

Supplementary information

Graphene-Supported Non-precious Metal Electrocatalysts for Oxygen Reduction Reactions: the Active Center and Catalytic Mechanism

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Figures and images:

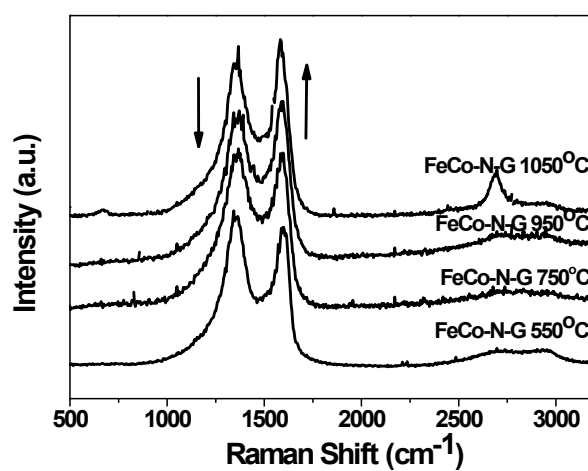


Fig. S1: Raman spectra of FeCo-N-G prepared in different annealing temperatures from 500 to 1050 °C.

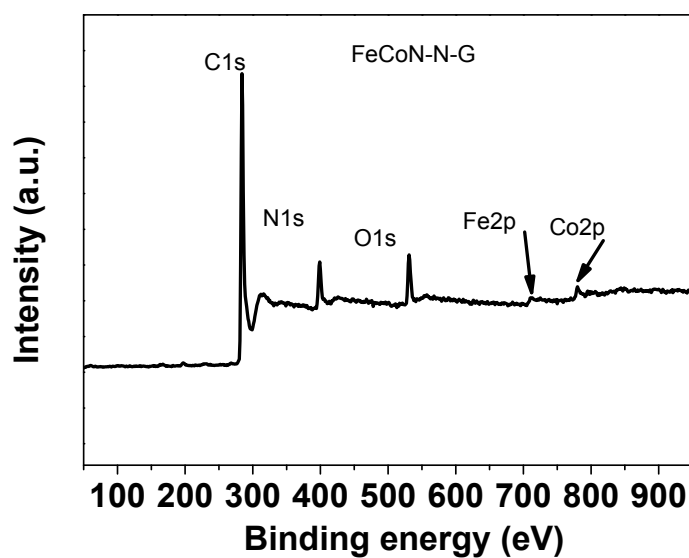


Fig. S2 XPS spectra of FeCo-N-G 750 °C prepared from annealing of FeCo-N complex/graphene composite under 750 °C.

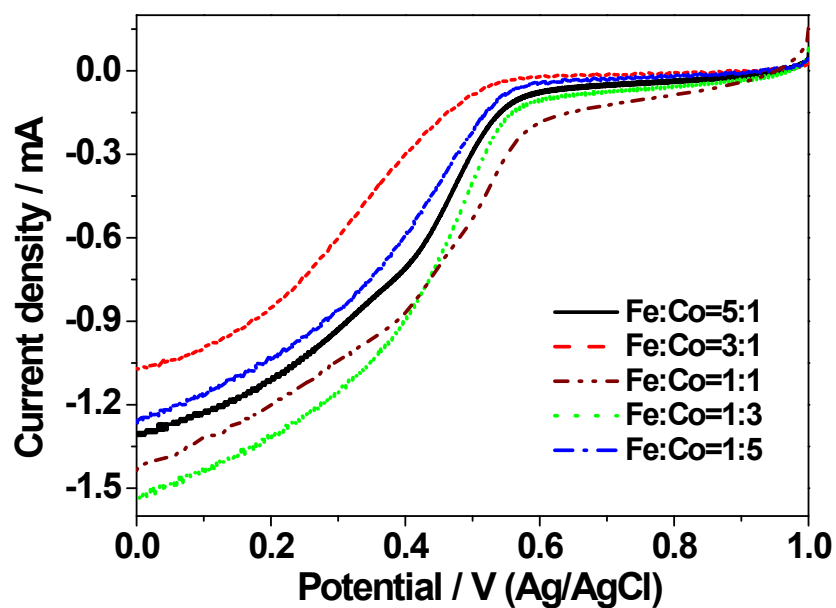


Fig. S3: RDE voltammetry curves for oxygen reduction on FeCo-N-G electrode prepared by annealing of FeCo complex/RG-O under 750 °C with electrode rotating rate of 2500 rpm in O₂ saturated 0.5 M H₂SO₄ electrolyte (T = 20 °C, ν = 10 mV s⁻¹)

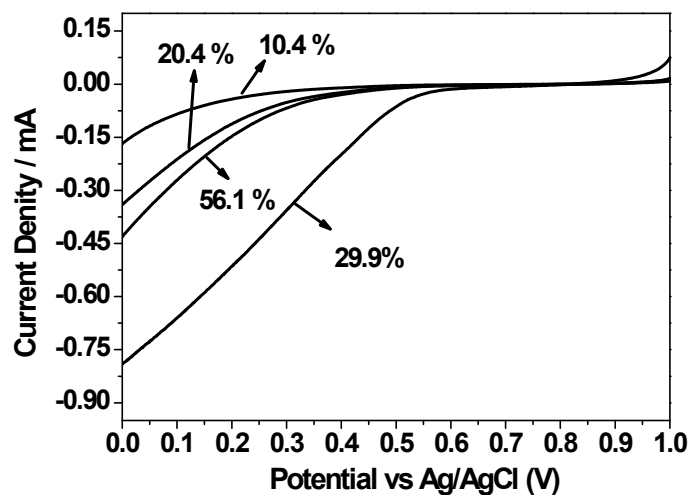


Fig. S4: RDE voltammetry curves for oxygen reduction on Fe-N-G electrode with an electrode rotation rate of 2500 rpm in O₂ saturated 0.5 M H₂SO₄ electrolyte. The Fe-N-G is prepared by loading different weight ratios of iron in the form of iron acetate onto the G-O surface (from 10.4 to 56.1%).

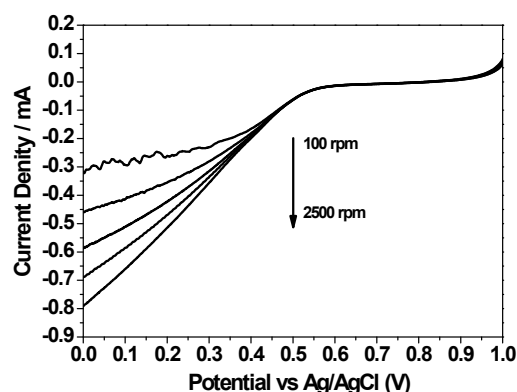


Fig. S5: Polarization curves of Fe-N-G catalyst with rotation rates from 100 to 2500 rpm and a scan rate of 10 mV s^{-1} in oxygen saturated $0.5 \text{ M H}_2\text{SO}_4$ electrolyte.

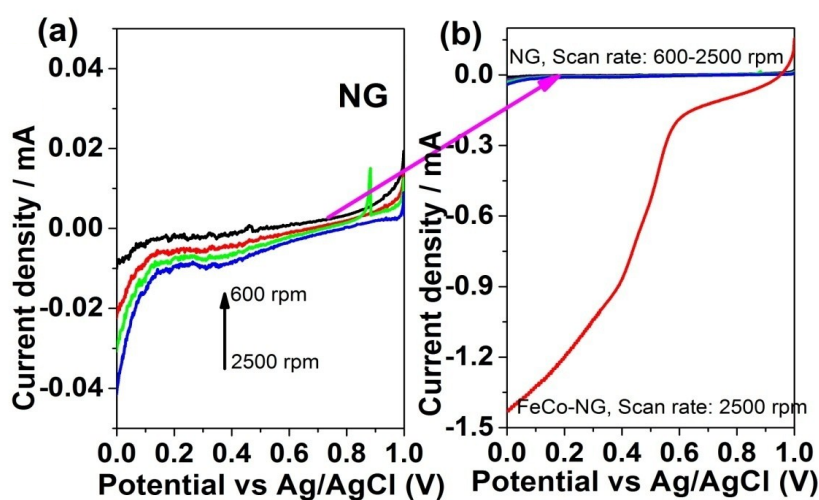


Figure S6: The RDE curves of N doped graphene in $0.5 \text{ M H}_2\text{SO}_4$ electrolyte with rotation rates of 600 to 2500 rpm (a), and in comparison with the FeCo-NG based catalyst at 2500 rpm rotating rate.

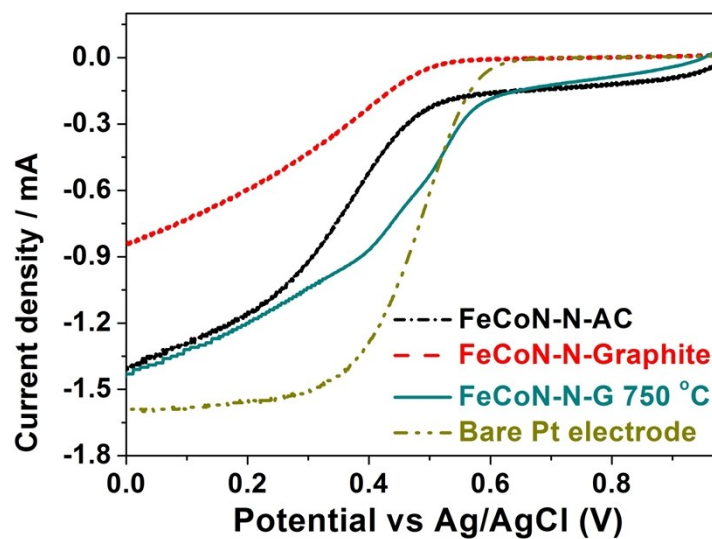


Figure S7: RDE curves for oxygen reduction performance of FeCoN-N-based catalysts on different carbon carriers, after annealing at 750°C (rotation rates: 2500 rpm, electrolyte: $0.5 \text{ M H}_2\text{SO}_4$), as compared with that of the bare Pt electrode

References:

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- [2] M. Pattabi, R. H. Castellanos, R. Castillo, A. L. Ocampo, J. Moreira, P. J. Sebastian, J. C. McClure, X. Mathew, *International Journal of Hydrogen Energy* 2001, 26, 171.
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