Supplementary data

Enhanced Catalytic Centres by RuO_2 addition to $CuFe_2O_4$ Cathode Catalyst towards Rechargeable Lithium-Air Battery: Influence of CO_2 on the Li-O_2 battery performances

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Materials used

Copper nitrate trihydrate ($Cu(NO_3)_2 \cdot 3H_2O$, Sigma-Aldrich), ferric nitrate nonahydrate ($Fe(NO_3)_3 \cdot 9H_2O$, Loba chemicals), Ruthenium oxide (RuO_2, Sigma-Aldrich) and glycine ($C_2H_5NO_2$, Avra chemicals) were used for the synthesis of the RuO_2@$CuFe_2O_4$. The non-aqueous electrolyte was comprised of lithium triflate ($LiCF_3SO_3$, Sigma-Aldrich) in tetraethylene glycol dimethyl ether (TEGDME, Sigma-Aldrich). The separator used in the batteries were made of Whatman glass microfiber filter paper (Alfa Aesar).

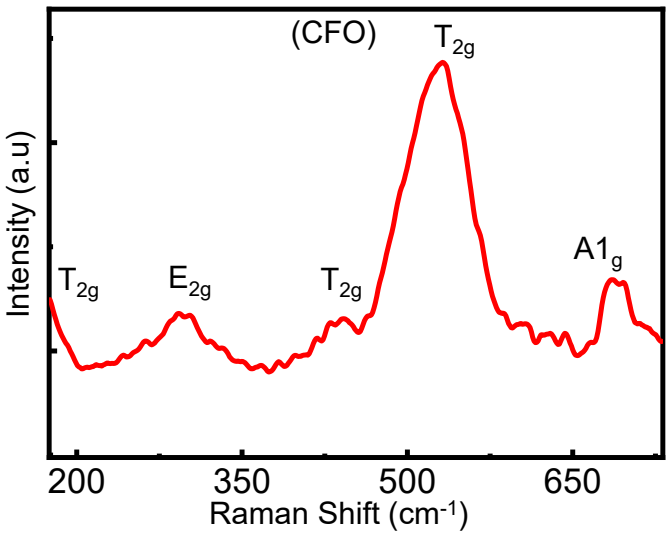


Figure S1. Raman spectrum recorded for the $CuFe_2O_4$ powder sample.

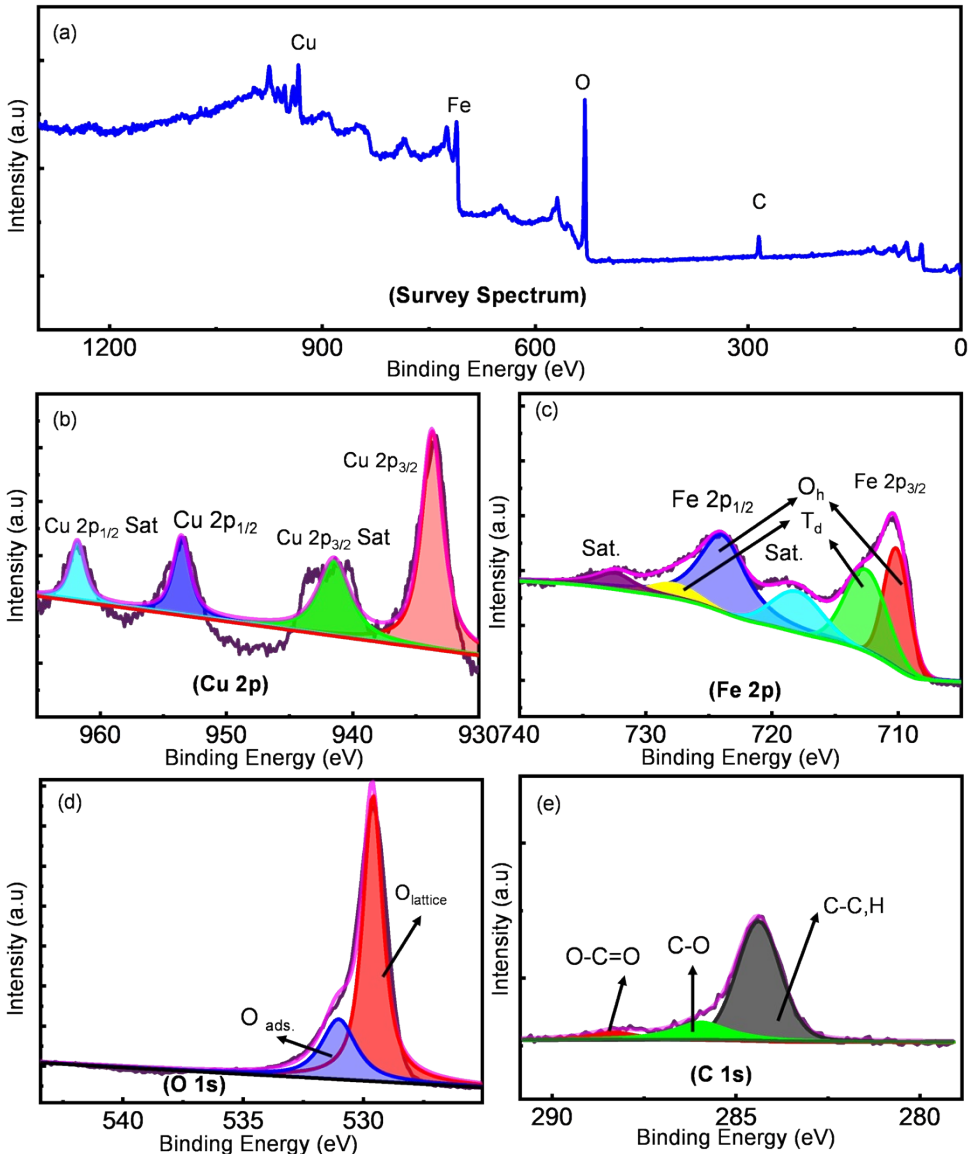


Figure S2. XPS **(a)** survey spectrum, and (b-e) Deconvoluted XPS profiles of Cu2p, Fe2p, O1s and C 1s scan profiles recorded for the $CuFe_2O_4$ (CFO) sample.

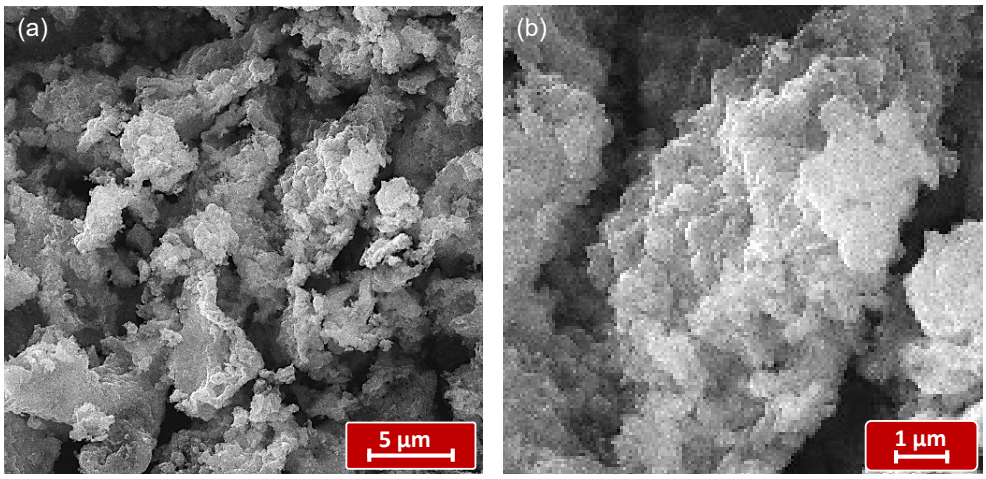


Figure S3. SEM images at different magnifications recorded for the pristine $CuFe_2O_4$ sample.

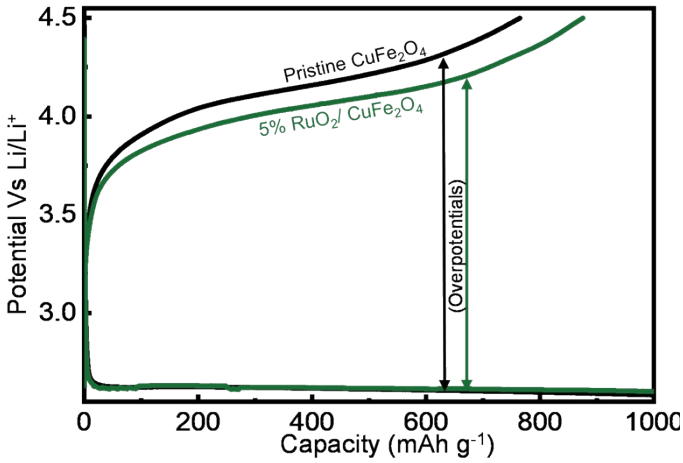
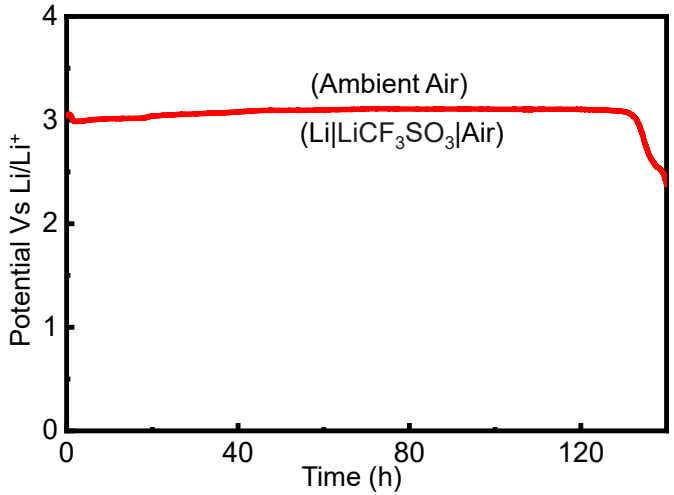


Figure S4. GCD curves recorded at a current density of 500 mA g^{-1} for the Li-Air battery containing each of the pristine $CuFe_2O_4$ and the RCFO-5 composite catalysts.

Figure S5. OCV profile recorded in the ambient atmosphere for the Li-Air battery having the RCFO-5 as the cathode catalyst.



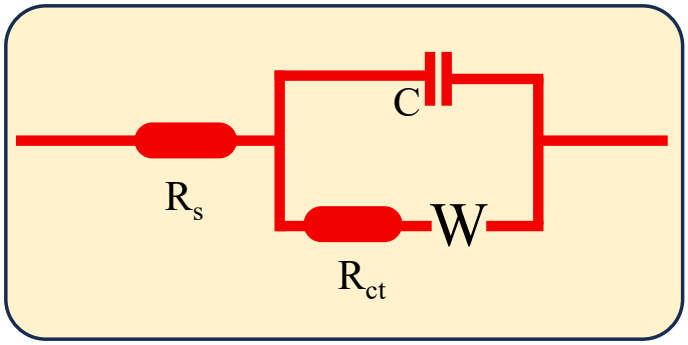


Figure S6. The equivalent circuit used to fit the obtained Nyquist plots in the Li-CO_2 battery.

Table S1. The R_{ct} resistance calculated at different depth of discharge in first and 5th discharge cycles.

State	Voltage (V)	R_{ct} (Ω)
First discharge	3.1	271
	2.5	310
	2.0	366
Fifth discharge	3.1	435
	2.5	445
	2.0	600