A, B site doping strategy enhances $Sr_{0.9}Y_{0.1}Fe_{1-x}Ni_xO_{3-\delta}$ structural stability, electrical and magnetic properties driven by Fe (IV) ions

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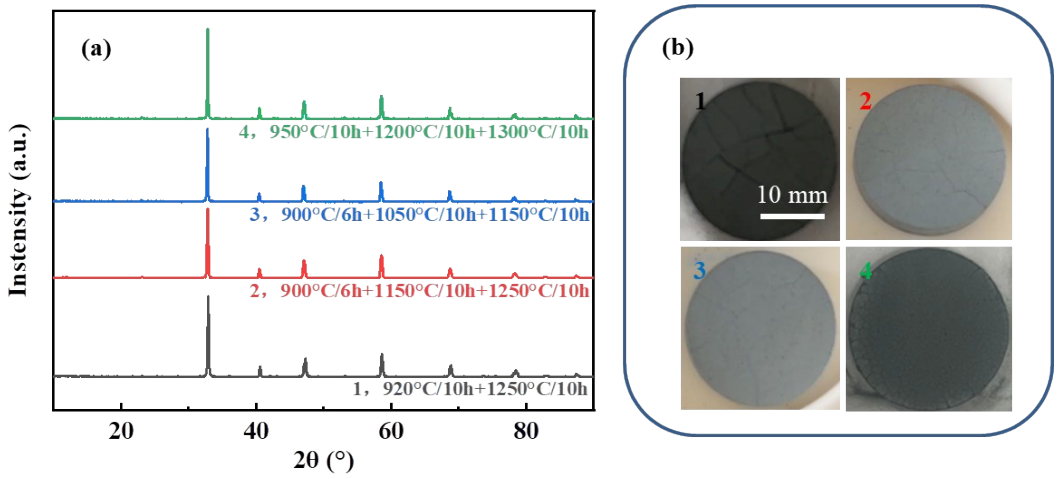

Fig. S1 (a) XRD patterns of different sintering processes for $SrFeO_{3-\delta}$. (b) Corresponding optical photographs.

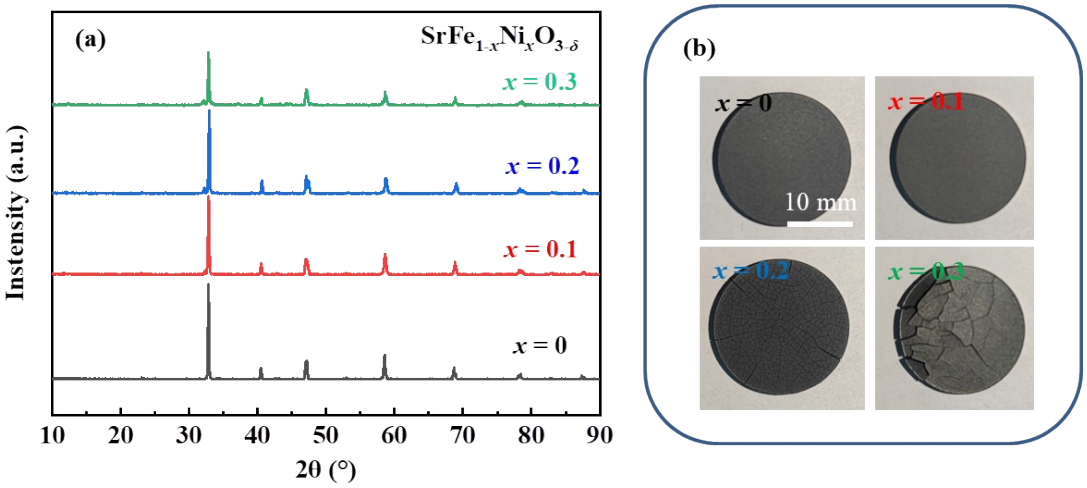

Fig. S2 (a) XRD patterns of $SrFe_{1-x}Ni_xO_{3-\delta}$ (x = 0~0.3) polycrystals. (b) Corresponding optical photographs.

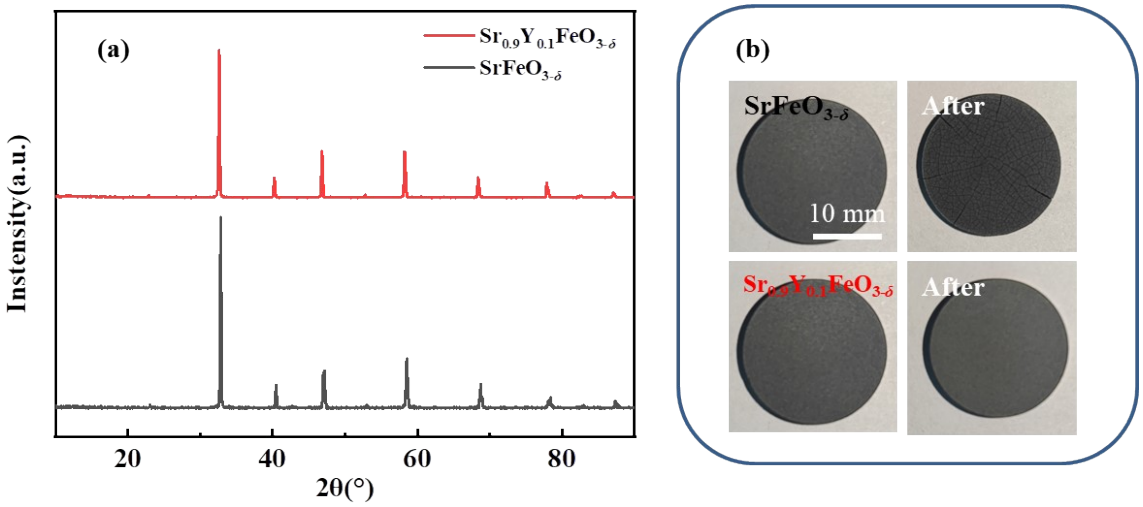

Fig. S3 (a) XRD patterns of $SrFeO_{3-\delta}$ and $Sr_{0.9}Y_{0.1}FeO_{3-\delta}$. (b) Comparison of finished sintering and after sitting.

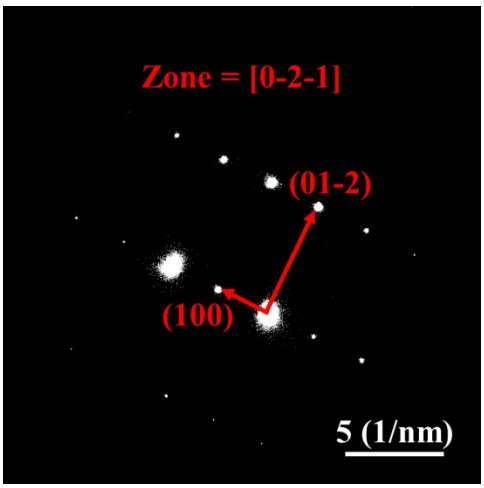

Fig. S4 The selected area electron diffraction (SAED) pattern of $Sr_{0.9}Y_{0.1}Fe_{0.9}Ni_{0.1}O_{3-\delta}$

Table S1 Crystal parameters of $Sr_{0.9}Y_{0.1}Fe_{1-x}Ni_xO_{3-\delta}$ (x = 0~0.3)

Sample	Phase structure	Space group	a / Å
x = 0	CP (97.5%) + T (2.5%)	$Pm\bar{3}m$ + $I4/mmm$	3.86518
x = 0.05	CP	$Pm\bar{3}m$	3.85615
x = 0.1			3.83091
x = 0.2	CP (98.9%) + NiO (1.1%)	$Pm\bar{3}m$+ $Fm\bar{3}m$	3.85507
x = 0.3	CP (84.19%) + NiO (5.39%) + T (10.42%)	$Pm\bar{3}m$+ $Fm\bar{3}m$+ $I4/mmm$	3.85978

Table S2 Atomic parameters of the Rietveld refinement

Sample	Phase structure	Atoms	Site	*x*	*y*	*z*	Occ
x = 0	CP	Sr_1	1b	0.5	0.5	0.5	0.9
		Y_1	1b	0.5	0.5	0.5	0.1
		Fe_1	1a	0	0	0	1
		O_1	3d	0.5	0	0	0.93
	T – $SrFeO_{3-\delta}$	Sr_1	8i	0.258	0	0	1
		Sr_2	8j	0.2519	0	0.5	1
		Fe_1	4e	0	0	0.2546	1
		Fe_2	8f	0.25	0.25	0.25	1
		Fe_3	4d	0.5	0	0.25	1
		O_1	2b	0	0	0.5	1
		O_2	16m	0.1201	0.1201	0.2227	1
		O_3	8h	0.2398	0.2398	0.5	1
		O_4	16k	0.1238	0.6238	0.25	1
		O_5	4c	0.5	0	0	1
x = 0.1	CP	Sr_1	1b	0.5	0.5	0.5	0.9
		Y_1	1b	0.5	0.5	0.5	0.1
		Fe_1	1a	0	0	0	0.9
		Ni_1	1a	0	0	0	0.1
		O_1	3d	0.5	0	0	0.93
x = 0.3	CP	Sr_1	1b	0.5	0.5	0.5	0.9
		Y_1	1b	0.5	0.5	0.5	0.1
		Fe_1	1a	0	0	0	0.7
		Ni_1	1a	0	0	0	0.3
		O_1	3d	0.5	0	0	0.93
	T – $Sr_3Fe_2O_7$	Sr_1	2b	0	0	0.5	1
		Sr_2	4e	0	0	0.3171	1
		Fe_1	4e	0	0	0.0979	1
		O_1	8g	0	0.5	0.0916	1
		O_2	4e	0	0	0.195	1
		O_3	2a	0	0	0	1