

Electronic supplementary information (ESI)

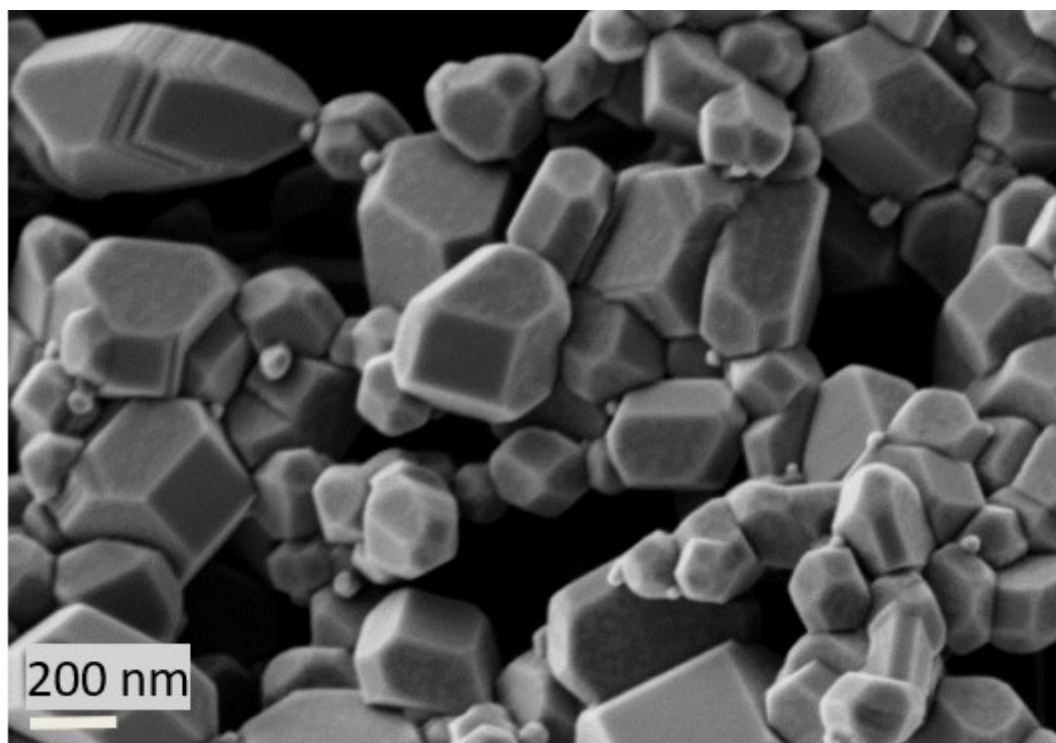


Fig S1. SEM image of L70SCrN after reduction.

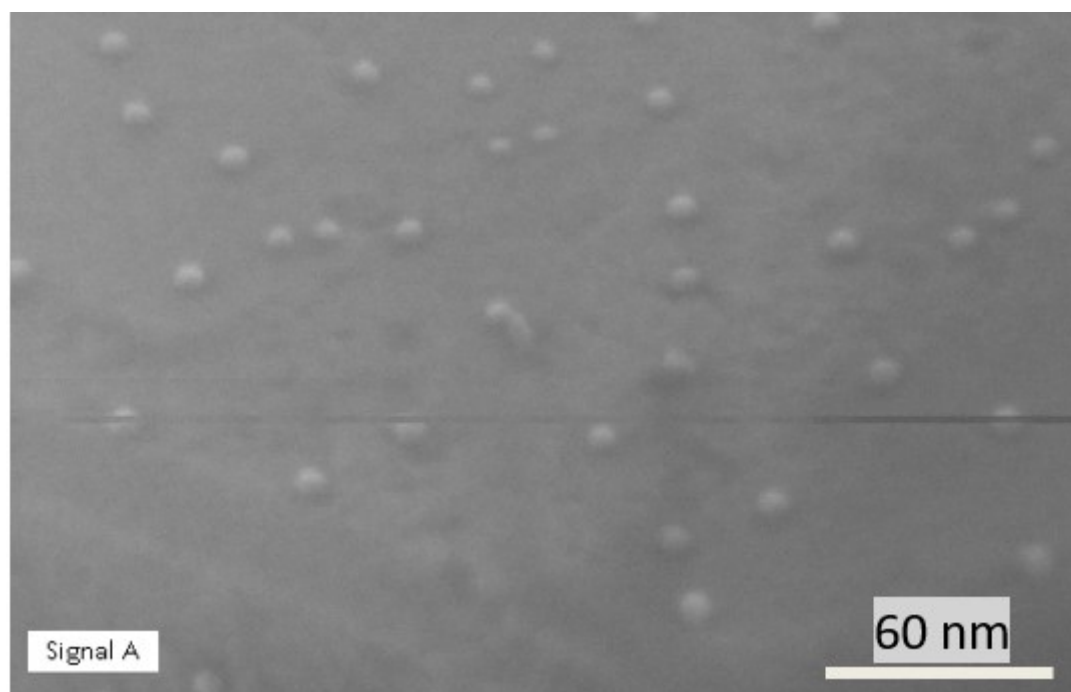


Fig S2. SEM image (magnification 400X, 10 kV). Ni exsolution after 3 hours treatment under H₂ atmosphere at 500 °C on surface Type 1 from Figure 6a.

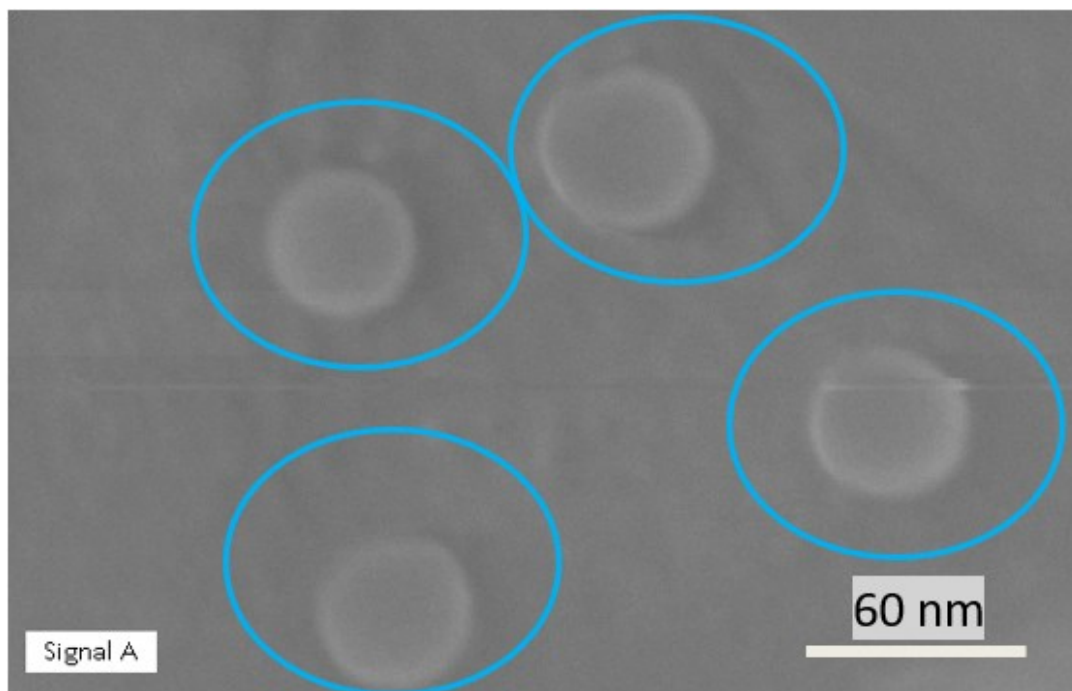


Fig S3. SEM image (magnification 400X, 10 kV). Ni exsolution after 3 hours treatment under H₂ atmosphere at 500 °C on surface Type 2 from Figure 6a.

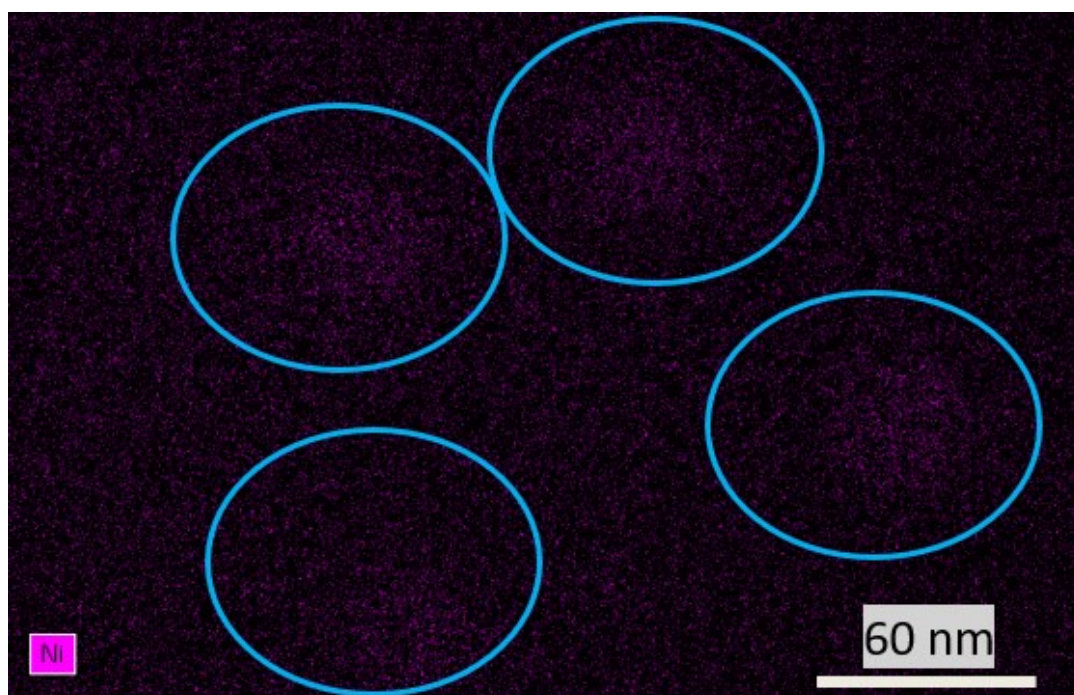


Fig S4. EDS mapping of Ni signal on SEM image shown on Fig. S3, where the area corresponding to the 4 nanoparticles shown on Fig. S3 could be correlated with an enrichment in Ni.

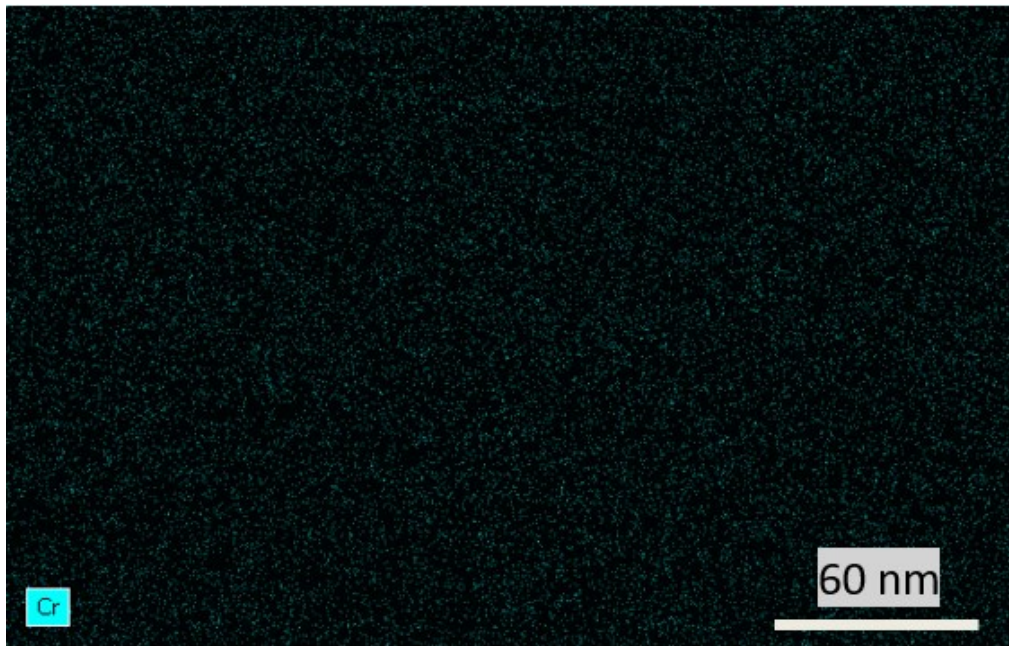


Fig S5. EDS mapping of Cr signal on SEM image shown on Fig. S3, where the area corresponding to the 4 nanoparticles shown on Fig. S3 could not be correlated with an enrichment in Cr.

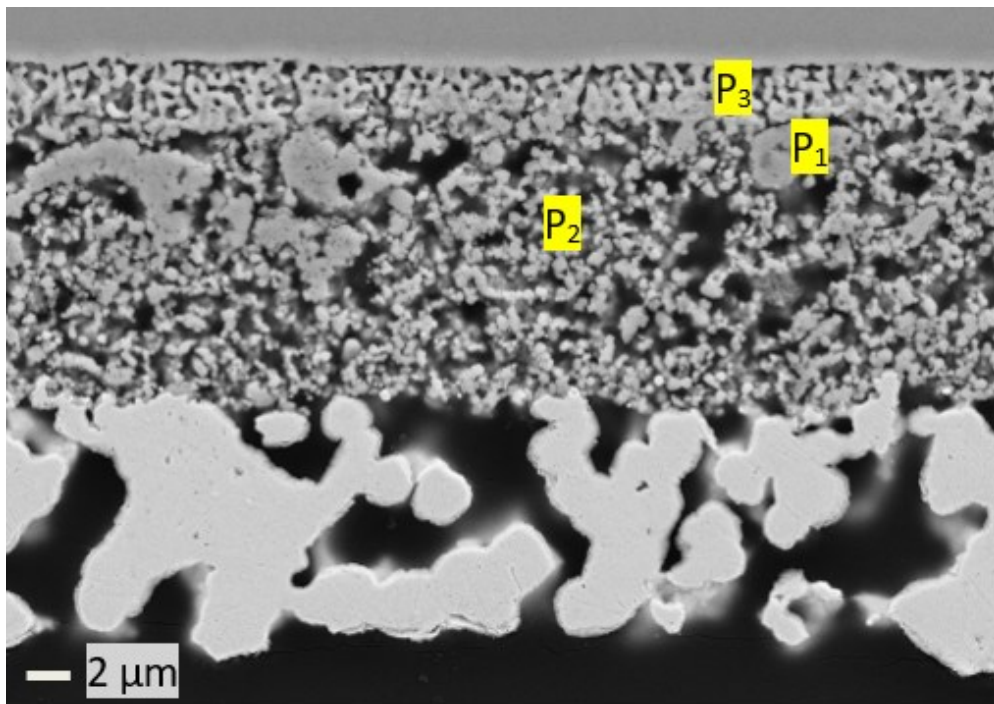


Fig S6 Polished cross-section view of the L655CrN fuel electrode ESC after FC, FC-EC, EC and co-EC operation at 860 °C with EDX point analysis.

Table S1. EDX with point analysis on Fig. S6 and mass percent content by element.

Element	La	Sr	Ni	Cr	O	Zr	Gd	Ce	Si	C	Pt
P 1	39.89	16.91	2.23	22.37	18.59	-	-	-	-	-	-
P 2	47.07	11.16	3.12	21.70	16.94	-	-	-	-	-	-
P 3	-	6.62	-	-	13.93	0.93	12.16	61.0	5.37	-	-

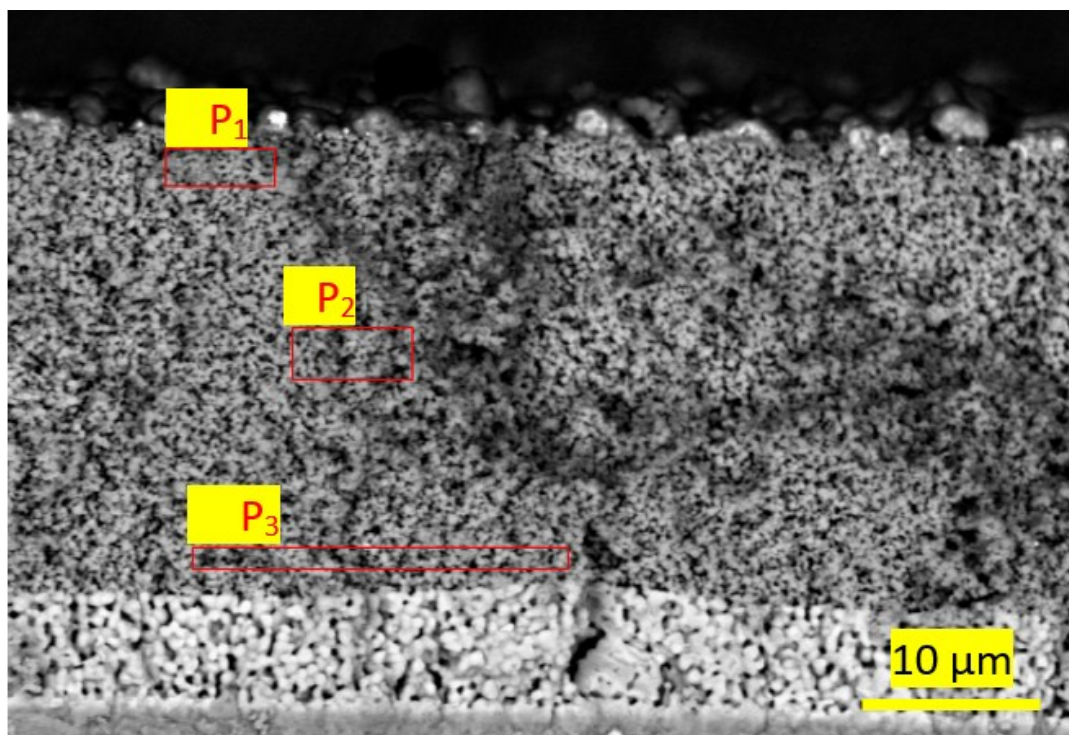


Figure S7. Cross-section view of the L655CrN fuel electrode ESC after long-term co-EC operation at 860 °C with EDX point analysis

Table S2. EDX with point analysis on Fig. S7 and mass percent content by element.

Element	C	O	Al	Si	Cr	Ni	Sr	Zr	La
P 1	2.82	22.35	0.53	0.14	20.22	2.14	13.38	2.19	36.23
P 2	1.98	18.16	-	0.01	22.03	3.34	9.84	1.18	43.46
P 3	1.51	15.64	-	0.06	23.57	2.93	10.49	0.89	44.90

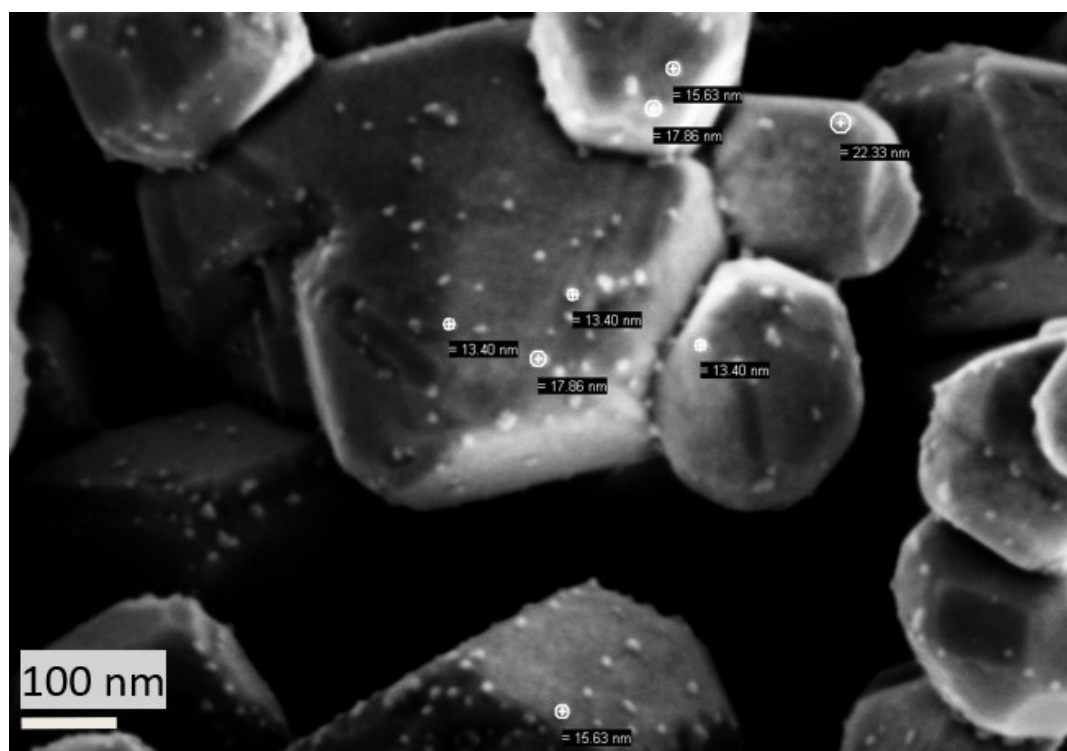


Figure S8. SEM image representative of the electrode surface showing the Ni nanoparticles of typical size after co-electrolysis at 860°C during 950 hours at -0.46 A.cm⁻².