Electronic Supplementary Material (ESI) for RSC Advances

Electronic Supplementary Information

A facile hard-templating synthesis of mesoporous spinel $CoFe_2O_4$ nanostructures as promising electrocatalysts for H_2O_2 reduction reaction

Rui Ding,[*a,b,c] **LeiLei Lv,**[a] **Li Qi,**[a] **Minjun Jia**[c] **and Hongyu Wang**[*a]

[a] *State Key Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, 5625 Renmin Street, Changchun 130022, China*

[b] *University of Chinese Academy of Sciences, Beijing 100039, China*

[c] *State Key Laboratory of Theoretical and Computational Chemistry, College of Chemistry, Jilin University, Changchun 130023, China*

[*] Email addresses: drm8122@163.com; dingrui@ciac.ac.cn (R. Ding); hongyuwang@ciac.ac.cn (H. Wang); Tel/Fax: +86 431 85262287;

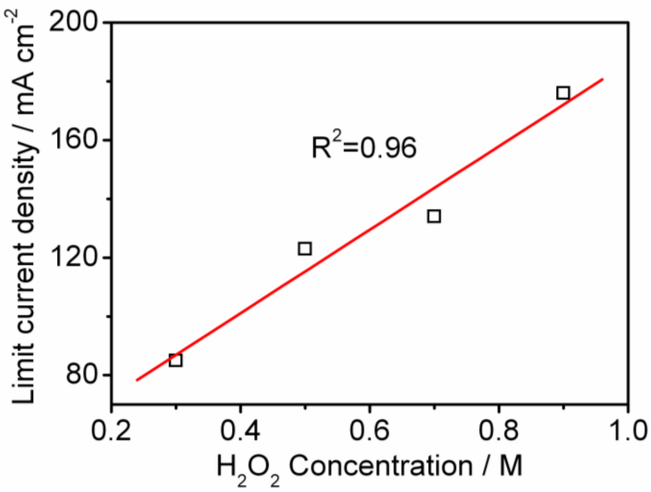

Fig. S1 Limit (peak) current density as a function of H_2O_2 concentration.

The limit (peak) current density and H_2O_2 concentration comply with the following relationship:

$$j_l = nFm_O C_O \quad (1)$$

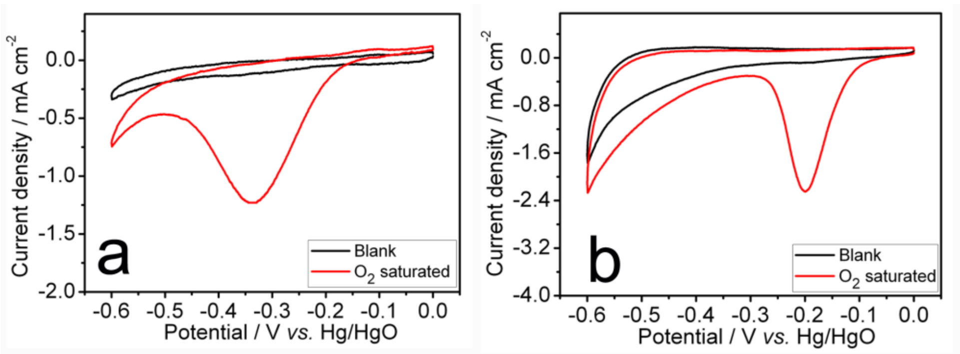

Fig. S2 CV plots of TAB (a) and $CoFe_2O_4$ (b) electrodes in blank and O_2 saturated 3 M NaOH solutions at a scan rate of 10 mV s^{-1}.

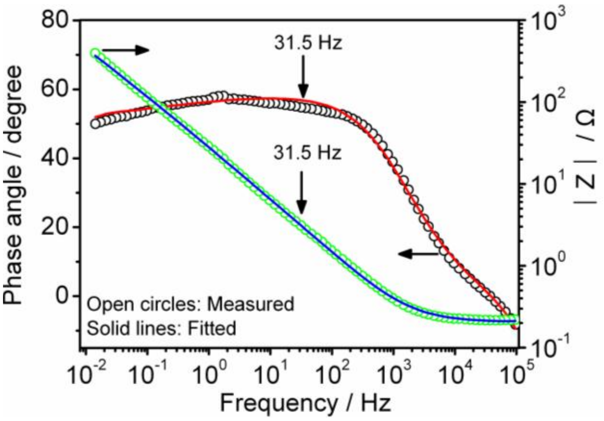

Fig. S3 Bode plots of $CoFe_2O_4$ electrode in 3 M NaOH solutions.

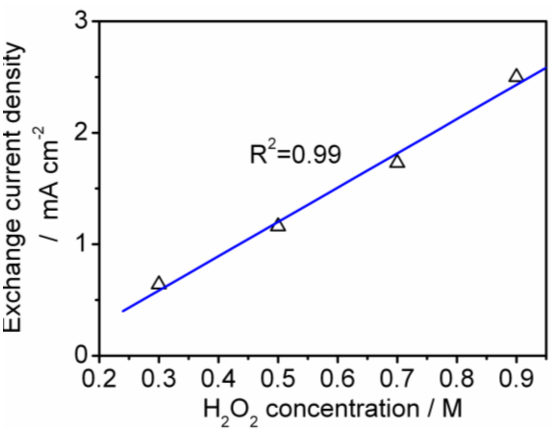

Fig. S4 Exchange current density as a function of H_2O_2 concentration.

Considering the EIS spectra were tested under open circuit potentials (quasi-equilibrium state), the exchange current density (j^0) can be calculated with the fitted values of charge transfer resistance (R_{ct}) according to following equation:

$$j^0 = \frac{RT}{nFR_{ct}} \tag{2}$$

Table S1 The fitted values of impedimetric parameters for the $CoFe_2O_4$ electrode in 3 M NaOH with different H_2O_2 concentrations.

H_2O_2 Conc.	Impedimetric parameters										
	L (H cm^2)	***R*$_e$** (Ω cm^2)	***Q*1, *Y*$_0$** (Ω^{-1} s^n cm^{-2})	***R*ct1** (Ω cm^2)	***T*, *Y*$_0$; *B*** (Ω^{-1} s$^{0.5}$ cm^{-2}; s$^{0.5}$)	***C*** (F cm^{-2})	***Q*2, *Y*$_0$** (Ω^{-1} s^n cm^{-2})	***R*ct2** (Ω cm^2)	***n*1**	***n*2**	**χ^2** (E-3)
Blank	7.1E-8	0.21	5.7E-3	5.64	6.3E-3; 10.65	1.42	–	–	0.74	–	1.2
0.3 M	3.5E-8	0.31	7.3E-3	0.80	–	–	7.6E-3	19.9	0.84	0.74	1.9
0.5 M	3.5E-8	0.38	7.5E-3	0.71	–	–	6.9E-3	11.1	0.83	0.75	4.0
0.7 M	8.6E-8	0.17	6.3E-3	0.74	–	–	8.1E-3	7.41	0.85	0.74	5.3
0.9 M	8.3E-8	0.16	5.1E-3	0.70	–	–	8.1E-3	5.13	0.88	0.72	4.0