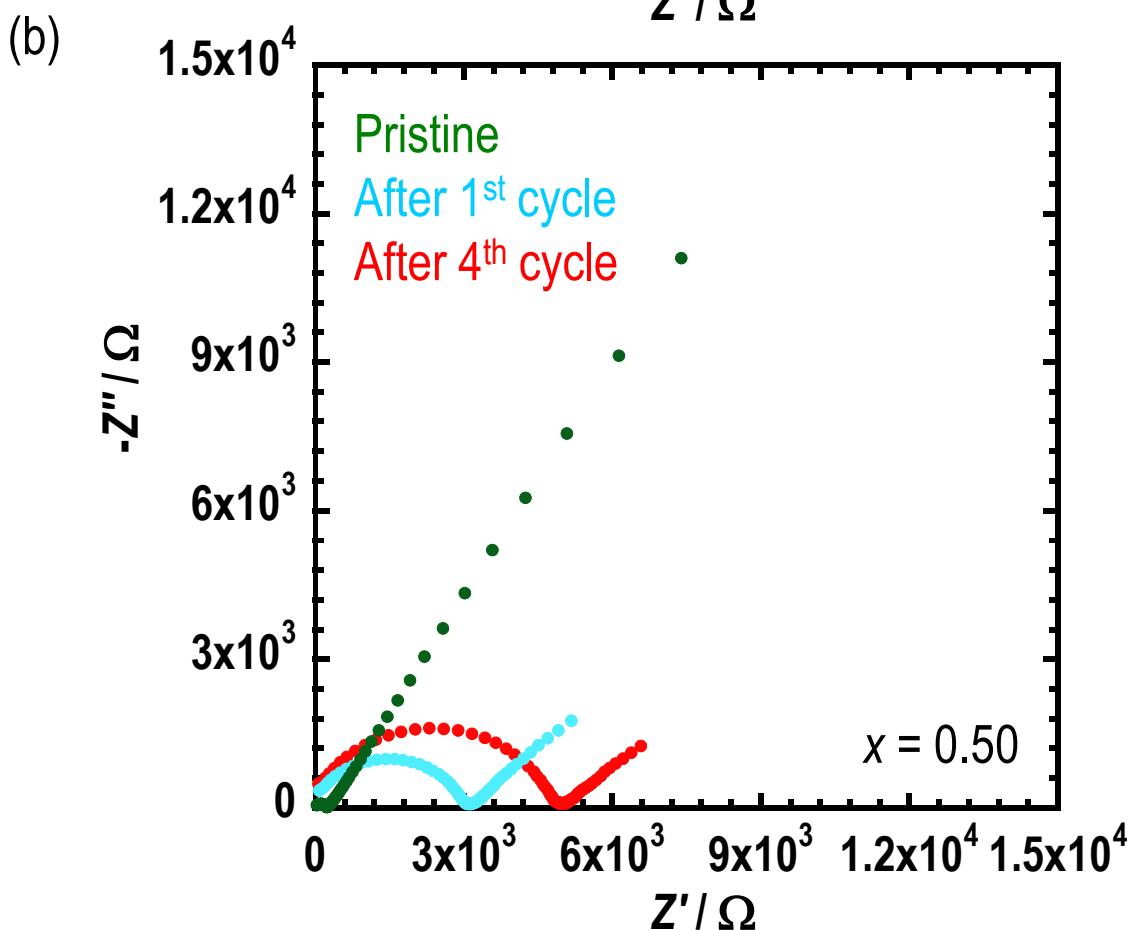
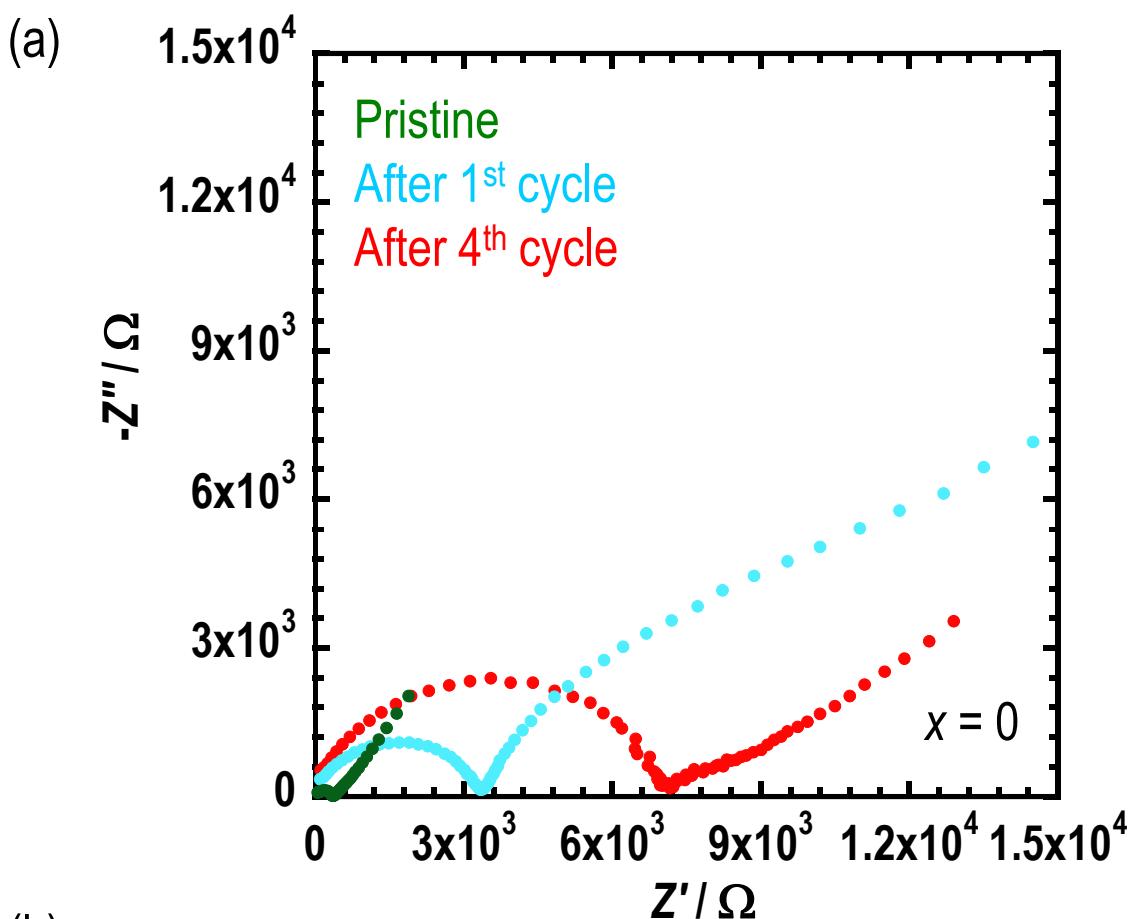


Fig. S3 Nyquist plots of the all-solid-state cells constructed with Na-Sn / $\text{Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot x\text{NaI} / \text{TiS}_2\text{-Na}_{2.88}\text{Sb}_{0.88}\text{W}_{0.12}\text{S}_4 \cdot x\text{NaI}$. (a) $x = 0$ and (b) $x = 0.50$.