SUPPORTING INFORMATION

An Efficient Electrocatalyst for Oxygen Evolution Reaction in Alkaline Solutions Derived from a Copper Chelate Polymer via in-situ Electrochemical Transformation

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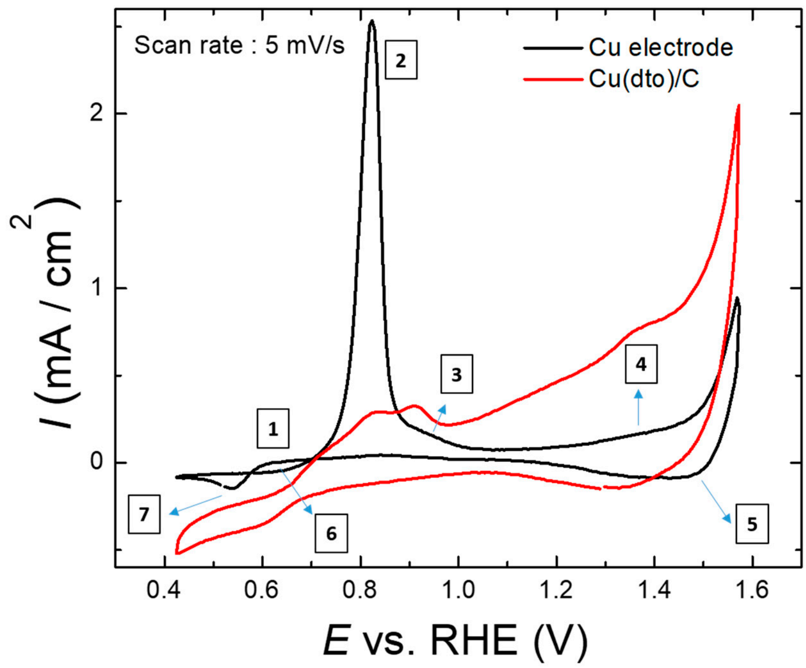

Fig. S1 Cyclic voltammograms of the Cu electrode and Cu(dto)/C electrode at a scan rate of 5 mV/s, in N_2-saturated 1M KOH.

Table S1 Assignment of the redox reactions in the cyclic voltammograms of the Cu electrode at a scan rate of 5 mV/s, in N_2-saturated 1M KOH.

Peak	*E* vs. RHE (V)	Assignment*
1	0.613	$2Cu + 2OH^- \rightarrow Cu_2O + H_2O + 2e$
2	0.823	$Cu_2O + 6OH^- + H_2O \rightarrow 2Cu(OH)_4^{2-} + 2e$ $Cu + 4OH^- \rightarrow Cu(OH)_4^{2-} + 2e$
3	0.928	$CuOH + OH^- \rightarrow Cu(OH)_2 + e$ $Cu + 2OH^- \rightarrow Cu(OH)_2 + 2e$ $Cu + 2OH^- \rightarrow CuO + H_2O + 2e$
4	1.374	$Cu(OH)_2 + 2OH^- \rightarrow Cu(OH)_4^- + e$ $CuO + H_2O + 2OH^- \rightarrow Cu(OH)_4^- + e$
5	1.468	$Cu(OH)_4^- + e \rightarrow Cu(OH)_2 + 2OH^-$ $Cu(OH)_4^- + e \rightarrow CuO + H_2O + 2OH^-$
6	0.643	$2Cu(OH)_2 + 2e \rightarrow Cu_2O + 2OH^- + H_2O$
7	0.538	$Cu_2O + H_2O + 2e \rightarrow 2Cu + 2OH^-$

1) Ambrose, J.; Barradas, R.G.; Shoesmith, D.W. Investigations of Copper in Aqueous Alkaline Solutions by Cyclic Voltammetry. *J. Electroanal. Chem. Interfacial Electrochem.* 1973, 47, 47-64, doi:https://doi.org/10.1016/S0022-0728(73)80344-4.

[2] Deng, Y.; Handoko, A.D.; Du, Y.; Xi, S.; Yeo, B.S. In Situ Raman Spectroscopy of Copper and Copper Oxide Surfaces during Electrochemical Oxygen Evolution Reaction: Identification of CuIII Oxides as Catalytically Active Species. *ACS Catal.* 2016, 6, 2473-2481, doi:10.1021/acscatal.6b00205.

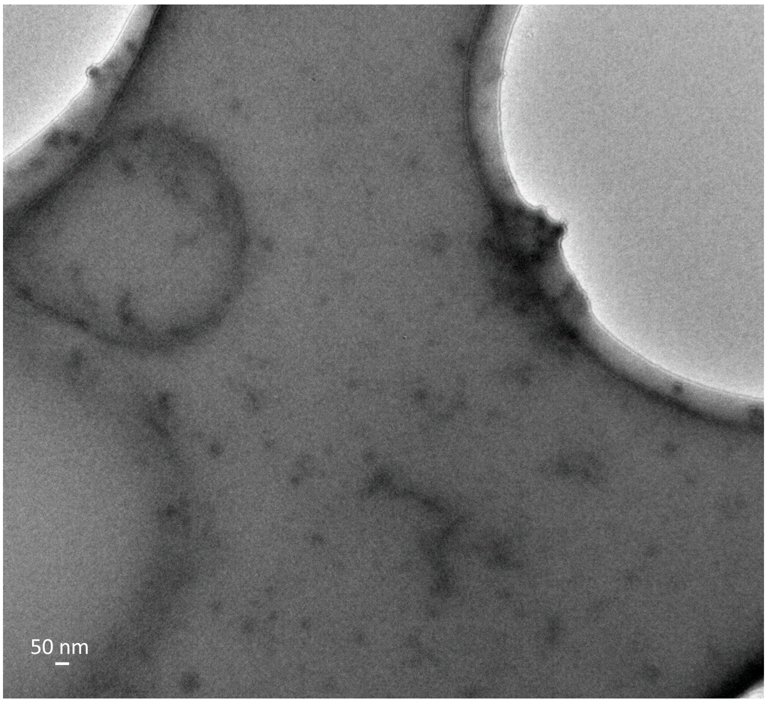

Fig. S2 TEM image of Cu(dto)-DO/C powder after cycling in the potential window of 0.42 - 1.57 V vs. RHE with a scan rate of 5 mV/s. TEM image was taken on JEOL 2100 microscope at 200 keV. The powder was deposited from ethanolic solution on a Cu grid (300 mesh) coated with the Lacey Carbon.