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Electronic Supplementary Information

MOFs derived metal oxides nanohybrids with *in-situ* grown rGO: A smart material for simultaneous electrochemical sensing of HQ and RS

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Randles–Sevcik equation

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Fig. S1 shows how the Randles–Sevcik equation can be used to determine the electrochemically active surface area of various electrodes.[1-3]

$$I_p = (2.69 \times 10^5)\, n^{3/2} A C^* D^{1/2} v^{1/2} \qquad (1)$$

The numbers *n*, *A*, *D*, *c*, and *v* in the preceding equation represent the number of electrons transfer, area of electrode, electroactive molecule diffusion coefficient in the solution, probe molecule concentration in the bulk solution, and scan rate, respectively. In this case, $Fe(CN)_6^{3-/4-}$ concentration = 2.0×10^{-3} M while D = 7.60 (±0.02) 10^{-6} $cm^2\ s^{-1}$. HKUST-1/rGO/CuO/α-Fe_2O_3 (0.237 cm^2) has a larger electrochemical surface area than HKUST-1/rGO/CuO (0.196 cm^2), HKUST-1/CuO (0.149 cm^2), HKUST-1 (0.127 cm^2), and bare GCE (0.0678 cm^2) respectively.

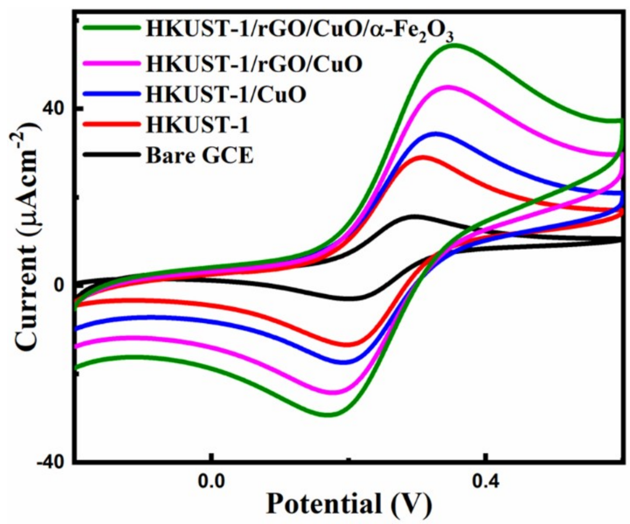

Fig. S1 Cyclic voltammograms of Bare GCE, HKUST-1/GCE, HKUST-1/CuO/GCE, HKUST-1/rGO/CuO/GCE, and HKUST-1/rGO/CuO/α-Fe_2O_3/GCE in 0.1 M KCl with 1 mM $K_4Fe(CN)_6$ and 1 mM $K_3Fe(CN)_6$.

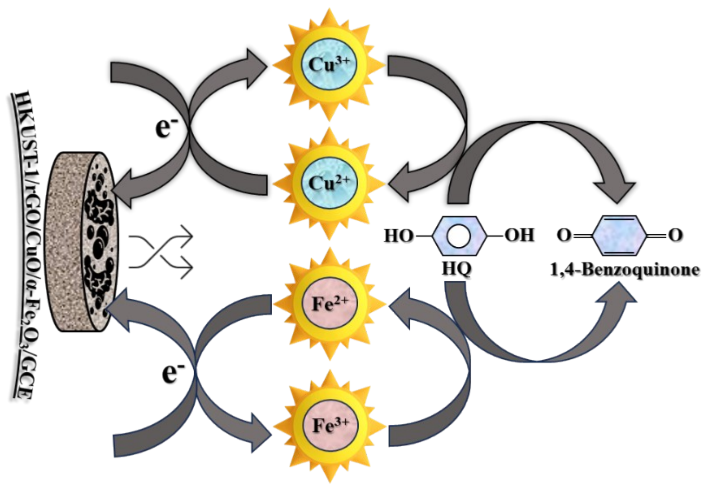

Fig. S2 Electrooxidation reaction mechanism of HQ on GCE modified HKUST-1/rGO/CuO/α-Fe_2O_3.

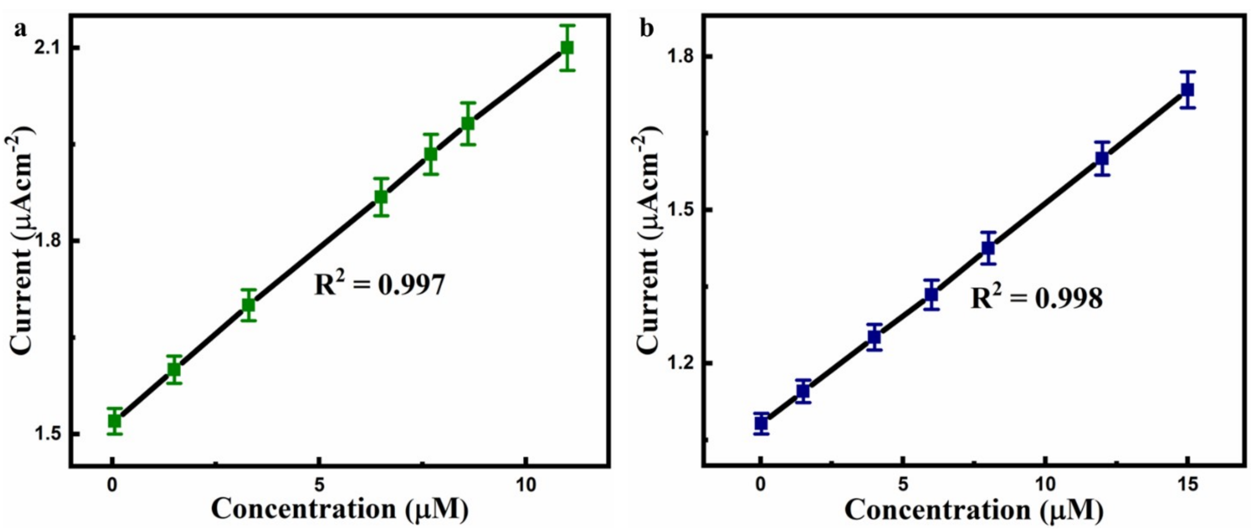

Fig. S3 (a, b) The linear calibration plots of current versus various concentration of each analyte in co-existence system of HQ and RS.

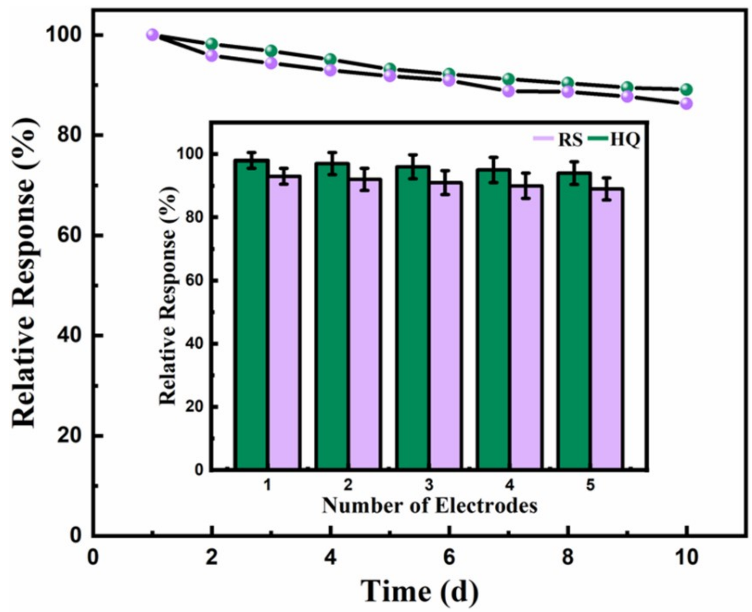

Fig. S4 Long-term stability assessment of HKUST-1/rGO/CuO/α-Fe_2O_3 modified GCE. Inset: Reproducibility test of HKUST-1/rGO/CuO/α-Fe_2O_3/GCE of five different electrodes in 5 mM HQ and RS (n = 3).

In our investigation, we performed detailed calculations to assess critical physical properties, including pore size, pore volume, and surface area. These parameters, crucial in understanding material characteristics, are summarized and presented in Table S1, offering a comprehensive overview of our findings.

Table S1 Assessment of physical properties, encompassing BET Surface Area and Pore Parameters, through BET analysis

Sample	Pore Size (nm)	Pore Volume (cm^3/g)	BET surface area (m^2/g)
HKUST-1	2.194	0.014	31.203
HKUST-1/CuO	2.983	0.036	39.436
HKUST-1/rGO/CuO	4.875	0.183	51.785
HKUST-1/rGO/CuO/α-Fe_2O_3	5.398	0.231	60.018

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