

Fig. S1 (a) particle size distribution of the metal nanoparticles in Fe-CoNC, (b) measurement of lattice fringe in Fig. 1d

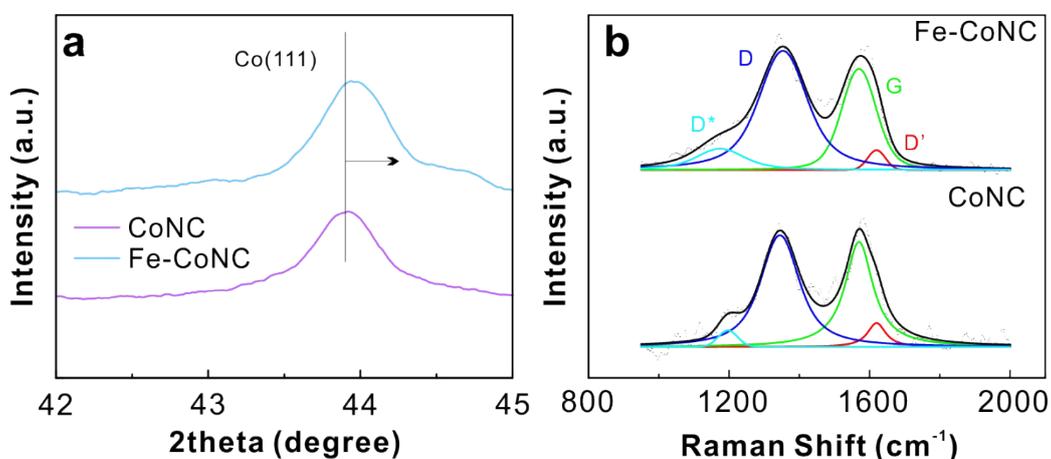


Fig. S2 (a) Magnified XRD patterns for CoNC and Fe-CoNC, (b) titting of the Raman spectra for CoNC and Fe-CoNC

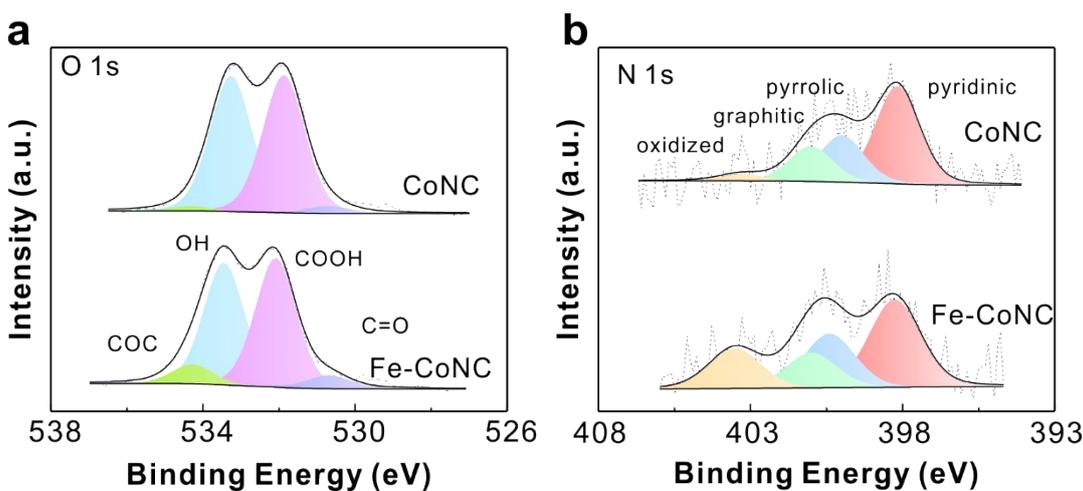


Fig. S3 O1s and N1s XPS spectra for CoNC and Fe-CoNC

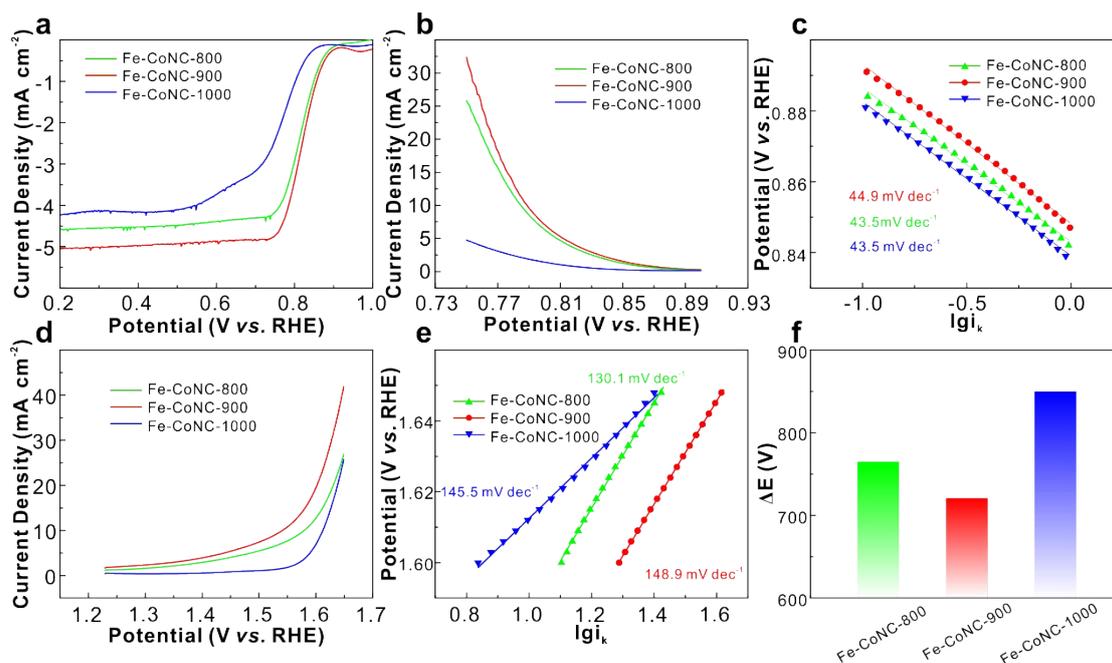


Fig. S4 (a) ORR polarization curves obtained in 0.1 mol L⁻¹ KOH, (b) corresponding kinetic current density curves and (c) Tafel plots of Fe-CoNC pyrolyzed at different temperature. (d) OER polarization curves obtained in 1 mol L⁻¹ KOH and (e) corresponding Tafel plots of Fe-CoNC pyrolyzed at different temperature. (f) comparison of potential difference of the ORR half-wave potential and the potential where OER current density reaches 10 mA cm⁻².

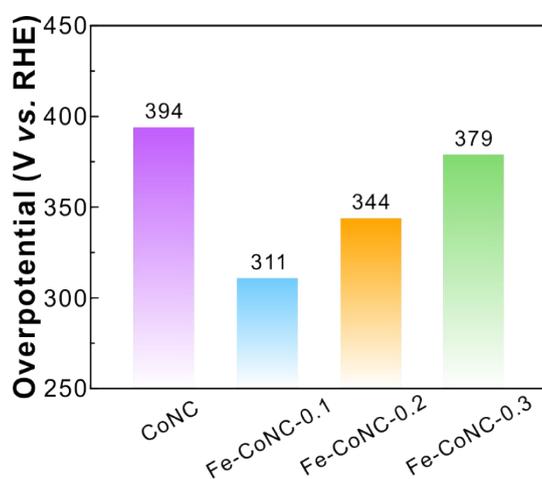


Fig. S5 Comparison of the $\eta_{i=10}$ for CoNC and Fe-CoNC with different doping level

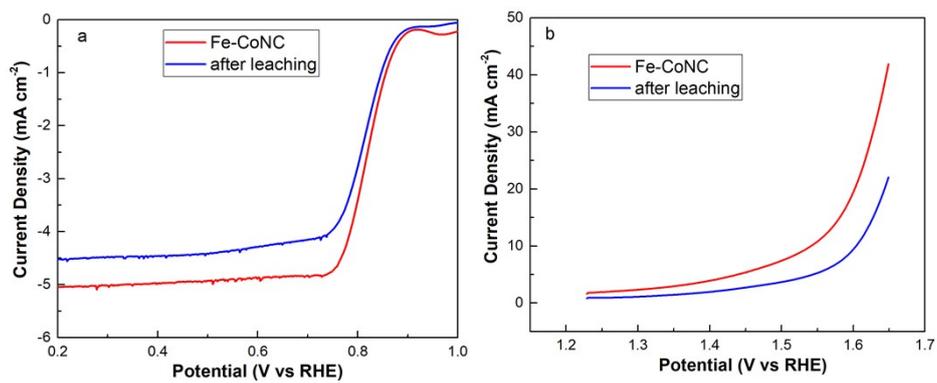


Fig. S6 (a) ORR and (b) OER polarization curves of Fe-CoNC before and after acid leaching