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Supplementary Information

Table S1: Bond valence sums for each metal site calculated for structures resulting from refinements against synchrotron X-ray powder diffraction data.

	Sr(II)	Ti(IV)	Zr(IV)	Nb(V)
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	2.02	4.01	-	5.20
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	1.96	3.93	5.34	5.10
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	1.91	3.86	5.24	5.00
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	1.82	3.72	5.05	4.83
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	1.76	3.59	4.87	4.65
$Sr_{0.8}Ti_{0.12}Zr_{0.48}Nb_{0.4}O_3$	1.72	3.44	4.67	4.46
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	1.67	-	4.49	4.29

Table S2: Bond valence sums for each metal site calculated for structures resulting from refinements against neutron powder diffraction data.

	Sr(II)	Ti(IV)	Zr(IV)	Nb(V)
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	2.01	4.00	-	5.18
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	1.96	3.93	5.34	5.10
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	1.91	3.86	5.24	5.00
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	1.82	3.72	5.04	4.82
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	1.77	3.57	4.85	4.63
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	1.68	-	4.47	4.27

Table S3: Tolerance Factors for $Sr_{0.8}Ti_{0.6-x}Zr_xNb_{0.4}O_3$ and parent compounds. Tolerance factors are calculated such that the A cation is taken to be 100 % strontium and the B cation is a weighted average of the B cations. Ionic radii are taken from Shannon [37]. *This is theoretical only as this composition does not form with a perovskite type structure[35].

Compound	Tolerance Factor
$SrTiO_3$	1.0091
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	1.0019
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	0.9984
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	0.9950
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	0.9881
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	0.9813
$Sr_{0.8}Ti_{0.12}Zr_{0.48}Nb_{0.4}O_3$	0.9746
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	0.9680
$SrZrO_3$	0.9531
*$Sr_{0.5}NbO_3$	0.9914

Table S4: Phase transition temperatures from cubic ($Pm\bar{3}m$) to tetragonal ($I4/mcm$).

Composition	Transition Temperature
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	90 K
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	< 298 K
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	~ 298 K
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	> 298 K
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	430 K
$Sr_{0.8}Ti_{0.12}Zr_{0.48}Nb_{0.4}O_3$	470 K
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	610 K

Table S5: Atomic coordinates and isotropic atomic displacement parameters as determined by refinements against synchrotron X-ray powder diffraction data collected at room temperature

Composition	Atom	x	y	z	U_{iso}
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	Sr	0.5	0.5	0.5	0.00933(8)
	Ti/ Nb	0	0	0	0.01119(8)
	O	0	0	0.5	0.01220(19)
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	Sr	0.5	0.5	0.5	0.00871(8)
	Ti/ Nb	0	0	0	0.00892(7)
	O	0	0	0.5	0.0125(2)
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	Sr	0.5	0.5	0.5	0.00970(8)
	Ti/Zr/Nb	0	0	0	0.00933(8)
	O	0	0	0.5	0.0147(2)
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	Sr	0.5	0.5	0.5	0.01068(7)
	Ti/Zr/Nb	0	0	0	0.00823(6)
	O	0	0	0.5	0.0195(2)
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.00997(5)
	Ti/Zr/Nb	0	0	0	0.00673(4)
	O1	0	0	0.25	0.0265(18)
	O2	0.2626(3)	0.7626	0	0.0182(8)
$Sr_{0.8}Ti_{0.12}Zr_{0.48}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.01053(5)
	Ti/Zr/Nb	0	0	0	0.00642(4)
	O1	0	0	0.25	0.0220(5)
	O2	0.27276(18)	0.77276	0	0.0208(4)
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.01042(5)
	Zr/Nb	0	0	0	0.00621(4)
	O1	0	0	0.25	0.0233(4)
	O2	0.27787(16)	0.77787	0	0.0217(3)

Table S6: Atomic coordinates and isotropic atomic displacement parameters as determined by refinements against neutron powder diffraction data collected at room temperature

Composition	Atom	x	y	z	U_{iso}
$Sr_{0.8}Ti_{0.6}Nb_{0.4}O_3$	Sr	0.5	0.5	0.5	0.0096(7)
	Ti/ Nb	0	0	0	0.014(2)
	O	0	0	0.5	0.0066(3)
$Sr_{0.8}Ti_{0.54}Zr_{0.06}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.0072(5)
	Ti/Zr/Nb	0	0	0	0.0074(13)
	O	0	0	0.5	0.0098(3)
$Sr_{0.8}Ti_{0.48}Zr_{0.12}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.0094(4)
	Ti/Zr/Nb	0	0	0	0.0059(8)
	O	0	0	0.5	0.0135(2)
$Sr_{0.8}Ti_{0.36}Zr_{0.24}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.0127(3)
	Ti/Zr/Nb	0	0	0	0.0087(4)
	O1	0	0	0.25	0.0346(10)
	O2	0.25645(19)	0.75645	0	0.0147(4)
$Sr_{0.8}Ti_{0.24}Zr_{0.36}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.0156(3)
	Ti/Zr/Nb	0	0	0	0.0102(4)
	O1	0	0	0.25	0.0175(8)
	O2	0.2667(2)	0.7667	0	0.0290(5)
$Sr_{0.8}Zr_{0.6}Nb_{0.4}O_3$	Sr	0	0.5	0.25	0.0144(3)
	Zr/Nb	0	0	0	0.0056(3)
	O1	0	0	0.25	0.0284(7)
	O2	0.27953(18)	0.77953	0	0.0227(4)