

Supplementary Information

In-situ exsolved CoFe alloys over perovskite toward enhanced ammonia synthesis

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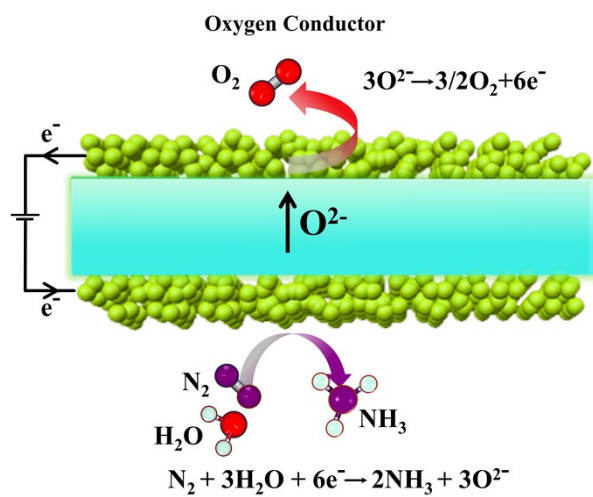


Fig. S1 Schematic graph of ammonia synthesis by electrocatalytic NRR via SOECs

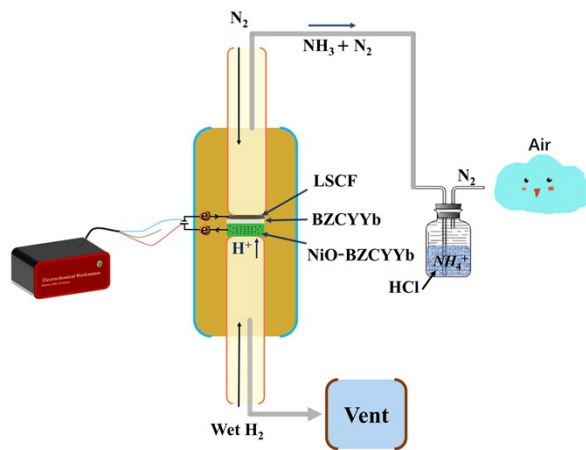


Fig. S2 Schematic diagram of the cell unit.

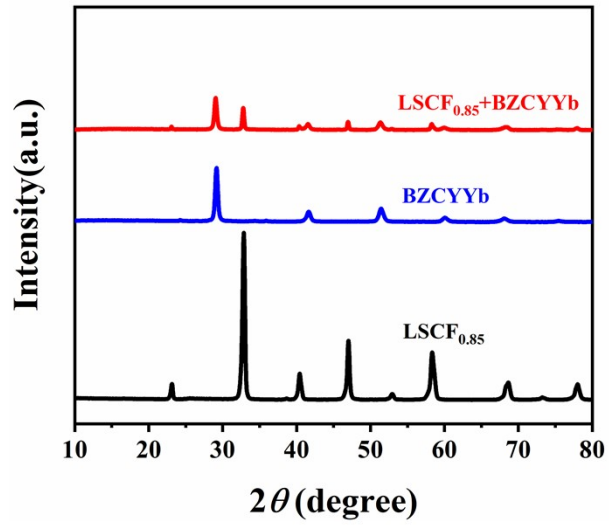


Fig. S3 XRD patterns of LSCF_{0.85}, BZCYYb, and LSCF_{0.85}-BZCYYb (1:1 mass ratio).

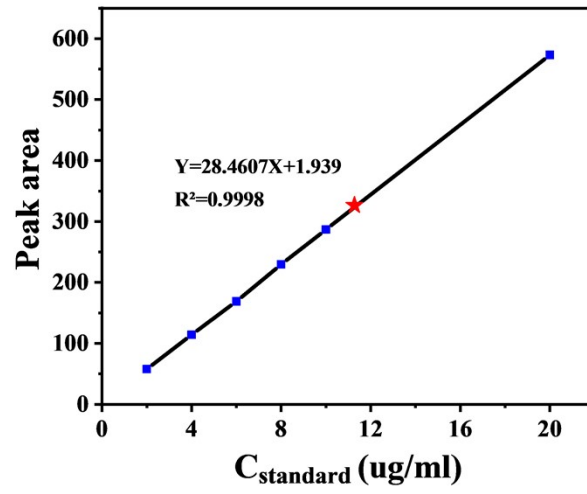


Fig. S4 Standard curve of ammonia nitrogen

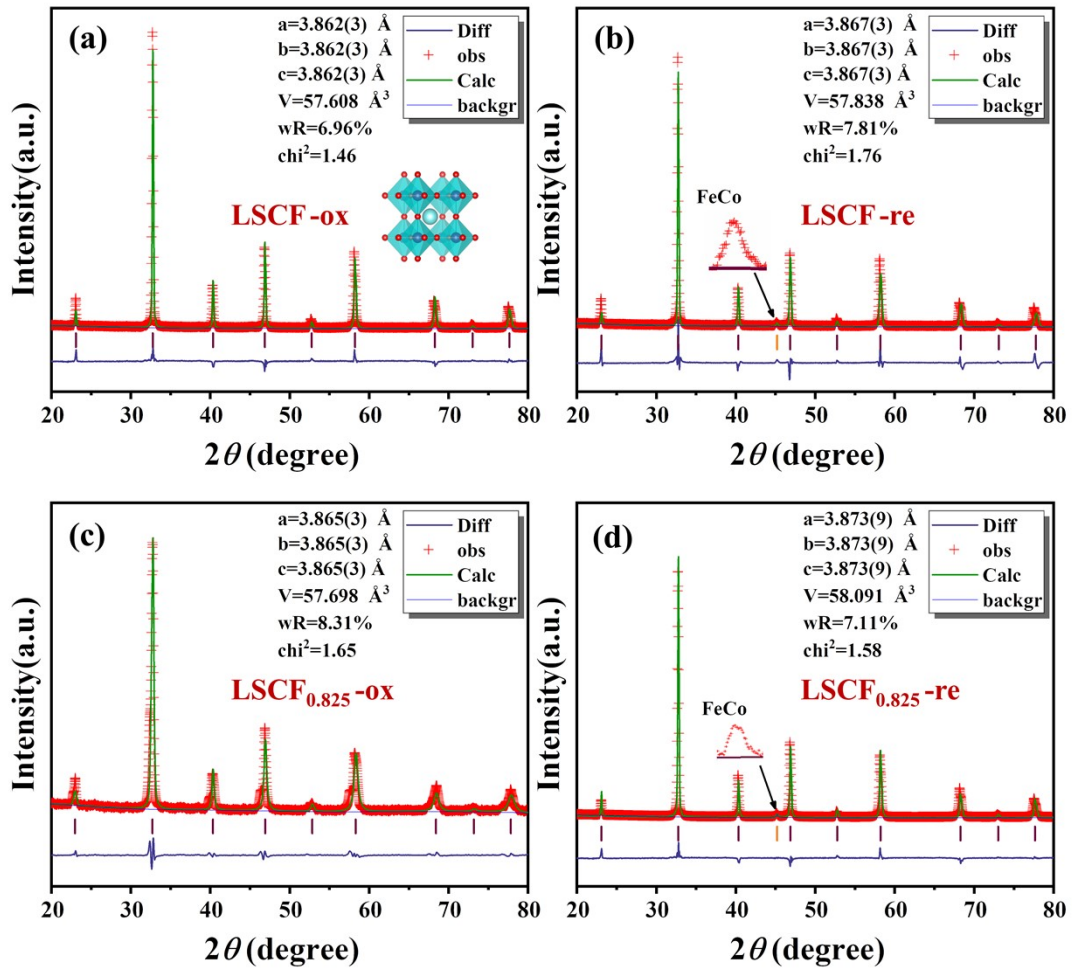


Fig. S5 XRD rietveld refinement patterns of the (a) oxidized and (b) reduced LSCF; (c) oxidized and (d) reduced of LSCF_{0.825}, respectively.

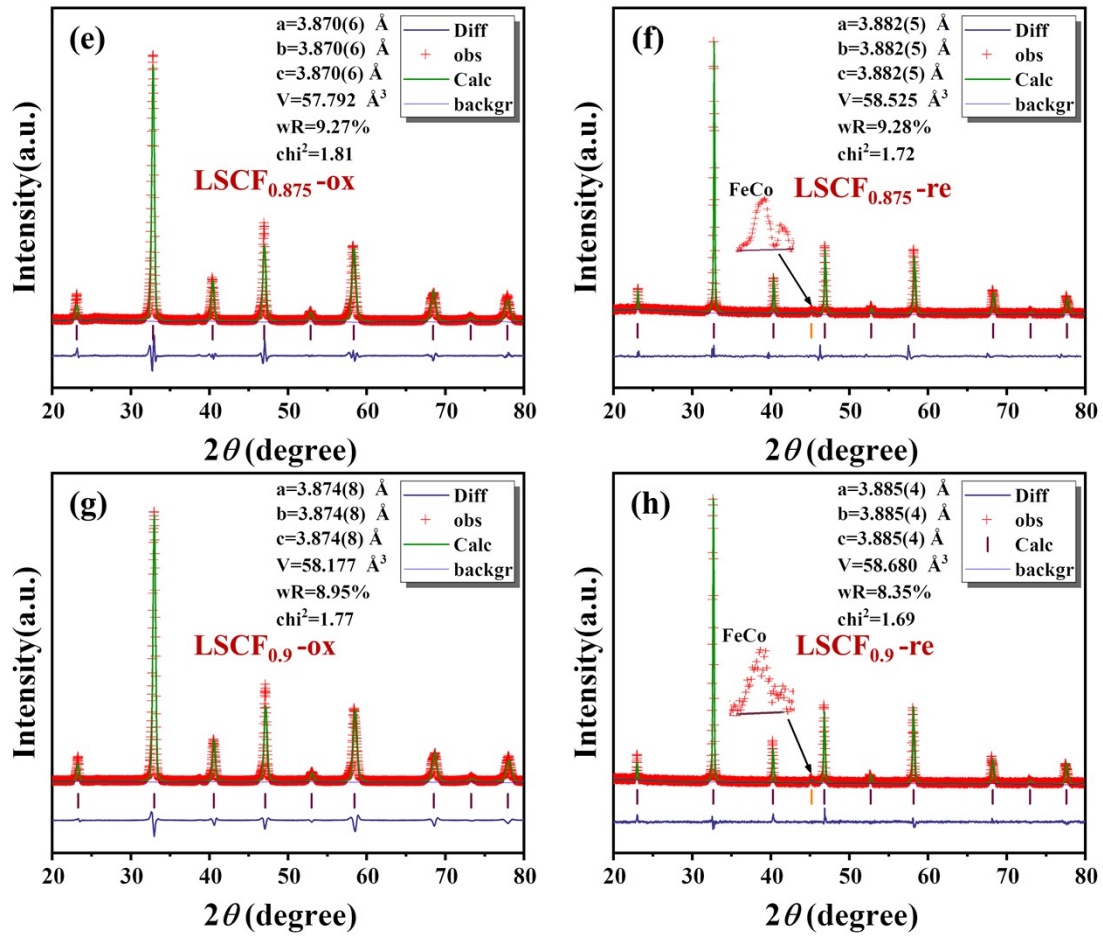


Fig. S6 XRD rietveld refinement patterns of the (e) oxidized and (f) reduced of LSCF_{0.875}; (g) oxidized and (h) reduced of LSCF_{0.9}, respectively.

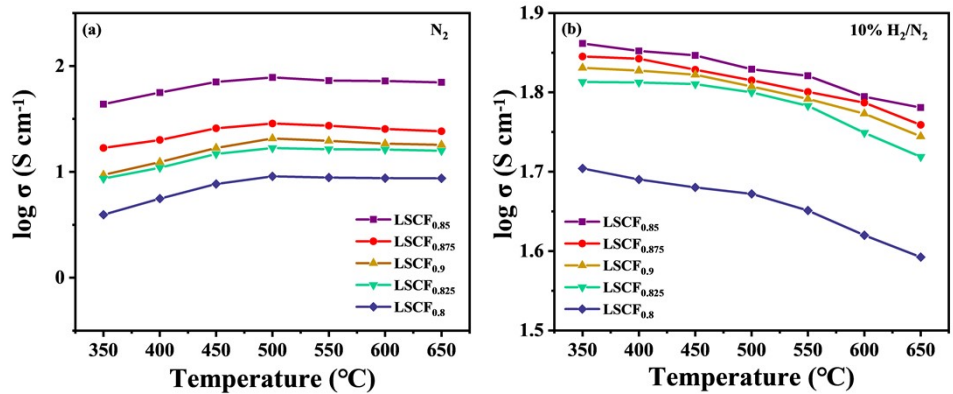


Fig. S7 The conductivity of LSCF_{0.8+x} in (a) pure N₂ atmosphere (b) 10% H₂/N₂ atmosphere.

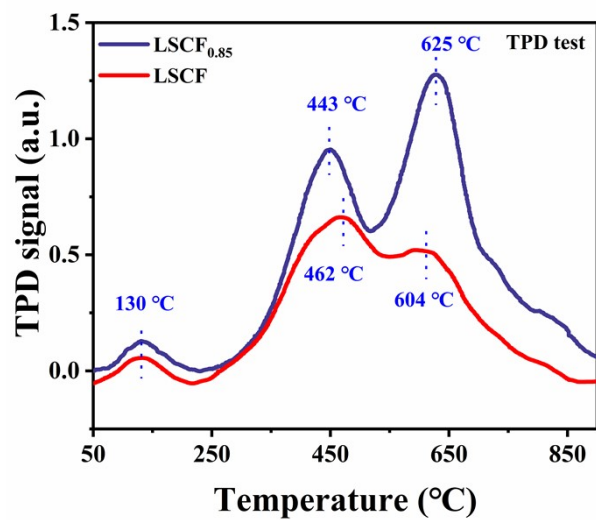


Fig. S8 The N₂-TPD curves of LSCF and LSCF_{0.85} powder

Table S1 Different valence peaks and atomic ratios of Fe and Co

Sample	Ions	Oxidation State		Reduction State	
		Atomic Ratio(%)	Energy(eV)	Atomic Ratio(%)	Energy(eV)
Fe2p _{3/2}	Fe ⁰			12.51	706.08
	Fe ²⁺	37.40	709.80	29.34	709.92
	Fe ³⁺	32.74	712.09	18.27	712.80
Fe2p _{1/2}	Fe ⁰			10.42	721.53
	Fe ²⁺	15.42	723.10	21.24	723.81
	Fe ³⁺	14.44	724.89	8.22	725.60
Co2p _{3/2}	Co ⁰			12.30	777.41
	Co ²⁺	50.18	780.27	31.71	779.82
	Co ³⁺	25.06	783.37	23.97	782.09
Co2p _{1/2}	Co ⁰			8.37	792.86
	Co ²⁺	15.27	795.29	15.44	795.27
	Co ³⁺	9.49	797.56	8.21	798.42