Electronic Supplementary Information

Power and carbon monoxide co-production by a proton-conducting solid oxide fuel cell with $La_{0.6}Sr_{0.2}Cr_{0.85}Ni_{0.15}O_{3-\delta}$ for on-cell dry reforming of CH_4 by CO_2

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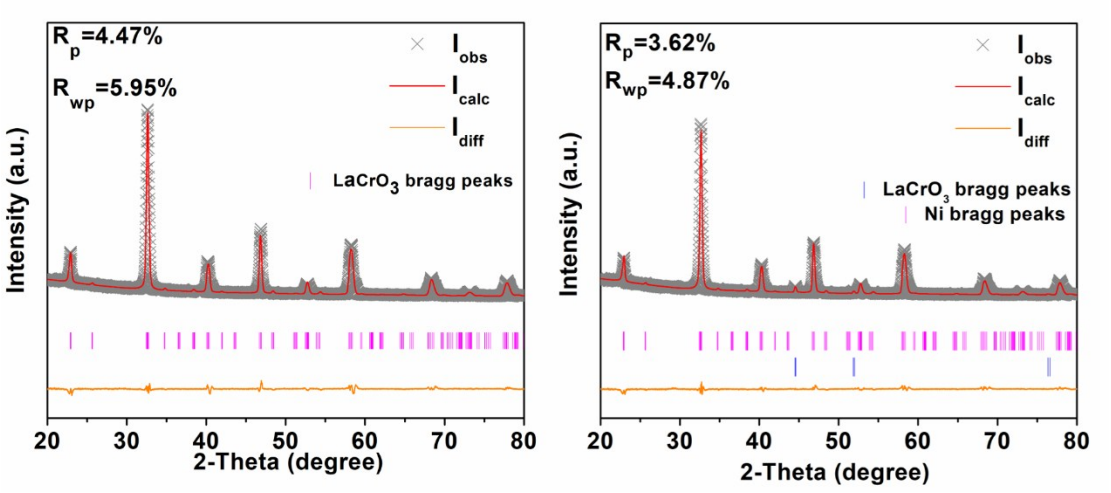

Fig. S1 Rietveld refinement for XRD patterns of (a) LSCrN and (b) reduced LSCrN.

Table S1 Structure parameters for LSCrN and reduced LSCrN powders obtained by the Rietveld refinement.

		Before reduction	After reduction	
		$La_{0.6}Sr_{0.2}Cr_{0.85}Ni_{0.15}O_3$	$La_{0.683}Sr_{0.228}Cr_{0.968}Ni_{0.032}O_{3-\delta}$	Ni
Space group		*Pbnm*(62)	*Pbnm*(62)	*Fm3m*(225)
Unite-cell parameters	*a* (Å)	5.4633(9)	5.4737(7)	3.5300(7)
	b (Å)	7.7684(0)	7.7791(1)	3.5300(7)
	c (Å)	5.5063(8)	5.5123(9)	3.5300(7)
Reliability factors	R_p (%)	4.12	3.42	
	R_{wp} (%)	5.95	4.87	
	χ^2	2.57	3.12	

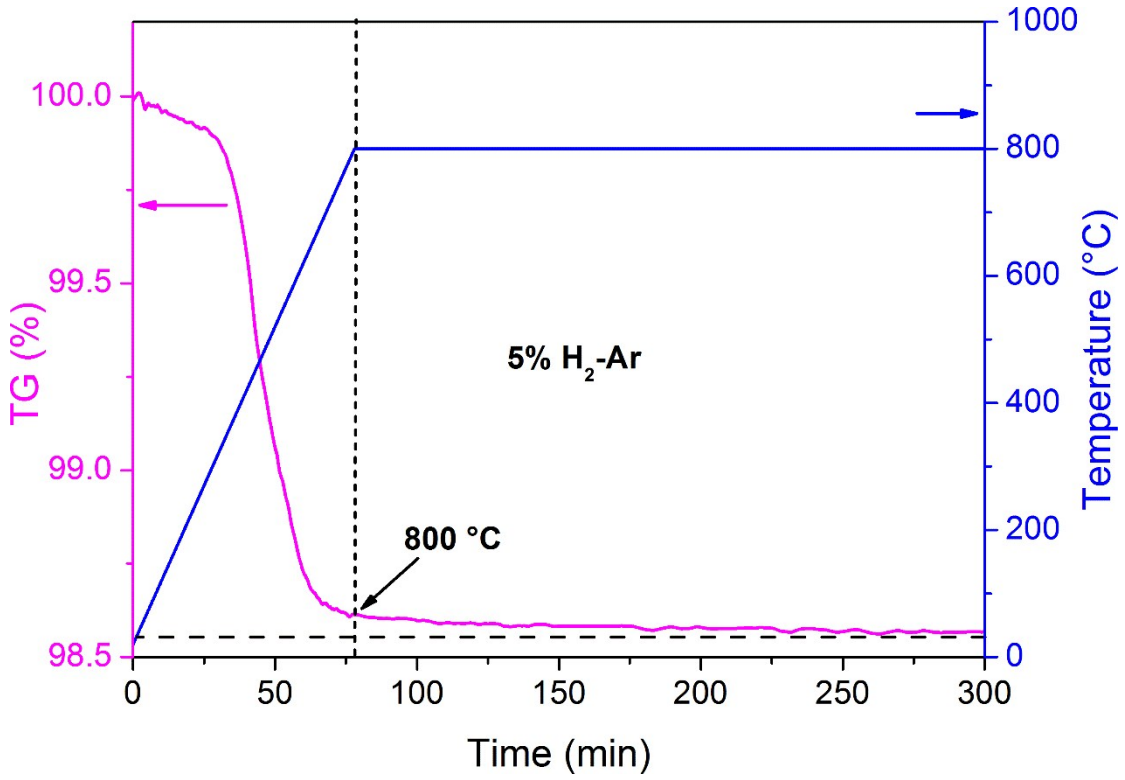

Fig. S2 Thermogravimetric analysis of LSCrN powder in 5% H_2-Ar up to and held at 800 °C.

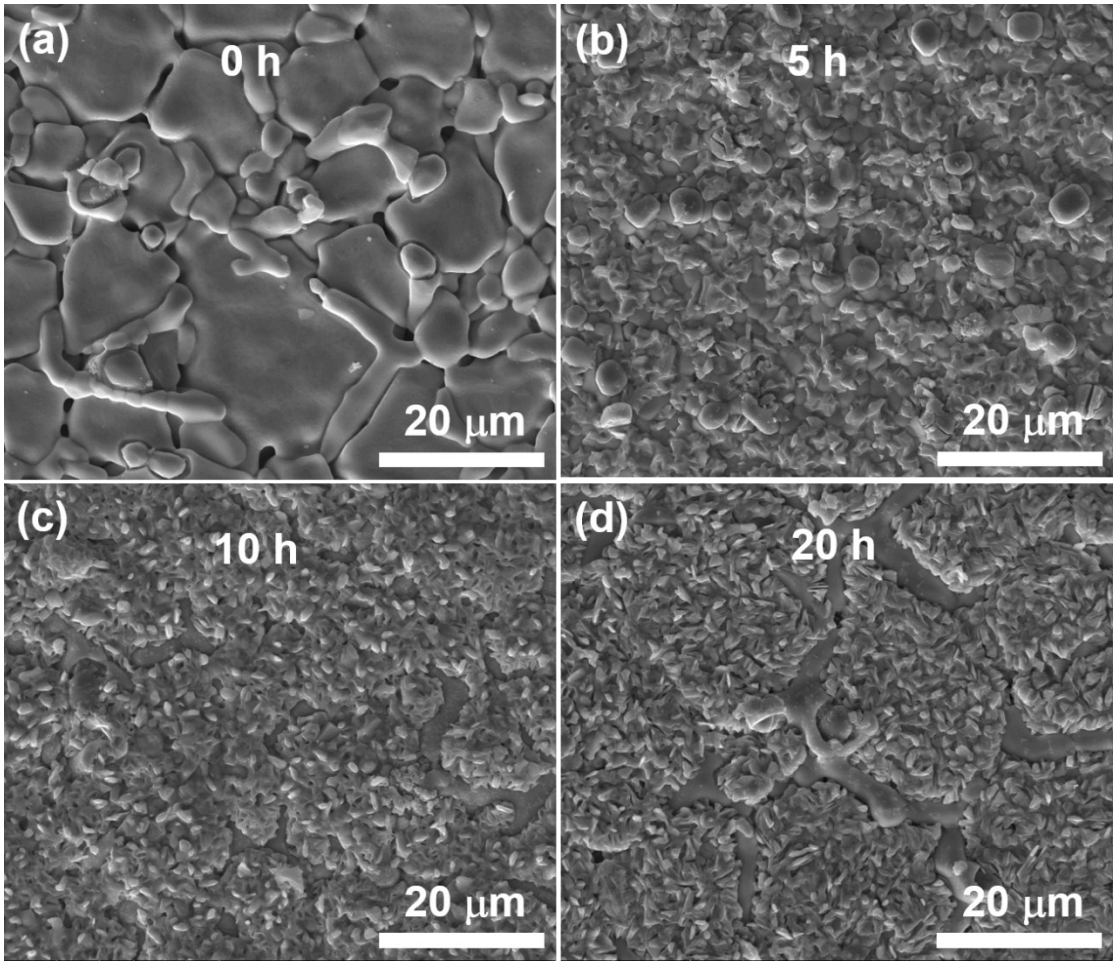

Fig. S3 Microstructure of BZCYYb discs heat-treated in CO_2 at 700 °C for (a) 0 h, (b) 5 h, (c)10 h and 20 h (d), respectively.

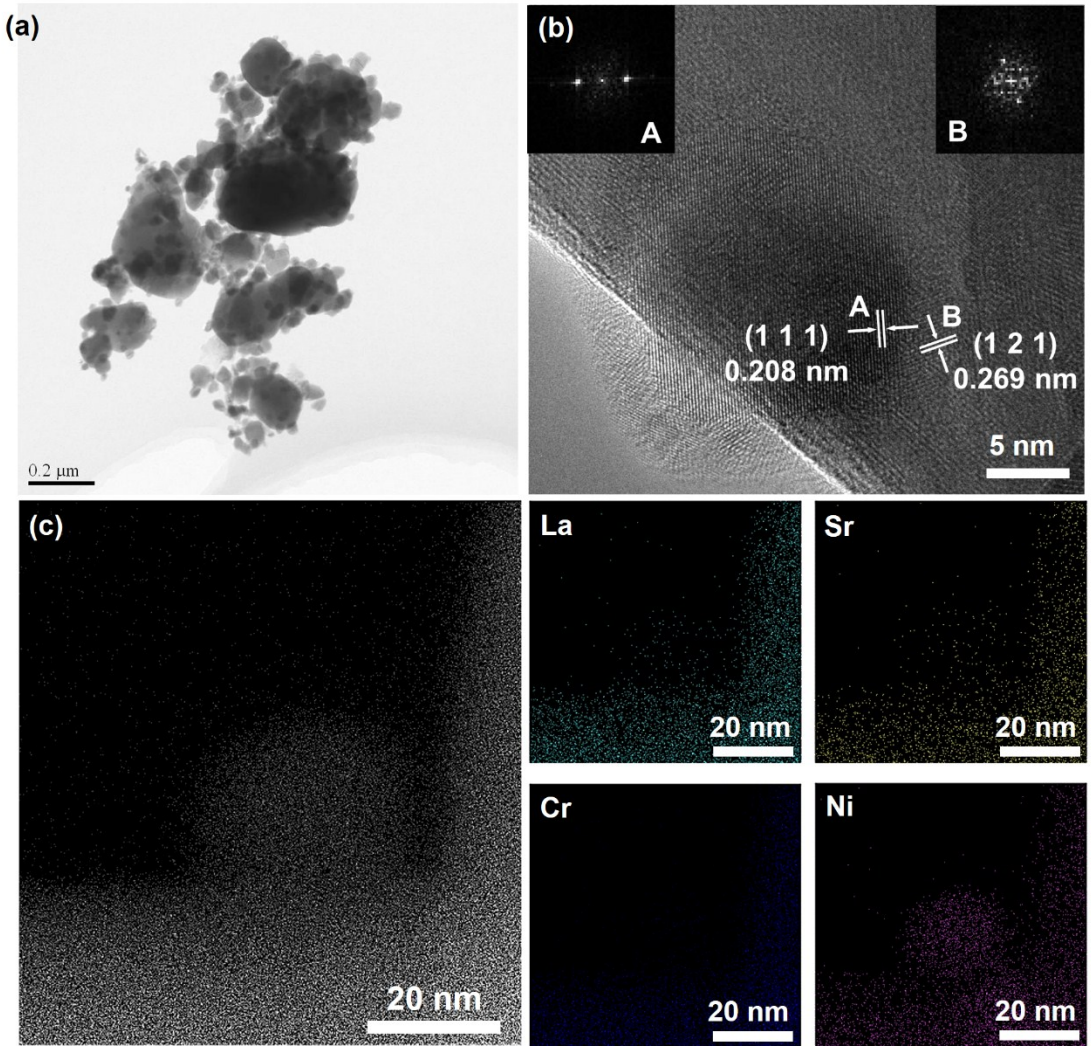

Fig. S4 TEM examination of LSCrN reduced in H2 at 800 °C for 4 h: (a) Low magnification image; (b) High magnification image; (c) elemental mapping.

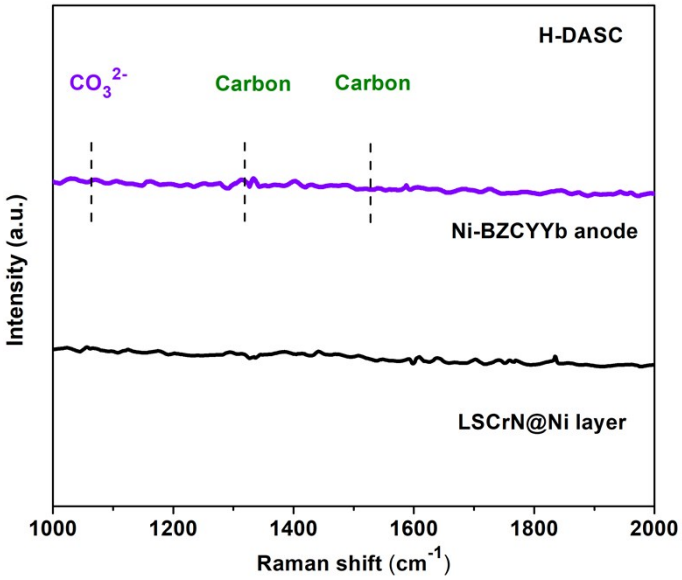

Fig. S5 Raman spectra taken at Ni-BZCYYb anode and LSCrN@Ni layer of H-DASC after stability test in CO_2-CH_4 at 700 °C and 0.6 A cm^{-2} for 65 h.