

Electronic Supplementary Information (ESI)

Disordered Spinel Cobalt Oxide Electrocatalyst for Highly Enhanced HER Activity in Alkaline Medium

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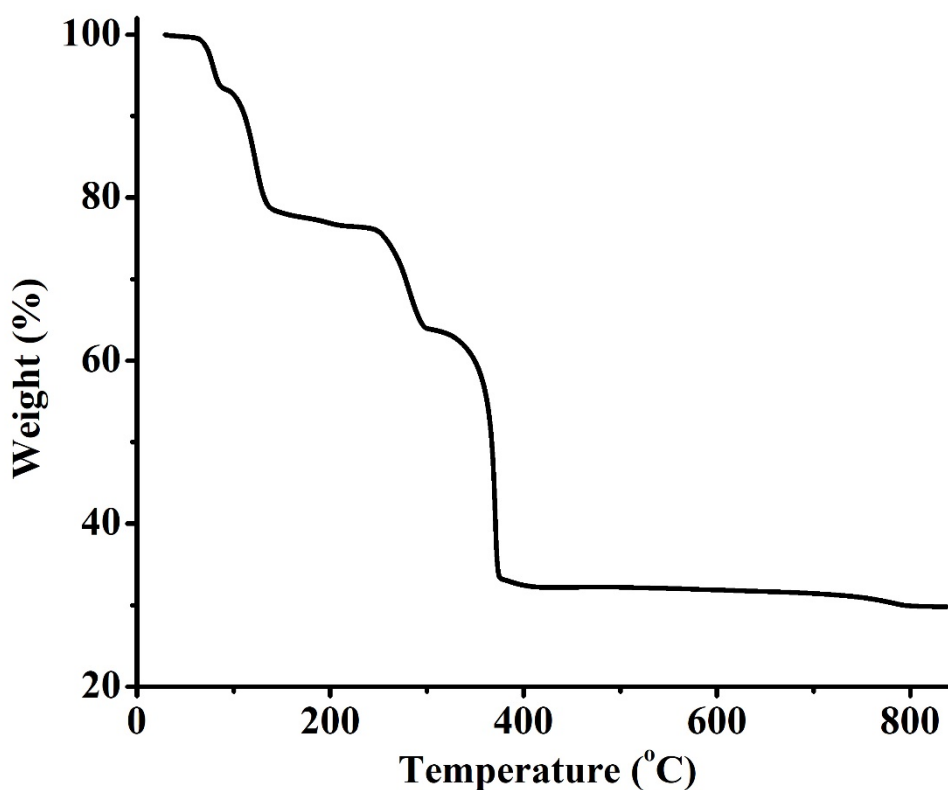


Figure S1. TGA analysis of Co(NO₃)₂.

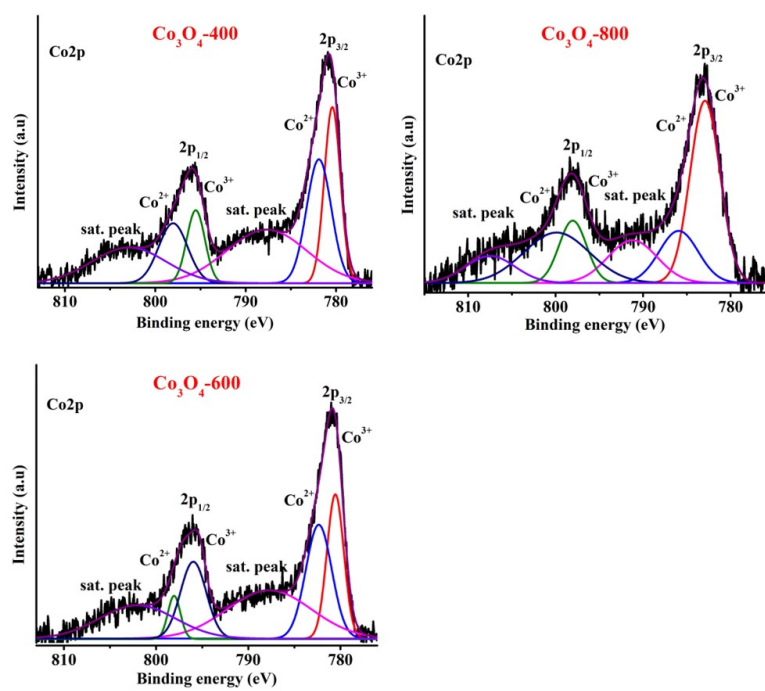


Figure S2. Deconvoluted XPS spectra of Co²⁺.

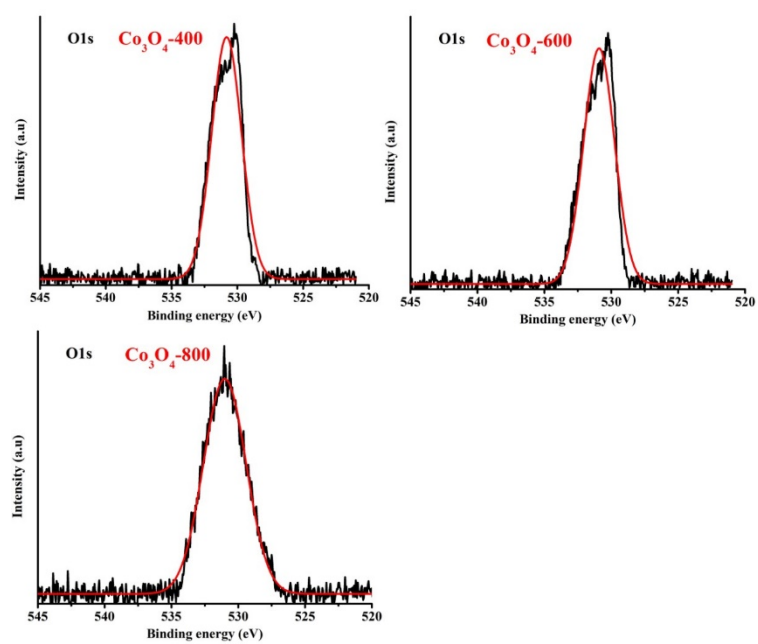


Figure S3. Deconvoluted XPS spectra of O1s.

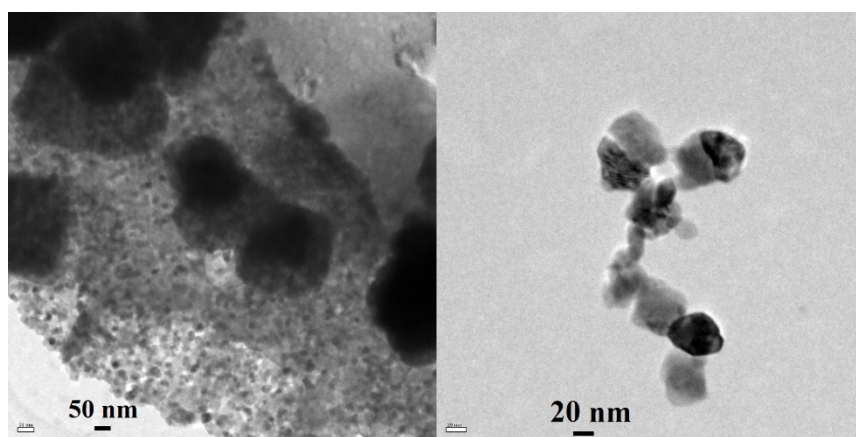


Figure S4. HR-TEM images of Co₃O₄-400.

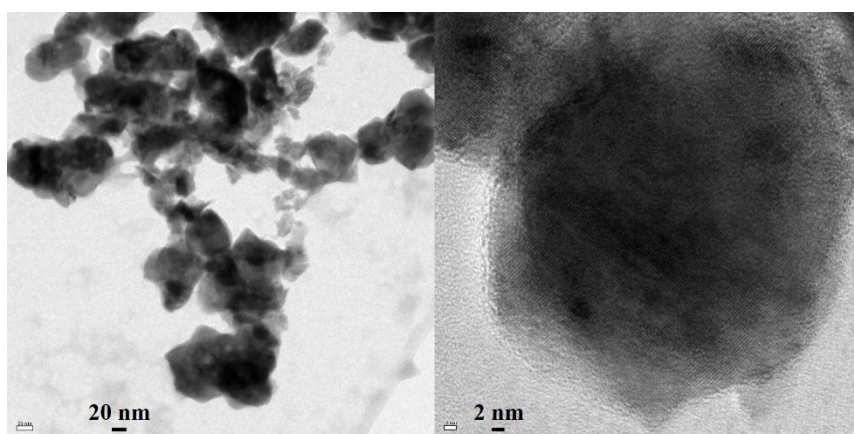


Figure S5. HR-TEM images of Co₃O₄-600.

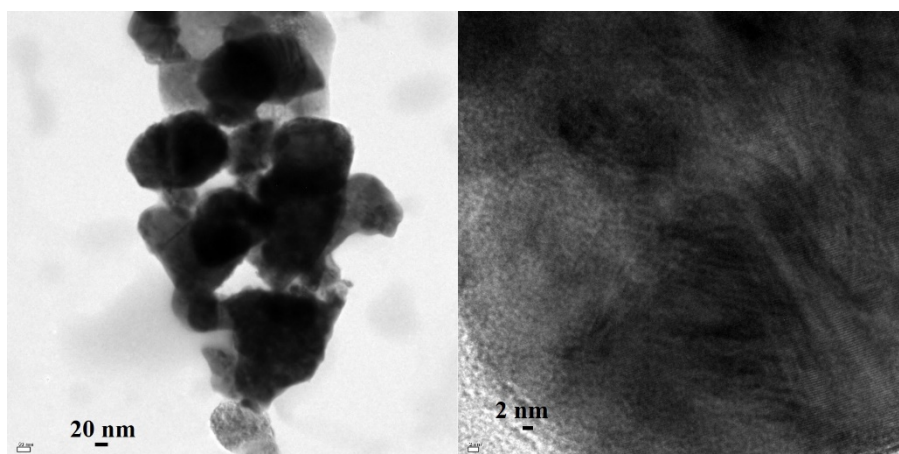


Figure S6. HR-TEM images of Co₃O₄-800.

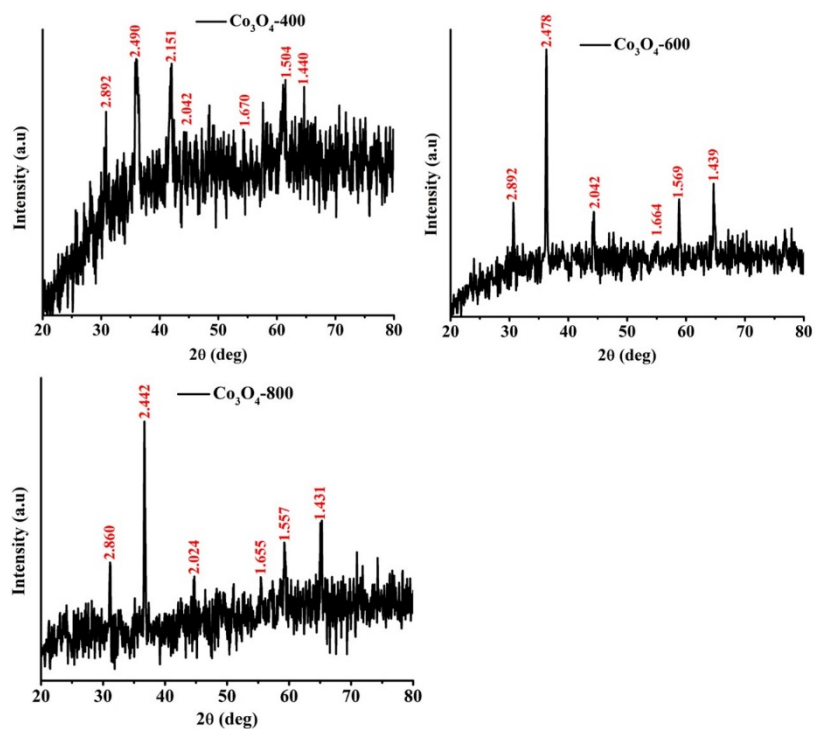


Fig. S7. PXRD pattern of Co_3O_4 along with d-spacing.

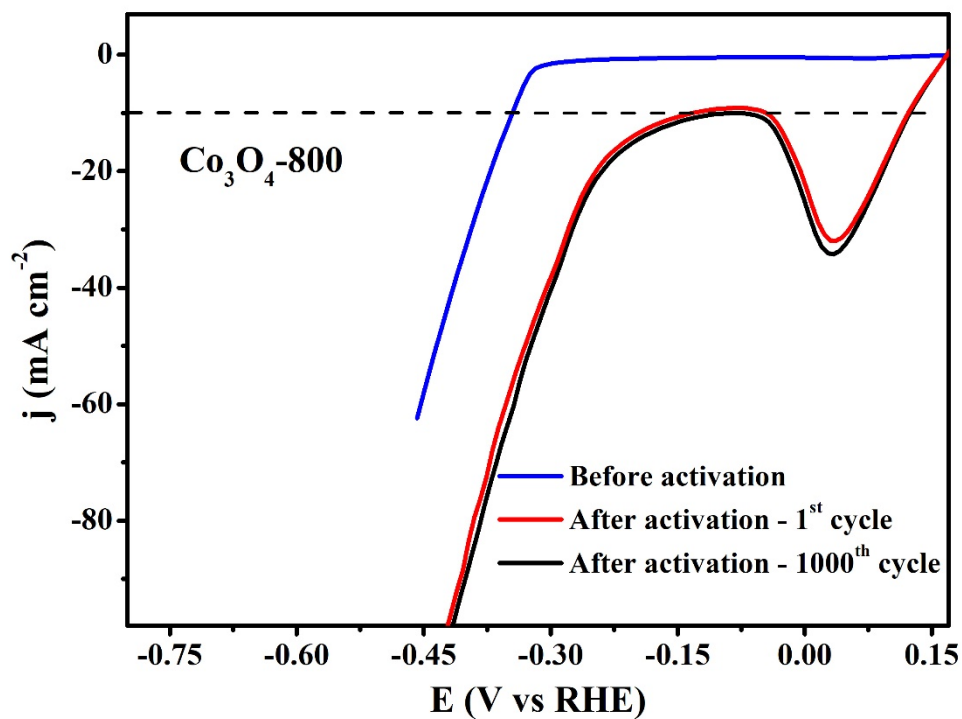


Fig. S8. HER Polarization curve of Co_3O_4 -800 before and after activation.

Table S1. Comparison of HER activity of Co₃O₄-800

Catalyst	Working electrode	Overpotential at 10 mA/cm ² (mV)	Reference
Co₃O₄	GCE	93	This work
Co ₃ O ₄	CC	297	J. Du, C. Li and Q. Tang, <i>Electrochim Acta</i> , 2020, 331 .
Co ₃ O ₄	NF	71	H. Zhang, J. Zhang, Y. Li, H. Jiang, H. Jiang and C. Li, <i>J. Mater. Chem. A</i> , 2019, 7 , 13506-13510.
Co ₃ O ₄	NF	225	R. Li, D. Zhou, J. Luo, W. Xu, J. Li, S. Li, P. Cheng and D. Yuan, <i>J. Power Sources</i> , 2017, 341 , 250-256.
Co ₃ O ₄ crystals for (111) facet	NF	195	L. Liu, Z. Jiang, L. Fang, H. Xu, H. Zhang, X. Gu and Y. Wang, <i>ACS Appl. Mater. Interfaces</i> , 2017, 9 , 27736-27744.
Octahedral Co ₃ O ₄ particles	CF	77.9	K. Wu, D. Shen, Q. Meng and J. Wang, <i>Electrochim Acta</i> , 2018, 288 , 82-90.
Co ₃ O ₄ nanocrystals	CFP	380	S. Du, Z. Ren, J. Zhang, J. Wu, W. Xi, J. Zhu and H. Fu, <i>Chem Commun.</i> , 2015, 51 , 8066-8069.
Co ₃ O ₄ @N-CNT	CP	380	T. Sharifi, E. Gracia-Espino, X. Jia, R. Sandstrom and T. Wagberg, <i>ACS Appl. Mater. Interfaces</i> , 2015, 7 , 28148-28155.
Co ₃ O ₄ @NC	NF	106	Y. Tang, X. Fang, X. Zhang, G. Fernandes, Y. Yang, D. Yan, X. Xiang and J. He, <i>ACS Appl. Mater. Interfaces</i> , 2017, 9 , 36762-36771.
Co/ Co ₃ O ₄	NF	90	X. Yan, L. Tian, M. He and X. Chen, <i>Nano Lett.</i> , 2015, 15 , 6015-6021.
Co@ Co ₃ O ₄ -NC	NF	221	C. Bai, S. Wei, D. Deng, X. Lin, M. Zheng and Q. A. Dong, <i>J. Mater. Chem.</i> , 2017, 5 , 9533-9536
Co/ Co ₃ O ₄ /NC	GCE	350	M. Khalid, A. M. B. Honorato, H. Varela and L. Dai, <i>Nano Energy</i> , 2018, 45 , 127-135.

*NF – Nickel Foam, *CF – Cobalt Foam, *CFP – Carbon Fibre Paper, *CP – Carbon Paper, *CC – Carbon Cloth, *GCE – Glassy Carbon Electrode

*Electrolyte – 1.0 M KOH (in all catalyst)

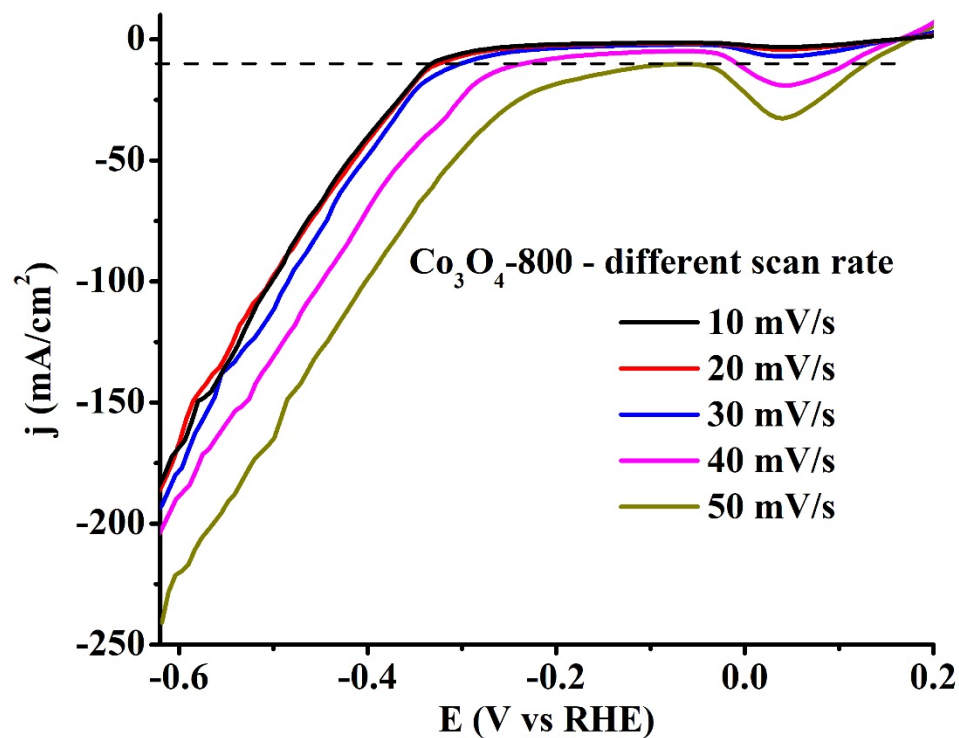


Fig. S9. HER Polarization curve of Co₃O₄-800 at different scan rate.

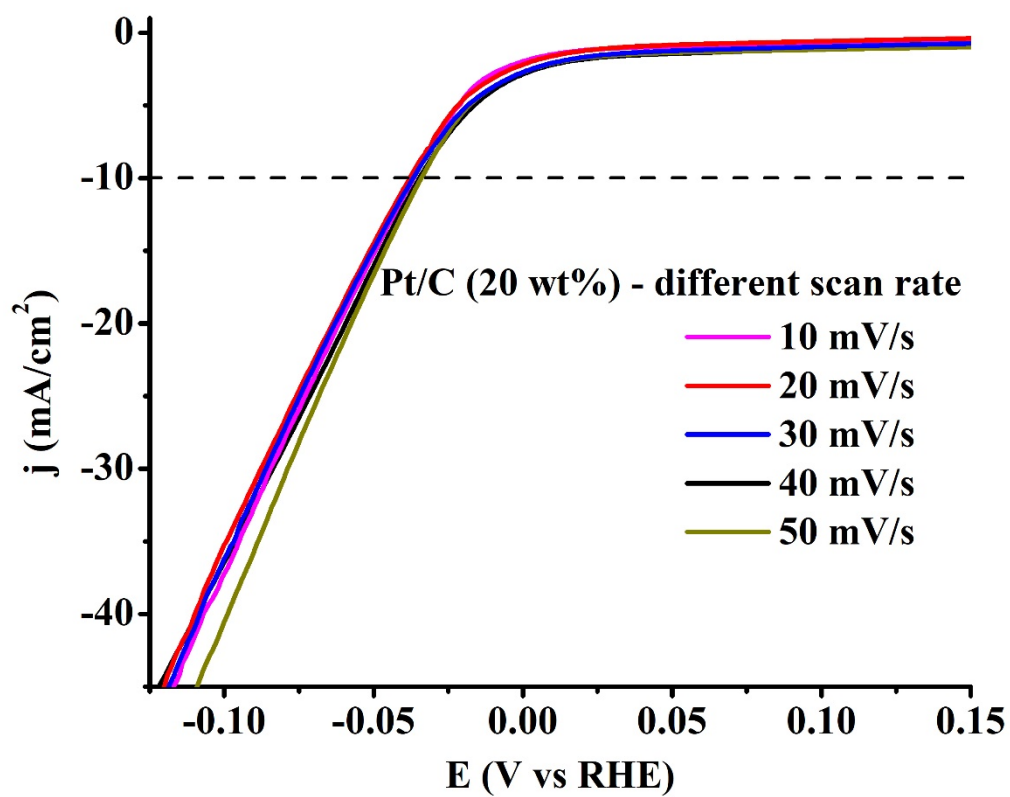


Fig. S10. HER Polarization curve of Pt/C at different scan rate.

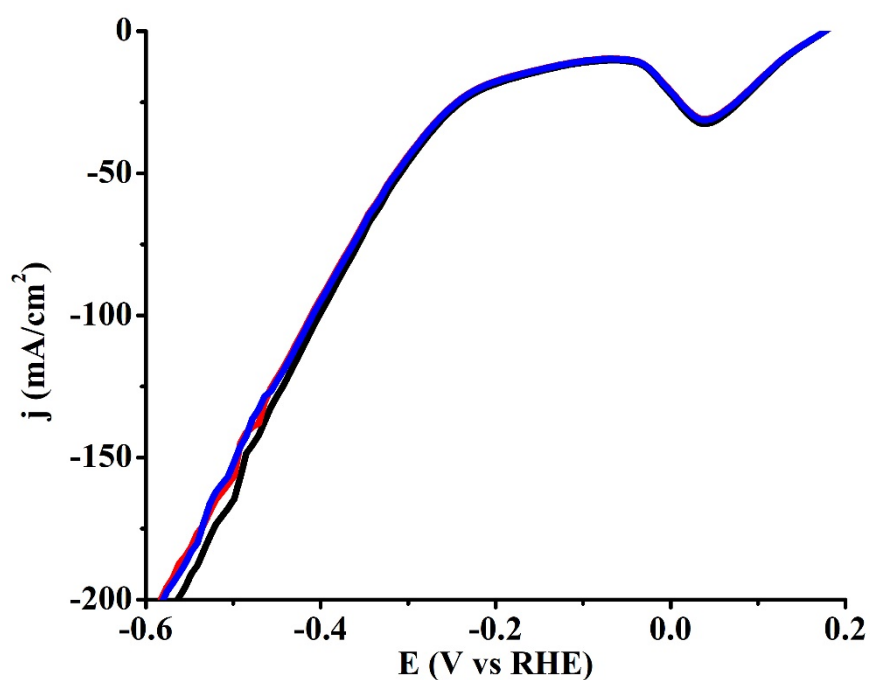


Fig. S11. HER Polarization curve of Co_3O_4 -800 prepared at different batches.

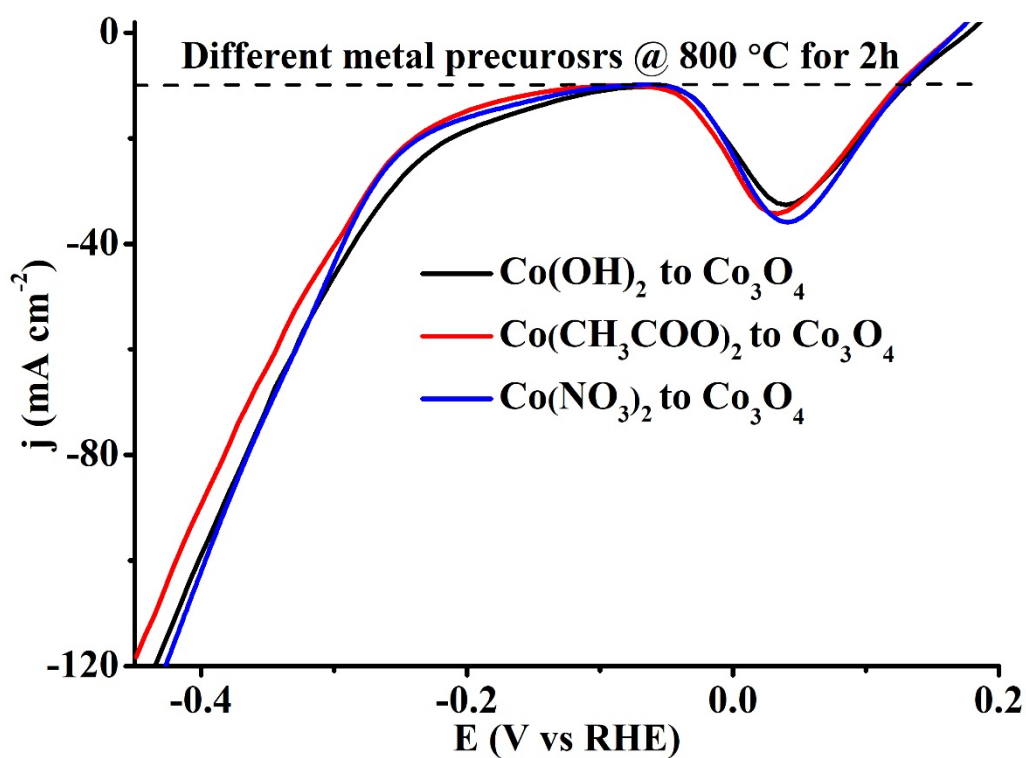


Fig. S12. HER Polarization curve of Co_3O_4 -800 prepared at different precursors.