Supplementary Materials

Development of Ni-Sr(V,Ti)$O_{3-\delta}$ Fuel Electrodes for Solid Oxide Fuel Cells

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Table S1. Taguchi planning matrix for cation compositions of $Sr_{1-\alpha}Ti_{1-\beta(1+\gamma)}V_{\beta}Ni_{\beta\gamma}O_{3-\delta}$ (STVN) series.

Level, *n*	Variable, *v*		
	α	*β*	*γ*
1	0	0.2	0.1
2	0.02	0.3	0.2
3	0.04	0.4	0.3

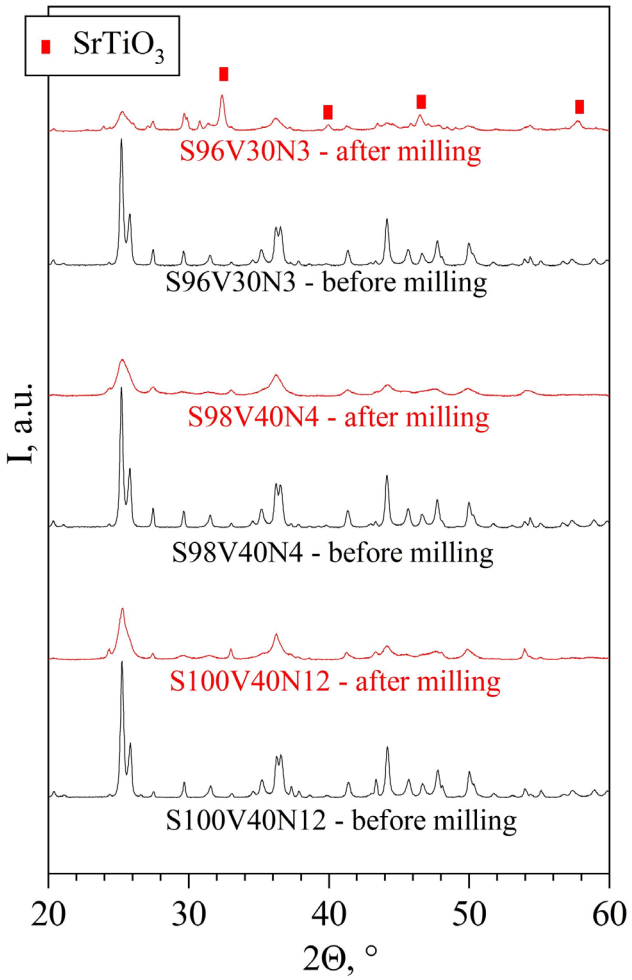

Figure S1. XRD patterns of selected precursor mixtures before and after the mechanical activation. An onset of target $SrTiO_3$-based perovskite phase was observed for S96V30N3 as a result of high-energy mechanical treatment.

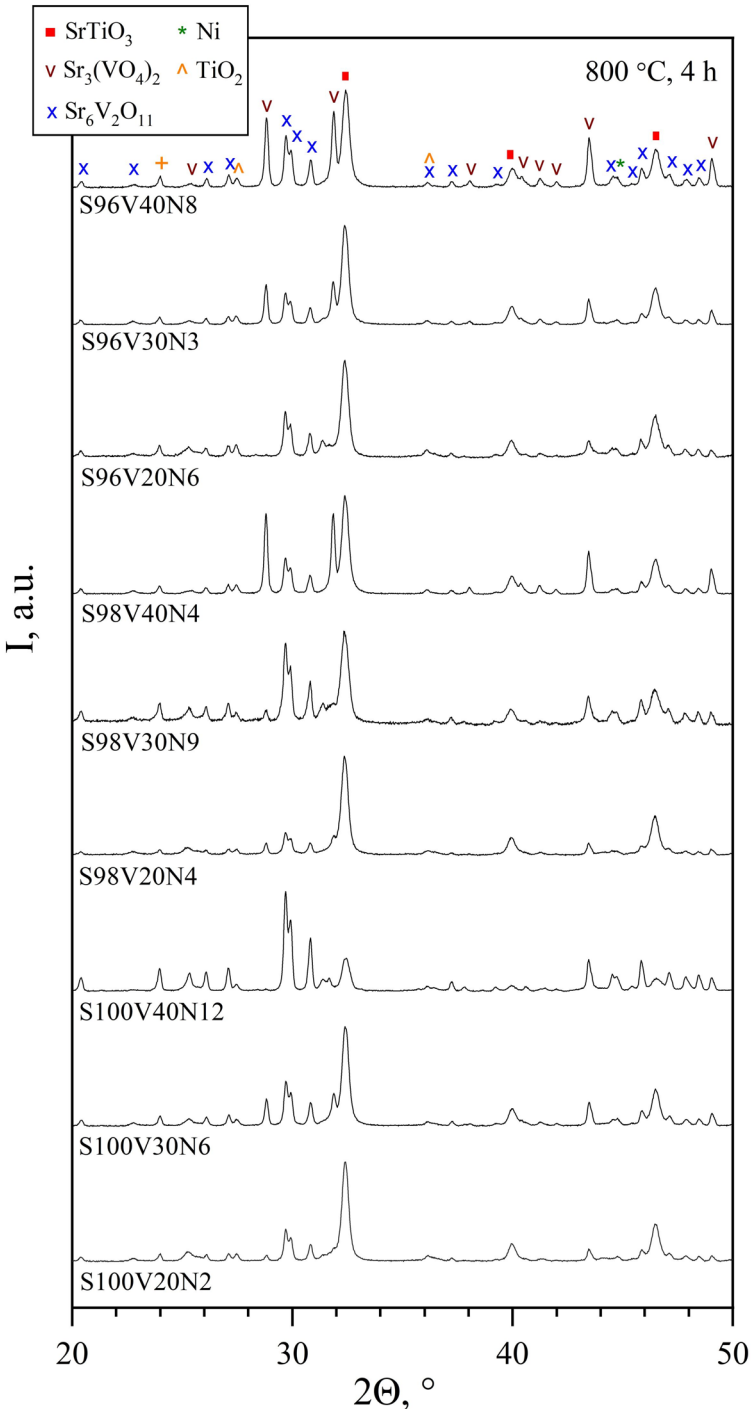

Figure S2. XRD patterns of SVTN samples after calcination for 4 h in flowing 10%H_2-N_2 atmosphere at 800 °C. Phase identification is representatively shown for the S96V40N8 sample.

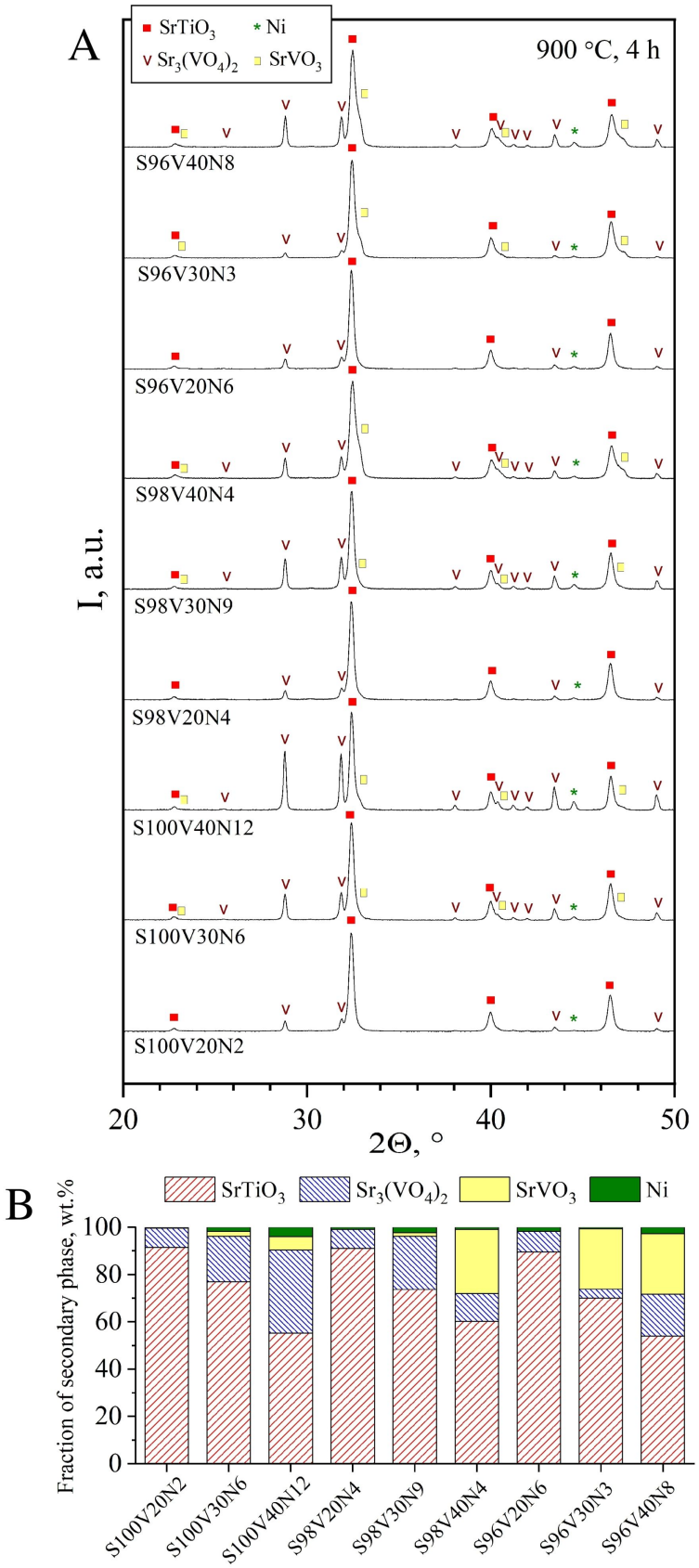

Figure S3. XRD patterns of SVTN samples (**A**) and estimated fractions of different phases (**B**) after calcination for 4 h in flowing 10%H_2-N_2 at 900 °C.

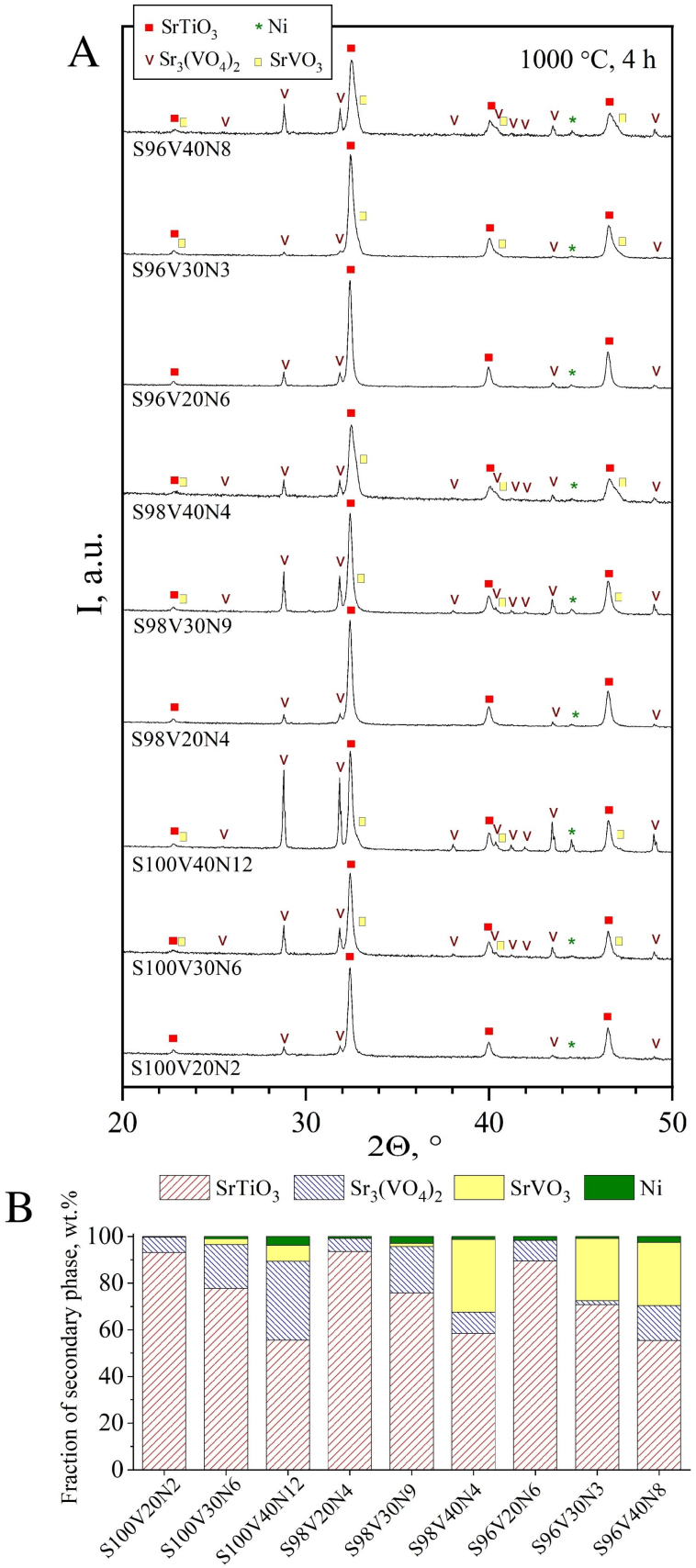

Figure S4. XRD patterns of SVTN samples (**A**) and estimated fractions of different phases (**B**) after calcination for 4 h in flowing 10%H_2-N_2 at 1000 °C.

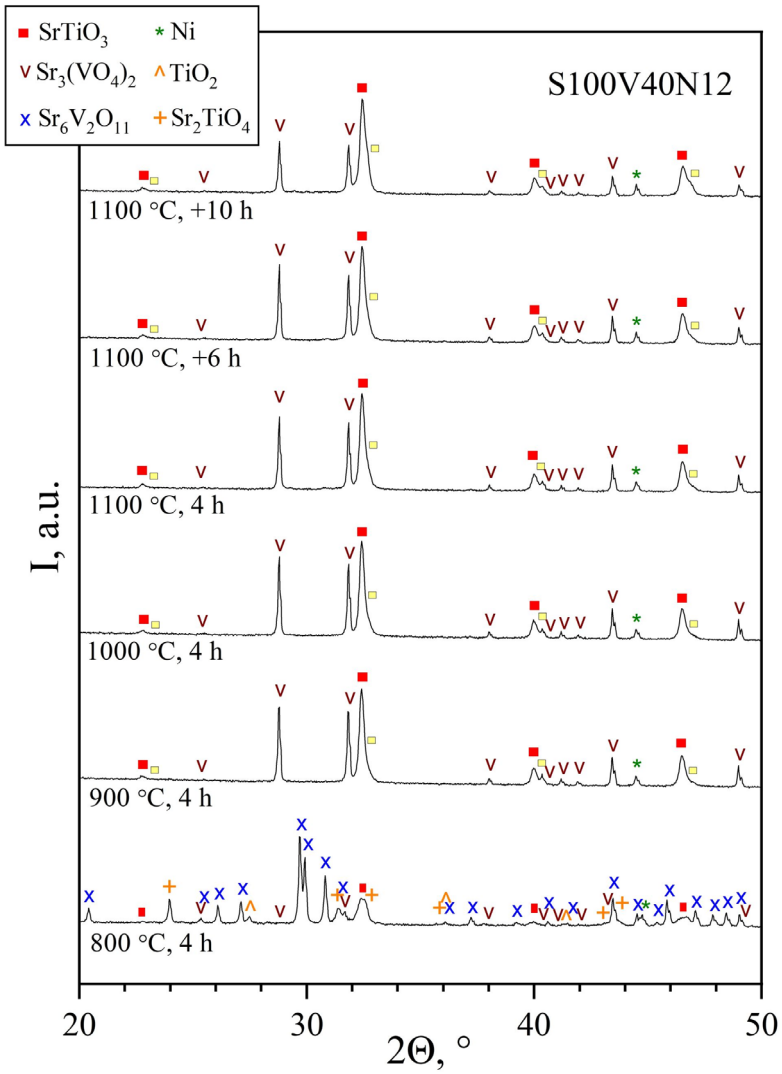

Figure S5. XRD patterns of SV40N12 sample after consecutive thermal treatment steps in flowing 10%H_2-N_2 at 800-1100 °C.

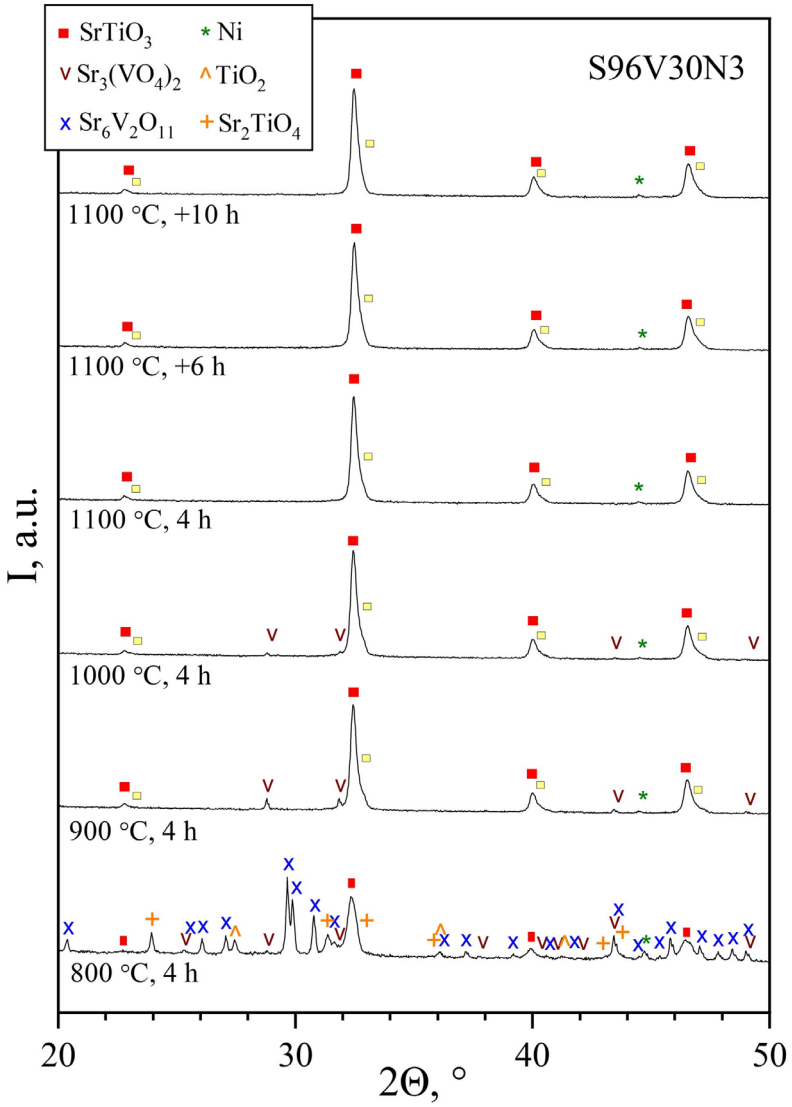

Figure S6. XRD patterns of S96V30N3 sample after consecutive thermal treatment steps in flowing 10%H_2-N_2 at 800-1100 °C.

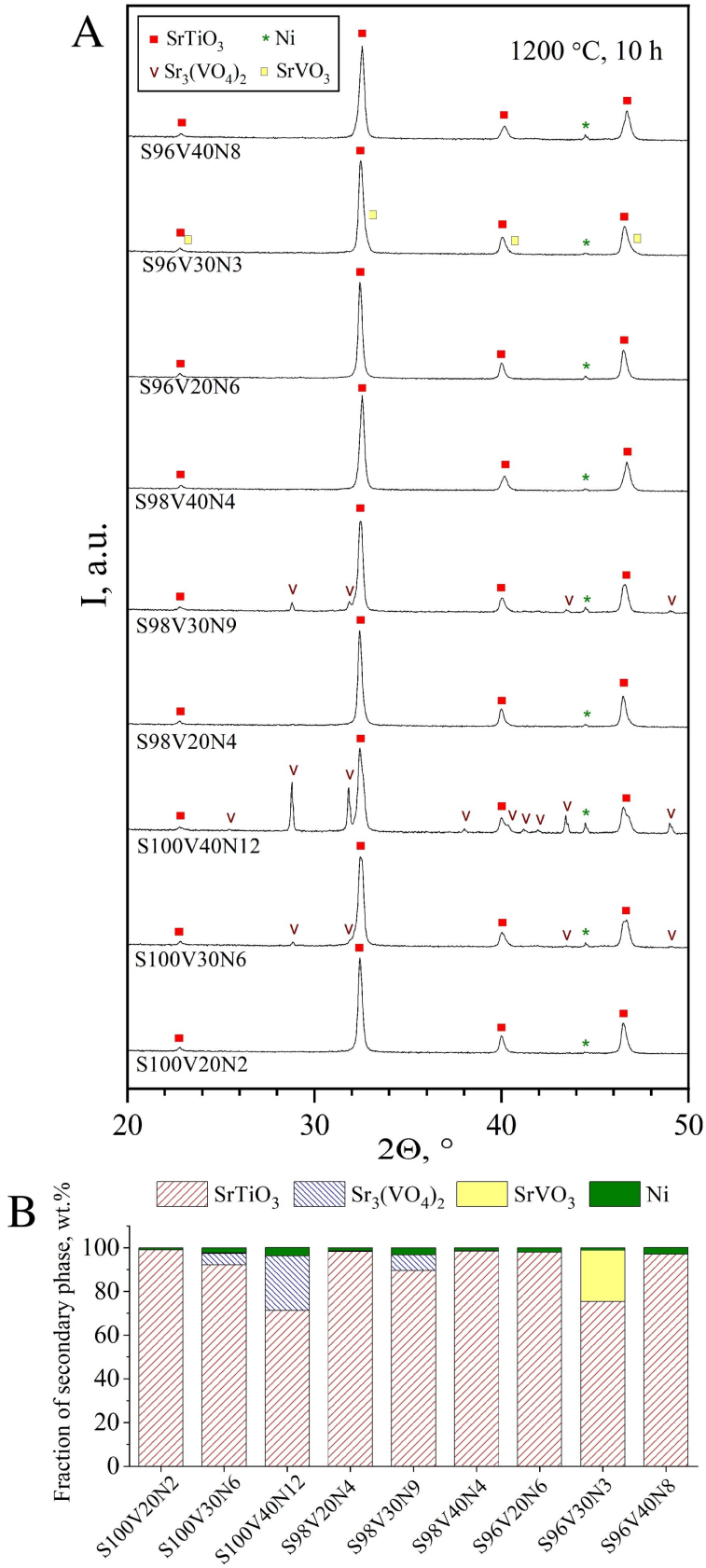

Figure S7. XRD patterns (**A**) and estimated fractions of different phases (**B**) in SVTN samples after firing in a flowing 10%H_2-N_2 atmosphere at 1200 °C for 10 h.

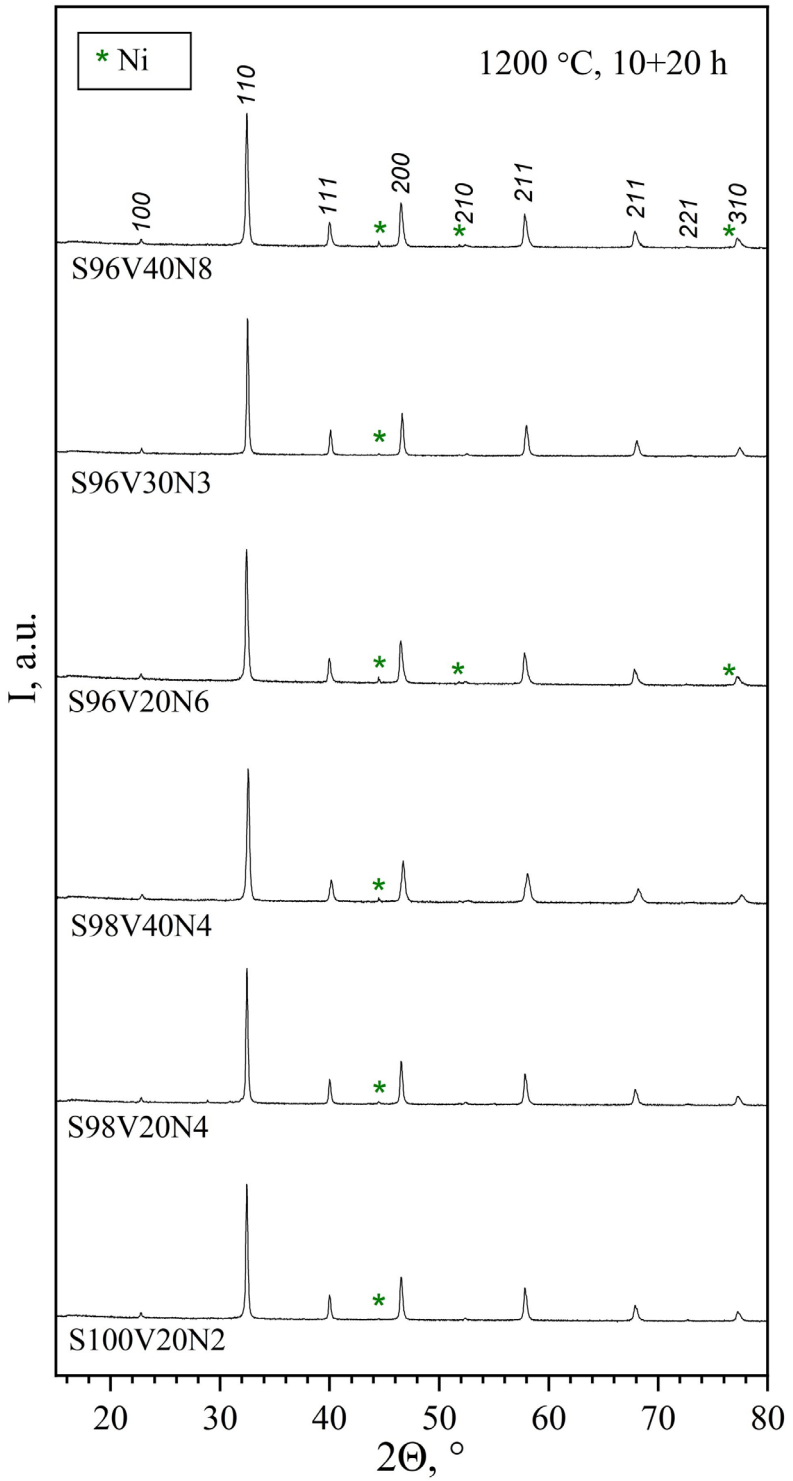

Figure S8. XRD patterns of STVN samples after firing in flowing 10%H_2-N_2 atmosphere at 1200 °C for 30 h.

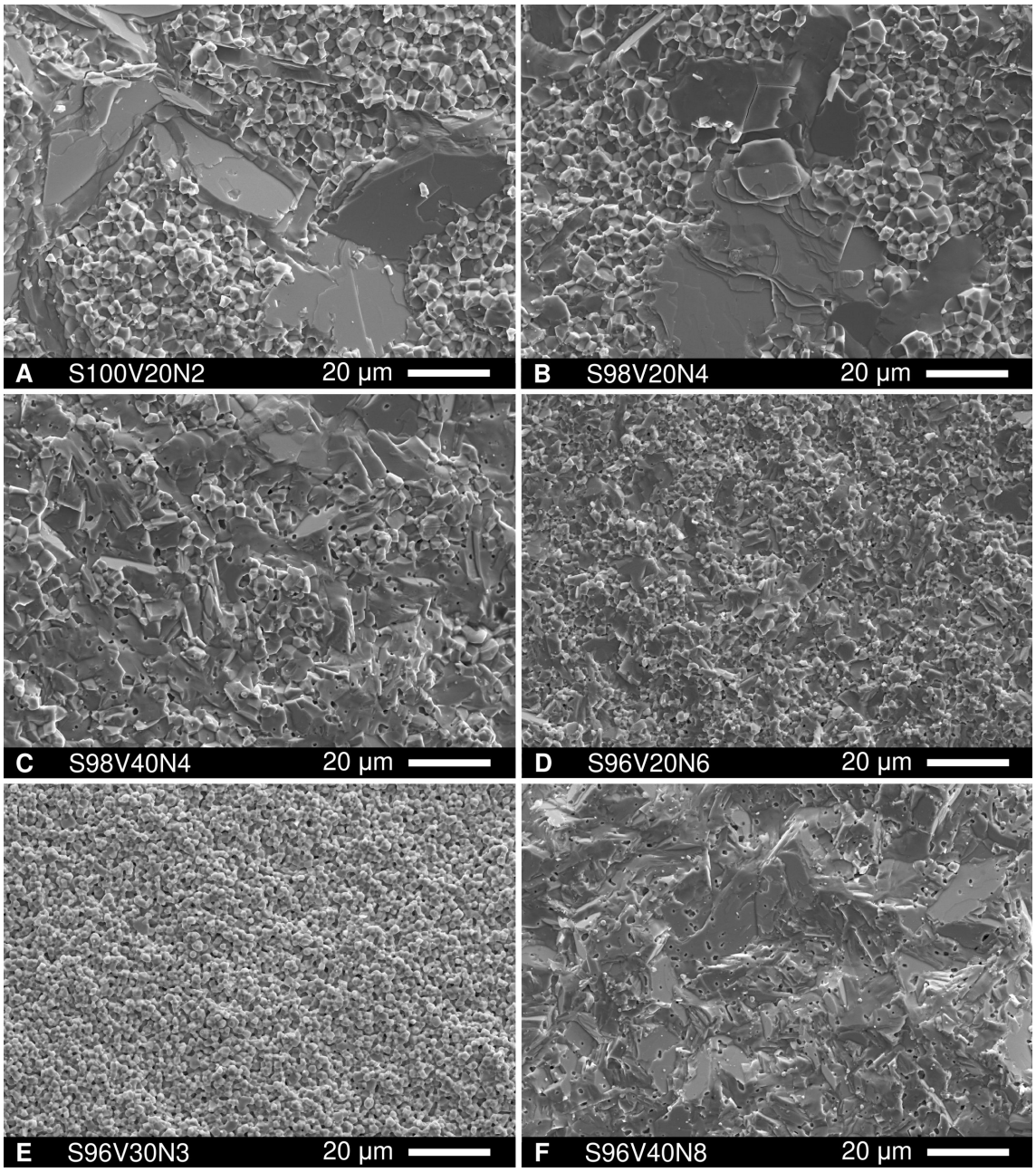

Figure S9. SEM micrographs of fractured cross-sections of STVN ceramics sintered at 1450 °C for 10 h in 10%H_2-N_2 atmosphere.

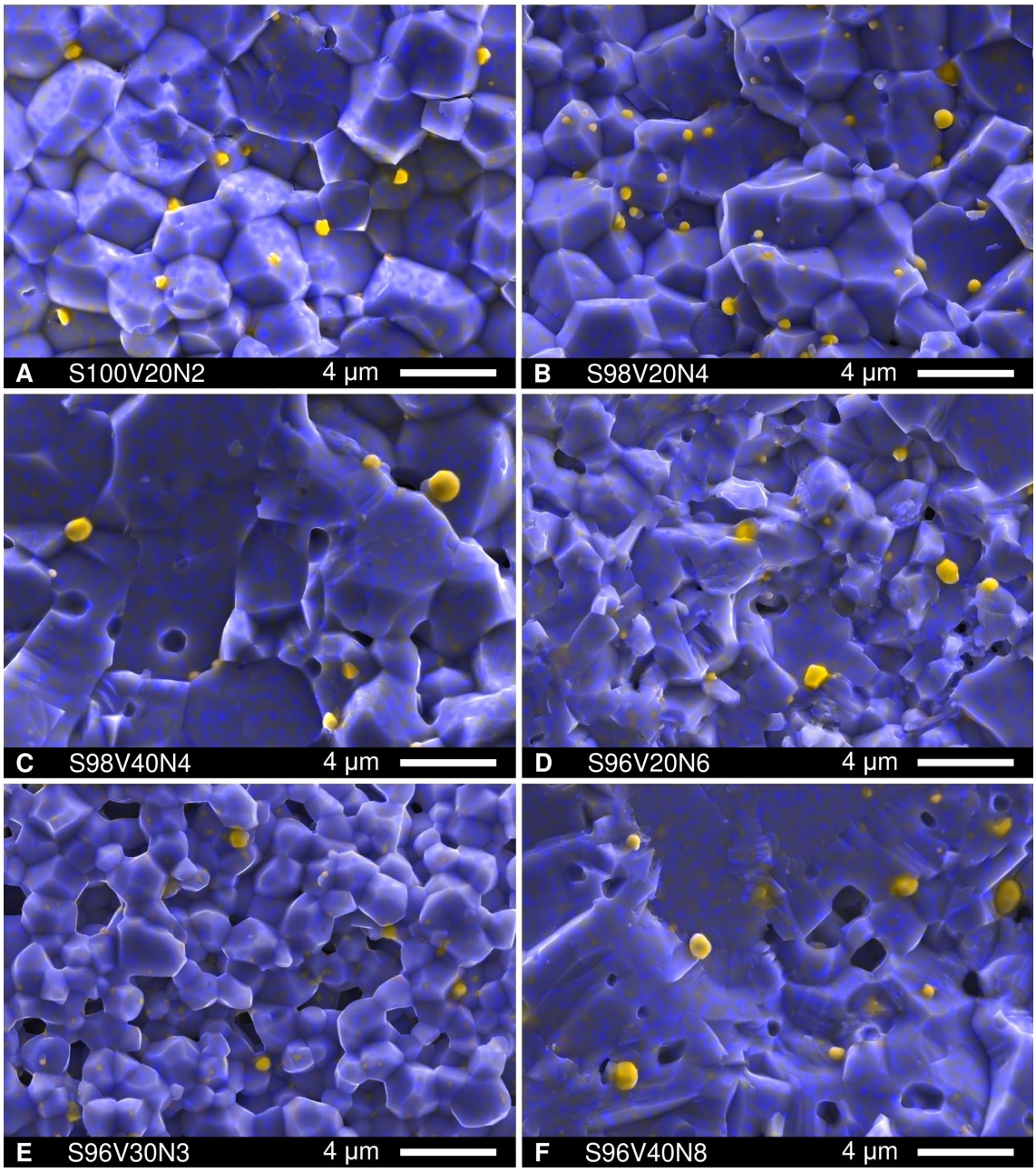

Figure S10. SEM micrographs of the fractured surface of STVN ceramics with overlaid EDS elemental mapping.

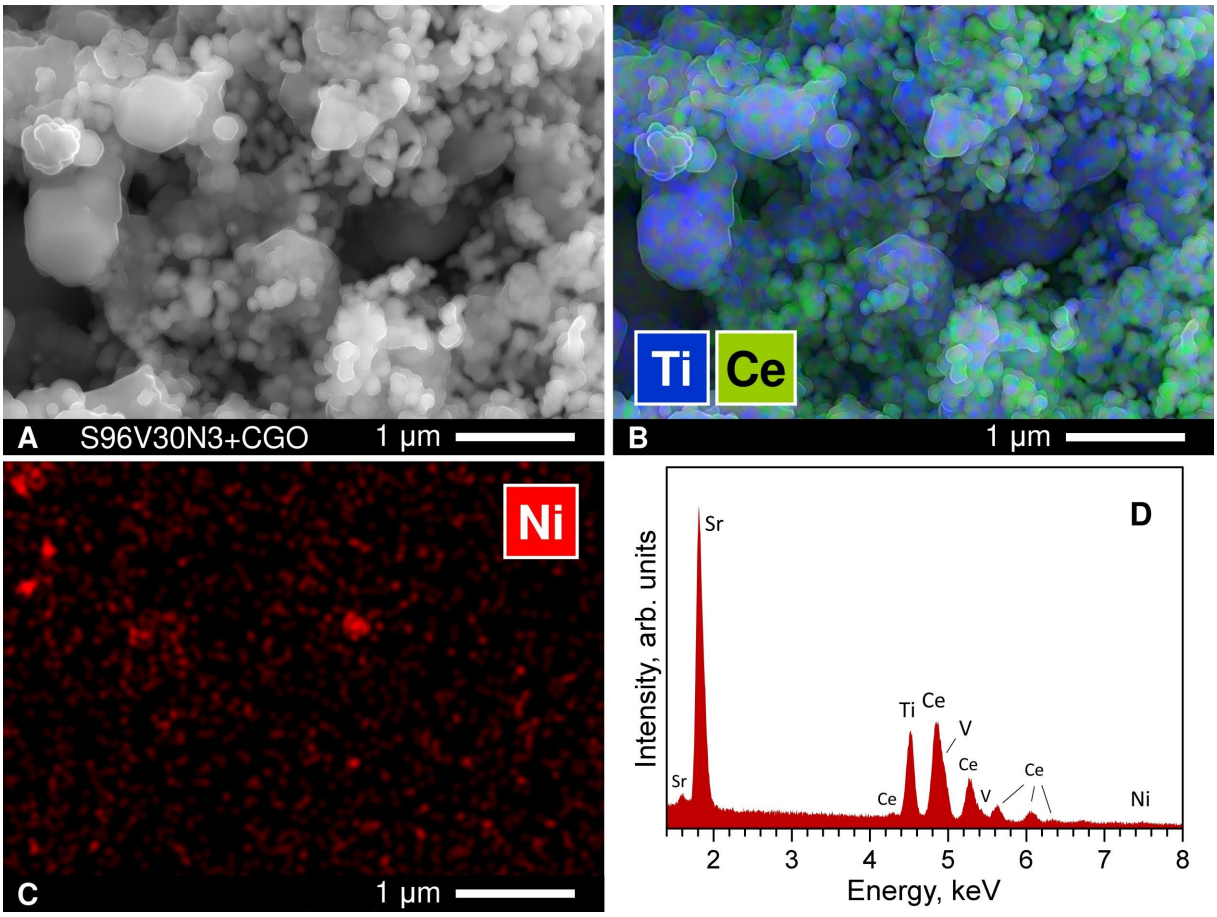

Figure S11. Microstructure of S96V30N3 electrode infiltrated with CGO (26 wt.%): (**A**) SEM image; (**B**) SEM image with overlaid EDS elemental mapping showing the distribution of STVN and CGO phases; (**C**) EDS mapping of Ni distribution; (**D**) corresponding EDS spectrum.

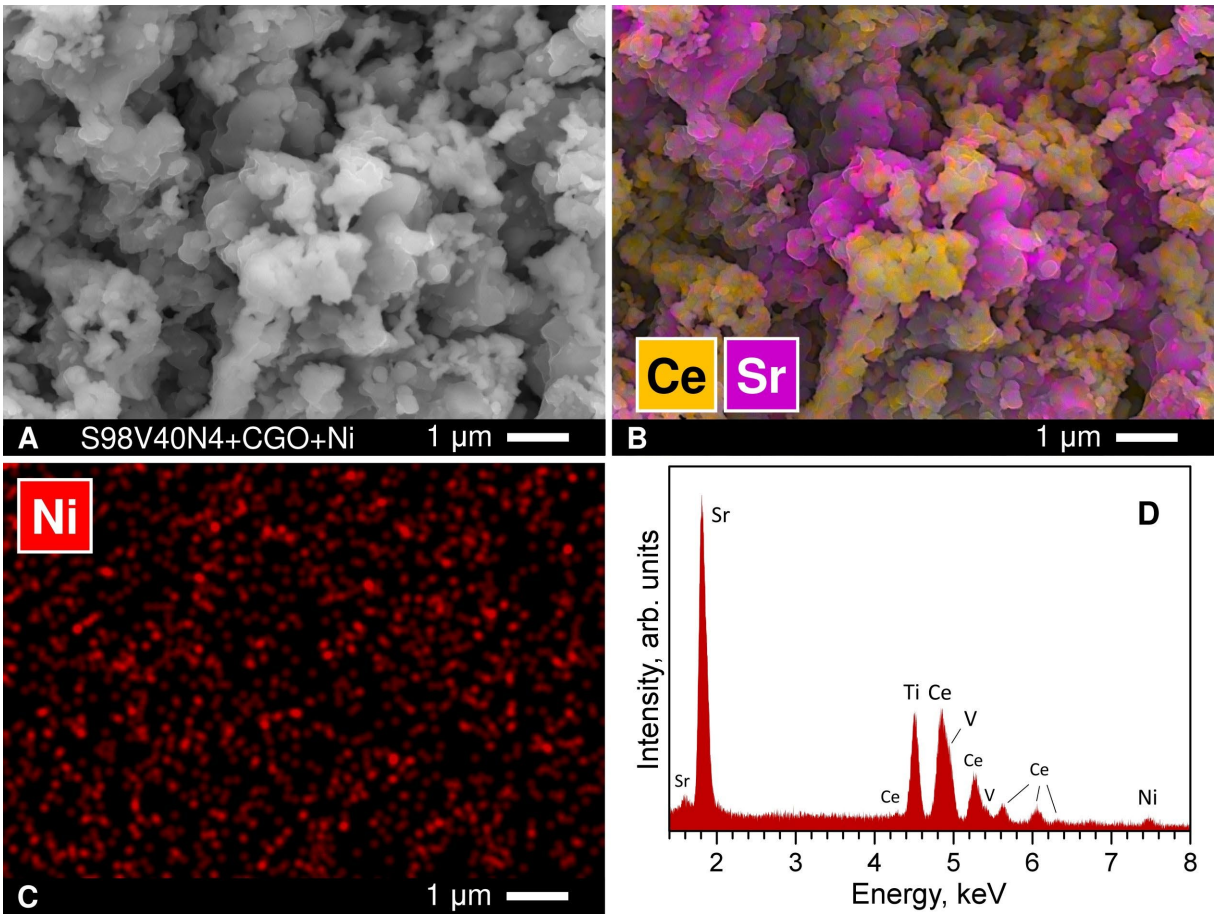

Figure S12. Microstructure of S98V40N4 electrode infiltrated with CGO and Ni (30 wt.%, CGO:Ni = 10:1): (**A**) SEM image; (**B**) SEM image with overlaid EDS elemental mapping showing the distribution of STVN and CGO phases; (**C**) EDS mapping of Ni distribution; (**D**) corresponding EDS spectrum.