

Electronic Supporting Information

Sodium ion conductivities in $\text{Na}_2\text{O-Sm}_2\text{O}_3\text{-SiO}_2$ Ceramics

Abinaya Sivakumaran^a, Vishnu Surendran^a, Shantel Butler^d, Samuel Reid^b, and Venkataraman Thangadurai^{a*,c}

^aDepartment of Chemistry, University of Calgary, Calgary, AB T2N 1N4, Canada

^bGeometric Energy Corporation, 1400–3507 Ave SW, Calgary, Alberta, T2P 3N9, Canada

^cSchool of Chemistry, University of St Andrews, KY16 9AJ, United Kingdom

^dElektra Industries, 2700-225 6 Ave SW, Calgary, AB, T2P 1N2, Canada

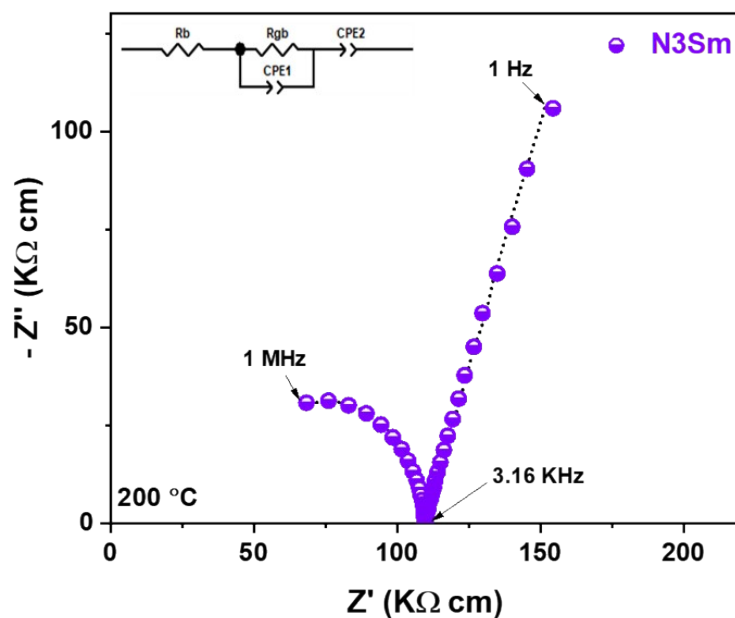


Fig. S1 N3Sm impedance at 200 °C with fitted equivalent circuit in the inset.

Compound	R_b (Ω)	R_{gb} (Ω)	CPE1 (F)	C1 (F)
5-N3Sm	61.59	446.2	6.94×10^{-9}	1.64×10^{-9}
10-N3Sm	35.33	213.7	3.03×10^{-8}	3.23×10^{-9}
15-N3Sm	23.19	159.8	1.85×10^{-8}	3.02×10^{-9}
20-N3Sm	32.85	191.5	1.02×10^{-8}	3.32×10^{-9}
N5Sm	20.57	43.81	3.35×10^{-8}	1.15×10^{-9}
N3Sm	3257	5173	7.84×10^{-11}	3.75×10^{-11}

Table S1. AC impedance data fitting results using suitable equivalent circuit elements.

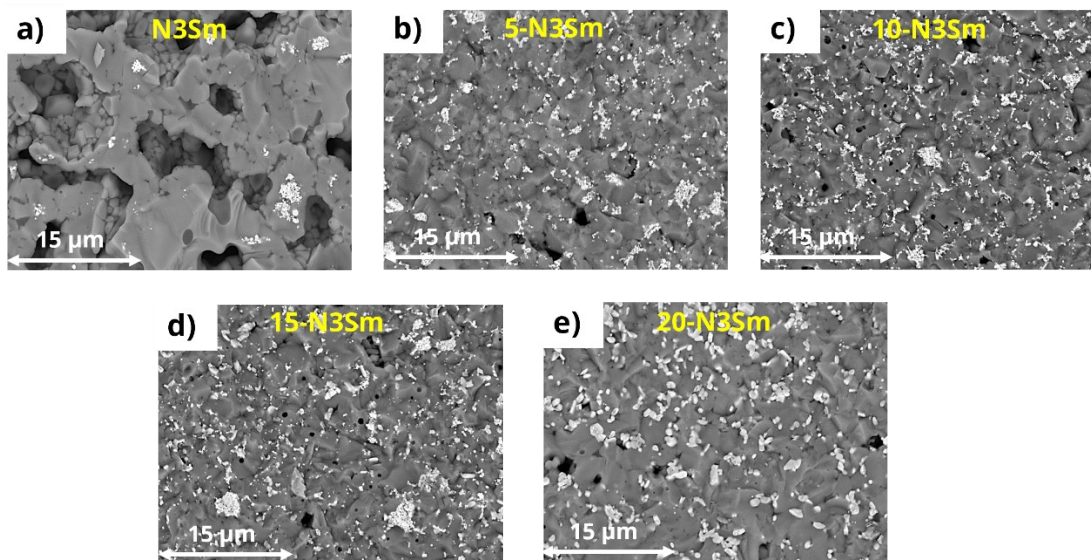


Fig. S2 Cross-section SEM images of N3Sm, 5, 10, 15, and 20-N3Sm.

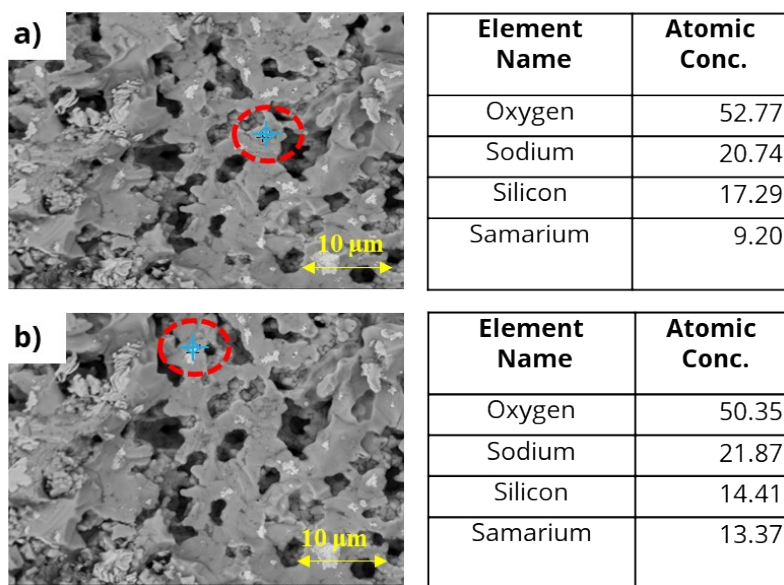


Fig. S3 Spot EDX and their elemental ratio of N3Sm at two different spots as in a) and b).

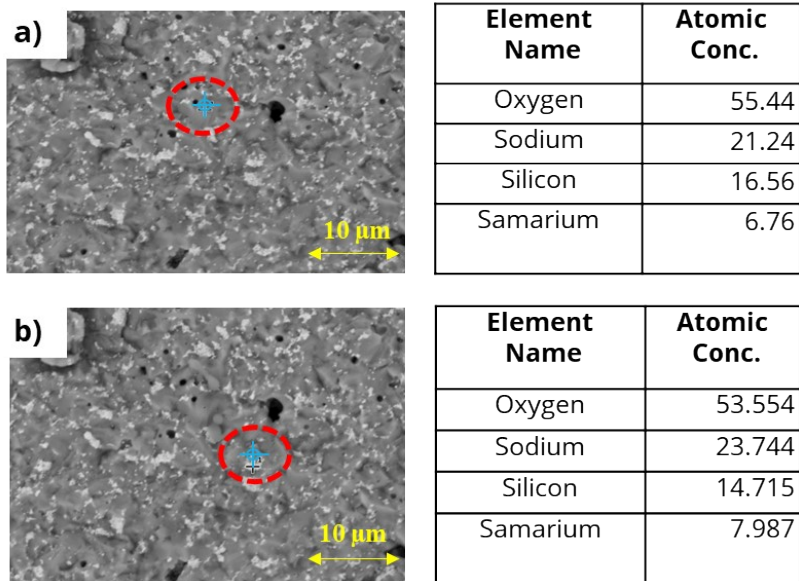


Fig. S4 Spot EDX and their elemental ratio of 5-N3Sm at two different spots as in a) and b).

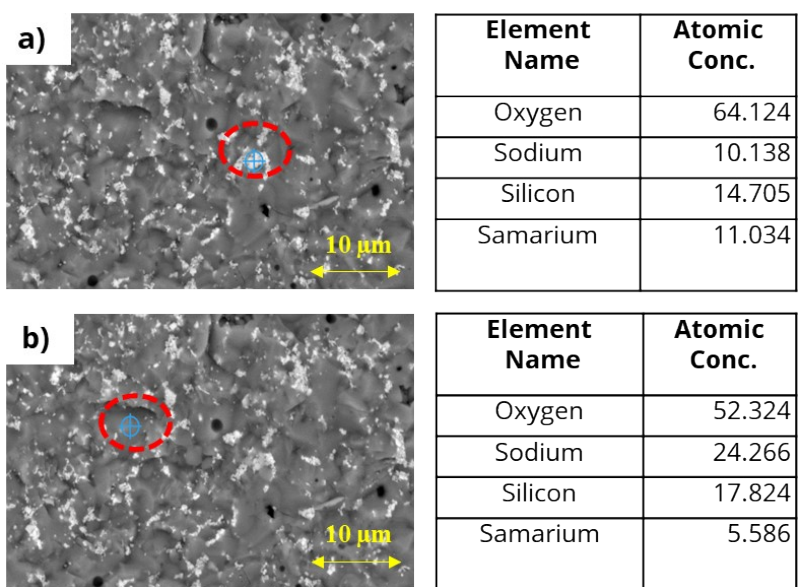


Fig. S5 Spot EDX and their elemental ratio of 10-N3Sm at two different spots as in a) and b).

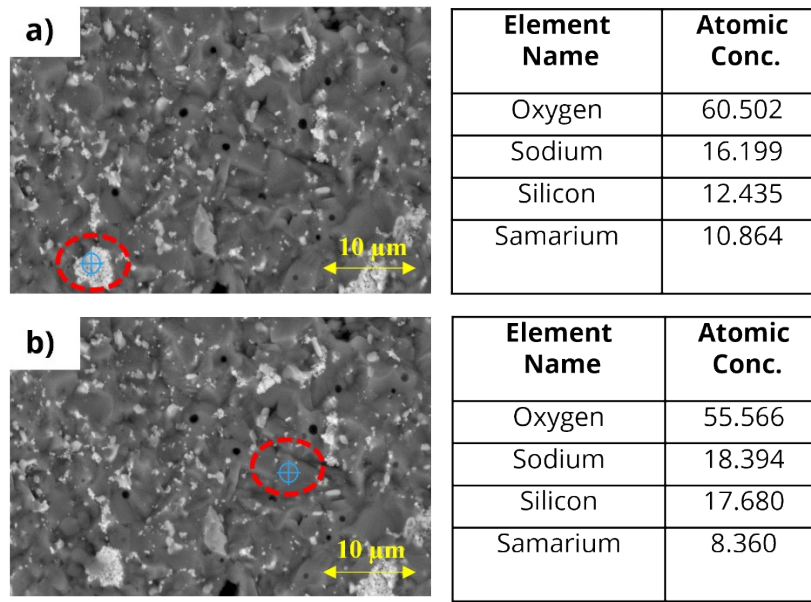


Fig. S6 Spot EDX and their elemental ratio of 15-N3Sm at two different spots as in a) and b).

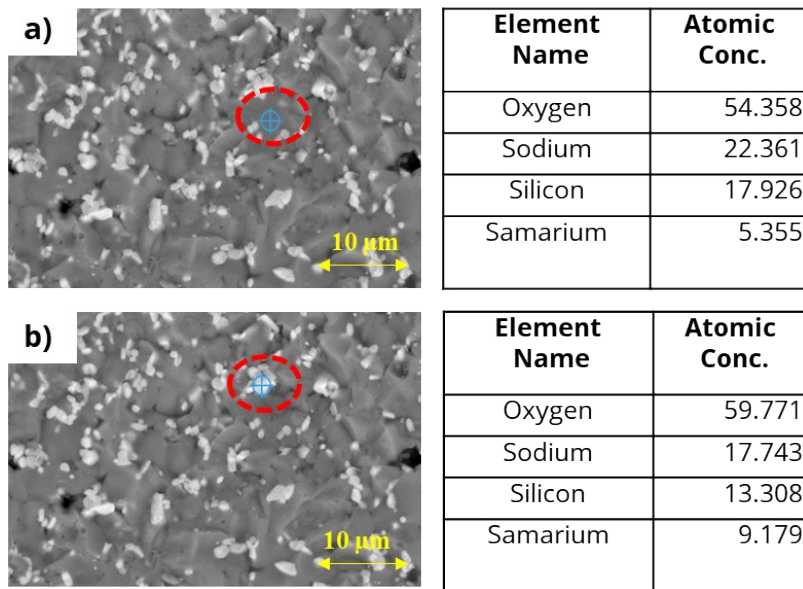


Fig. S7 Spot EDX and their elemental ratio of 20-N3Sm at two different spots as in a) and b).

Composition	Ionic conductivity (σ_i) (S cm ⁻¹) 25 °C	Density (g cm ⁻³)
5-N3Sm	1.07×10^{-4}	3.328
10-N3Sm	3.51×10^{-4}	3.352
15-N3Sm	9.42×10^{-4}	3.354
20-N3Sm	3.82×10^{-4}	3.361
N5Sm	1.33×10^{-3}	3.417

Table S2. Comparison table of ionic conductivity and density of all five compositions including 5 – 20-N3Sm and N5Sm.

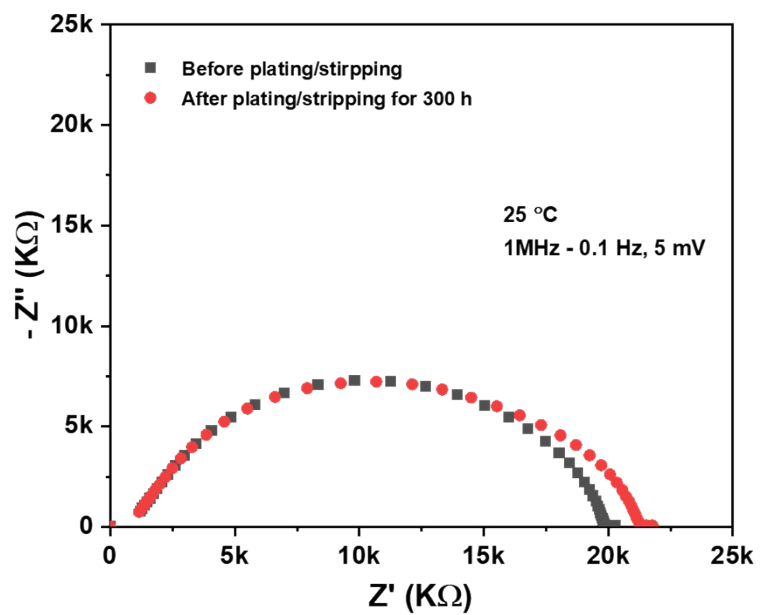


Fig. S8 EIS taken before and after galvanostatic sodium plating/stripping experiments at 0.05mA cm^{-2} for 300 h at RT.