

## Supplementary Information

### Giant Dielectric Response, Nonlinear Characteristics, and Humidity Sensing Properties of a Novel Perovskite: $\text{Na}_{1/3}\text{Sr}_{1/3}\text{Tb}_{1/3}\text{Cu}_3\text{Ti}_4\text{O}_{12}$

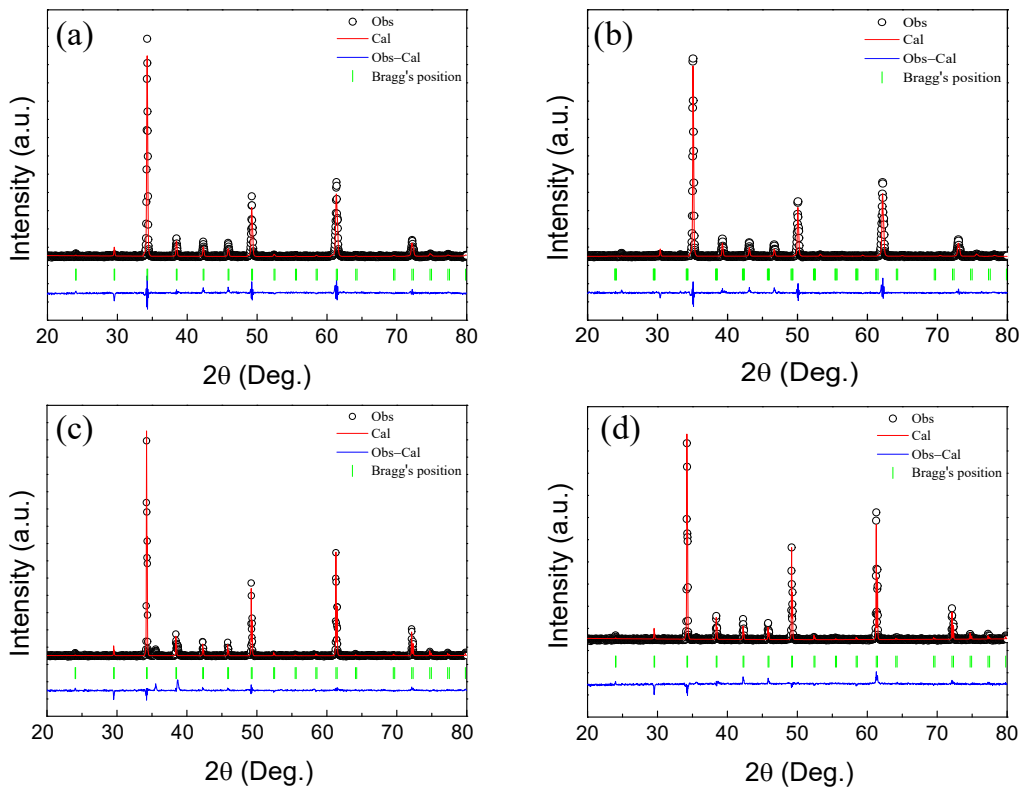
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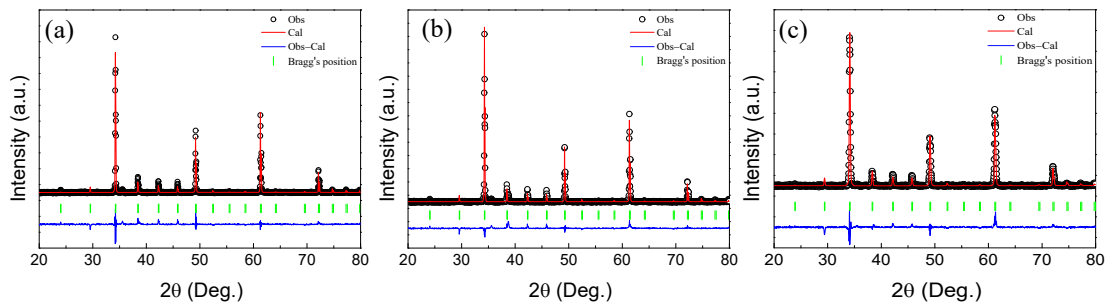
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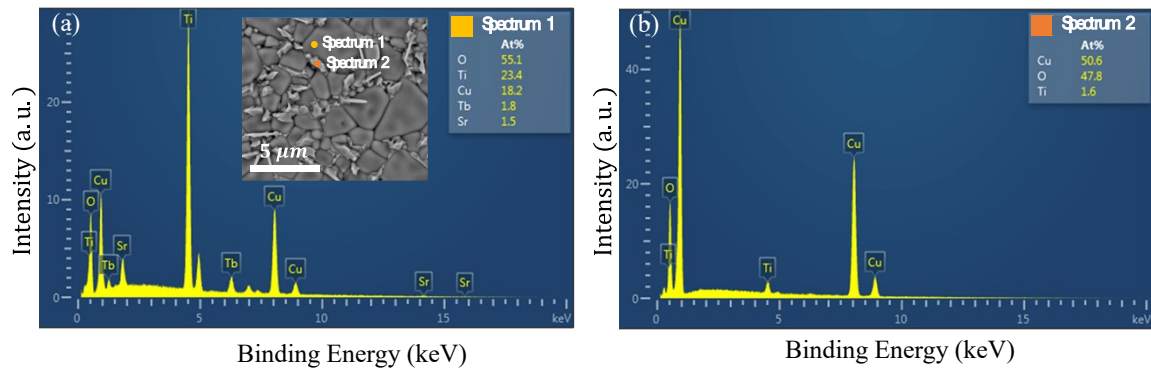
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**Fig. S1** Rietveld profile fitting of [NST]CTO sintered at (a) 1020°C for 4 h, (b) 1030°C for 4 h, (c) 1040°C for 4 h, and (d) 1040°C for 8 h.

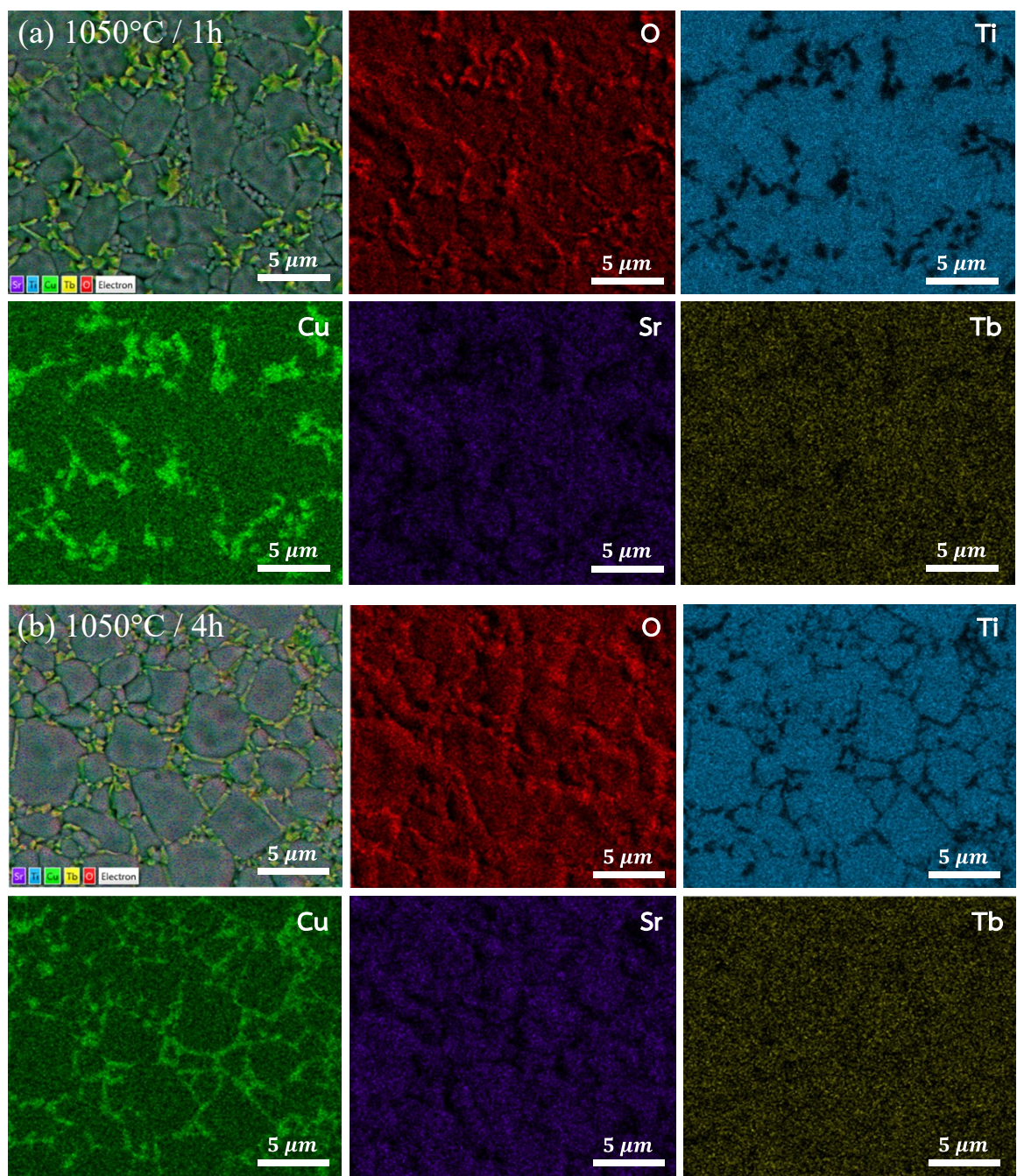


**Fig. S2** Rietveld profile fitting of [NST]CTO sintered at (a) 1050°C for 4 h, (b) 1050°C for 2 h, and (c) 1050°C for 1 h.

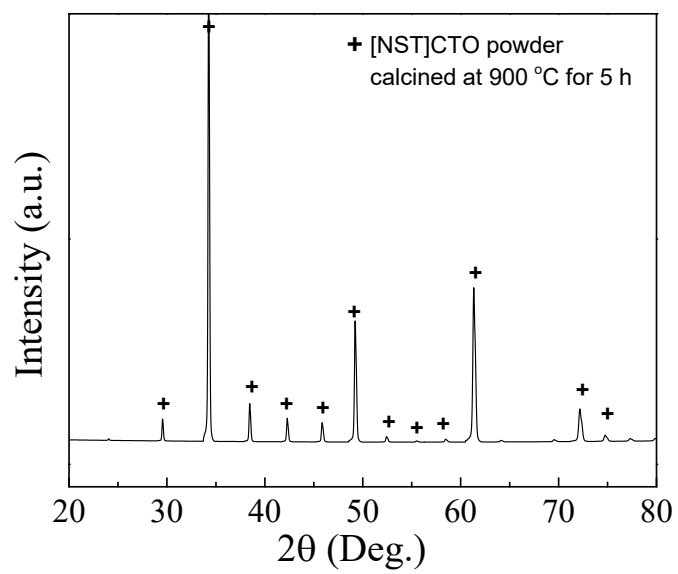


**Fig. S3** EDS spectra of [NST]CTO sintered at 1040°C for 4 h detected at (a) a regular grain and (b) rock-like grain.

The EDS spectra of [NST]CTO, sintered at 1040°C for 4 h and analyzed at both regular and rock-like grains, are showcased in Fig. S3. In the case of the regular grain (*spectrum 1*), all elements were detected in the EDS spectrum, confirming the presence of the [NST]CTO phase, with the exception of Sodium (*Na*). Contrastingly, the analysis of the rock-like grain (*spectrum 2*) revealed relatively high-intensity peaks for Copper (*Cu*) and Oxygen (*O*), indicative of the CuO phase. It is important to note that *Na* was not identified in the [NST]CTO grains. The inability to detect *Na* can be attributed to its relatively low atomic number (11), which results in weaker X-ray lines compared to elements with higher atomic numbers. This factor, at times, complicates its detection, especially in the presence of elements with substantially stronger X-ray lines where the signal might be overshadowed or suppressed. Additionally, it is plausible that *Na* might have evaporated on the sample surface during the analysis, further contributing to its non-detection in the EDS spectra.



**Fig. S4** SEM-mapping images for elements of [NST]CTO sintered at (a) 1050°C for 1 h and (b) 1050°C for 4 h.



**Fig. S5** XPD pattern of [NST]CTO powder calcined at 900 °C for 5 h.