Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Anchoring of ultrafine Co_3O_4 nanoparticles on MWCNTs using supercritical fluid processing and its performance evaluation towards electrocatalytic oxygen reduction reaction

Pitchai Thangasamy[a], Karuppiah Selvakumar [b], Marappan Sathish* [a], Sakkarapalayam Murugesan Senthil Kumar* [b] and Rangasamy Thangamuthu [b]

[a]Functional Materials Division, [b]Electrochemical Materials Science Division,
CSIR-Central Electrochemical Research Institute, Karaikudi, Tamil Nadu, 630 003, India.
E-mail address: msathish@cecri.res.in; senthilkumarsm@cecri.res.in

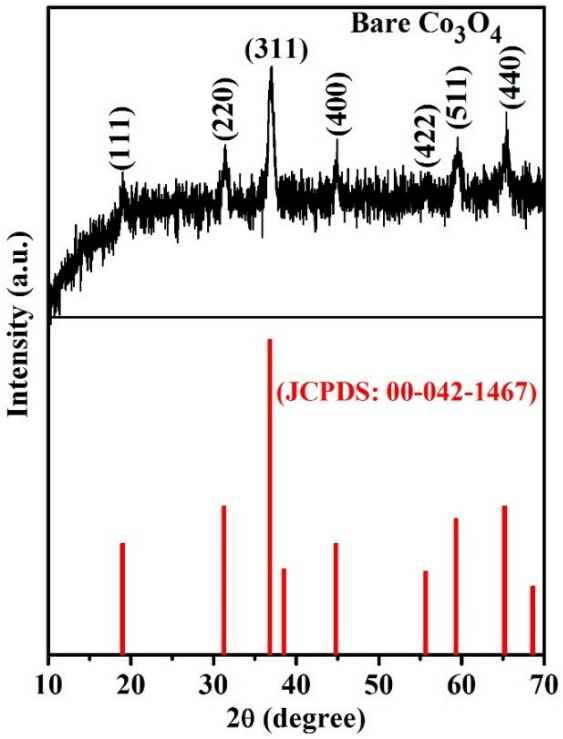

Fig. S1 XRD pattern of bare Co_3O_4 nanoparticles with standard reference pattern of cubic phase of Co_3O_4 (JCPDS card No: 00-042-1467).

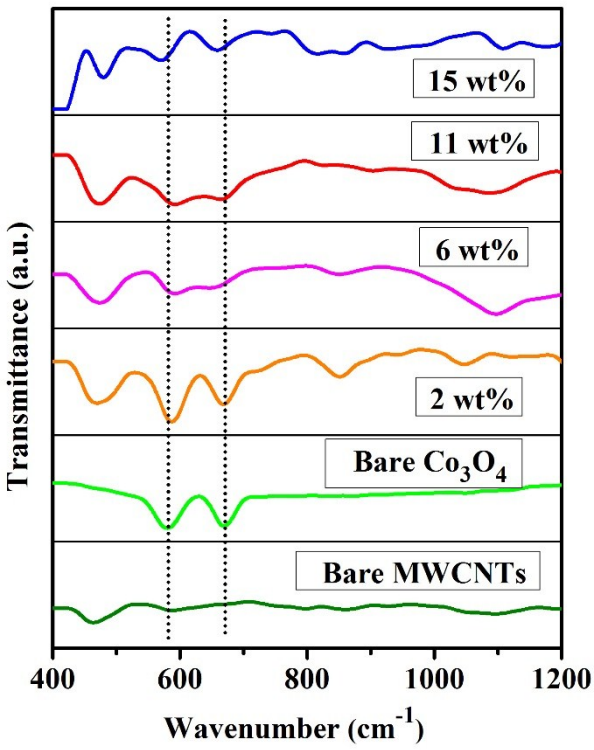

Fig. S2 FT-IR spectra of bare MWCNTs, Co_3O_4 and MWCNTs-Co_3O_4 with different weight loadings.

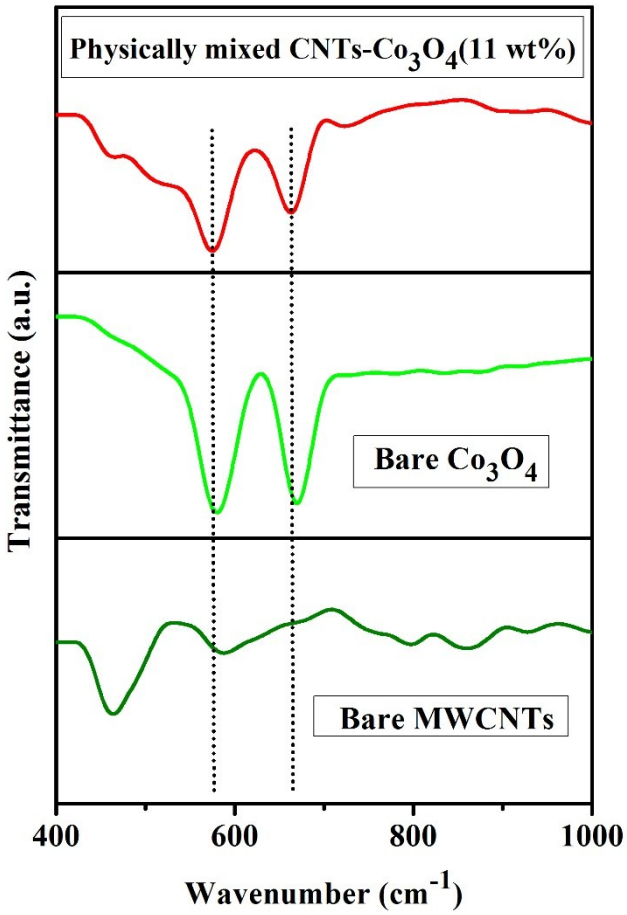

Fig. S3 FT-IR spectra of bare MWCNTs, Co_3O_4 and Physically mixed MWCNTs-Co_3O_4 (11 wt%) composite.

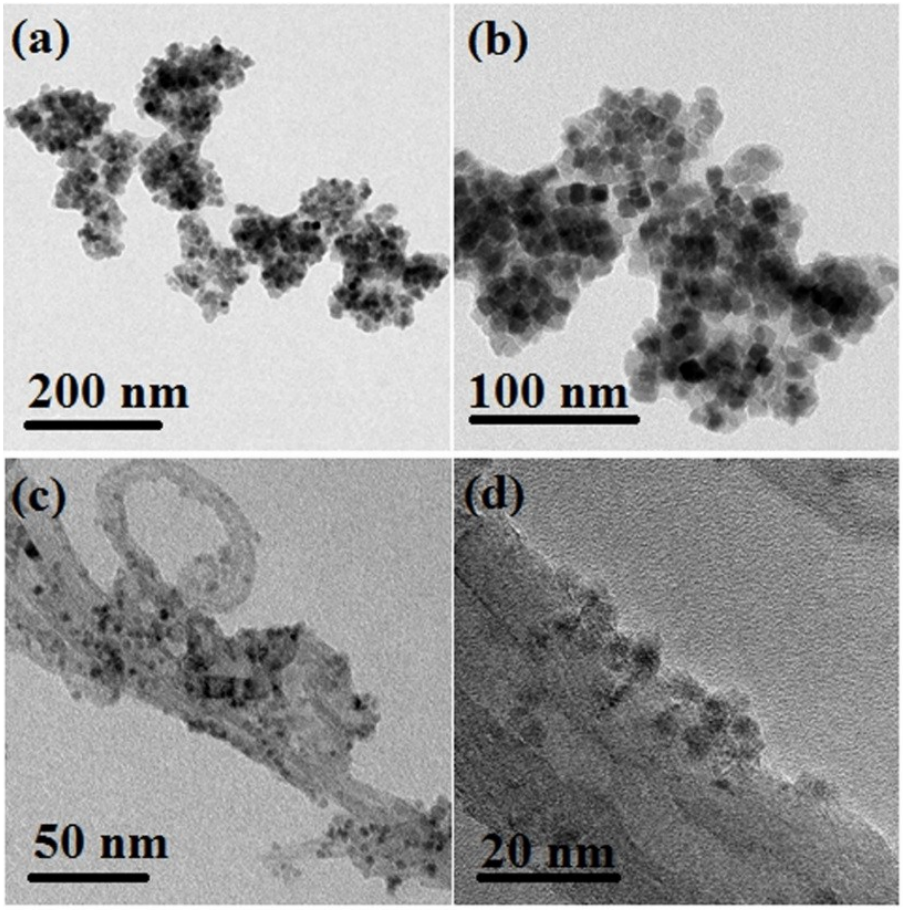

Fig. S4 HR-TEM images of (a, b) bare Co_3O_4 and (c, d) MWCNTs/ Co_3O_4 (11 wt%).

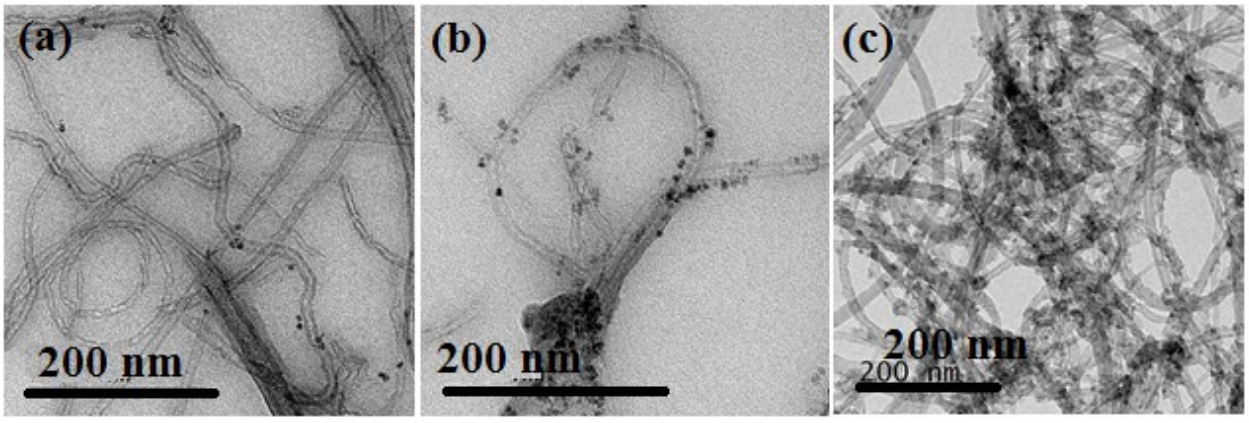

Fig. S5 HR-TEM images of (a) MWCNTs/Co_3O_4 (2 wt%), (b) MWCNTs/Co_3O_4 (6 wt%) and (c) MWCNTs/Co_3O_4 (15 wt%).

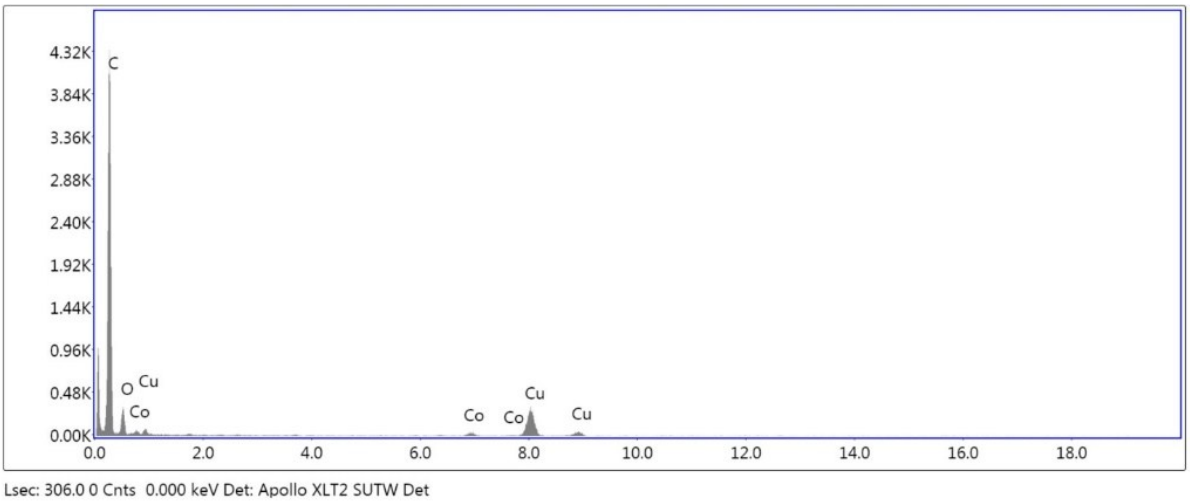

Fig. S6 TEM-EDX analysis of MWCNTs/ Co_3O_4 (11 wt%).

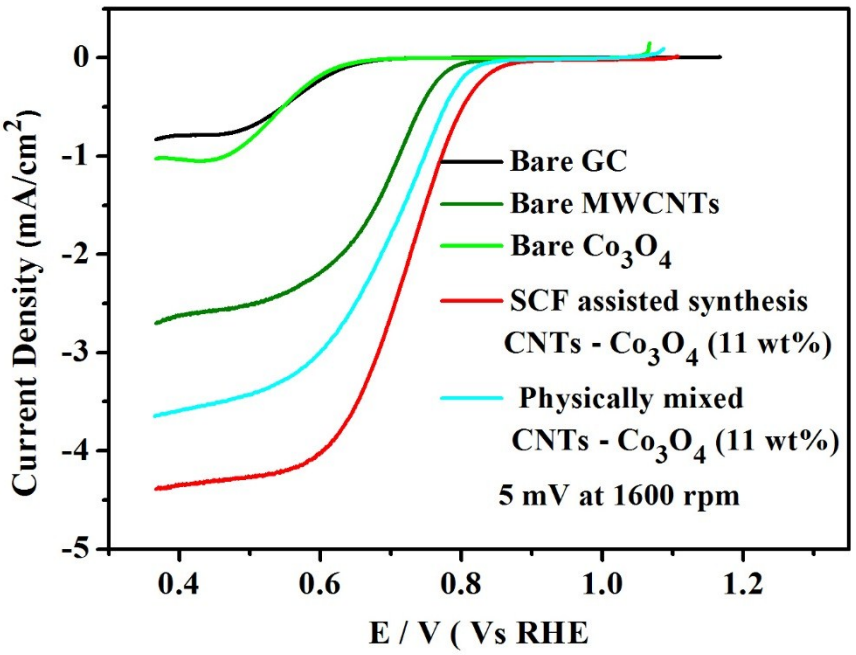

Fig. S7 Rotating ring disc electrode response recorded at 5 mV s^{-1} scan rate with a rotation rate 1600 rpm in O_2 saturated 0.1 M KOH solution.

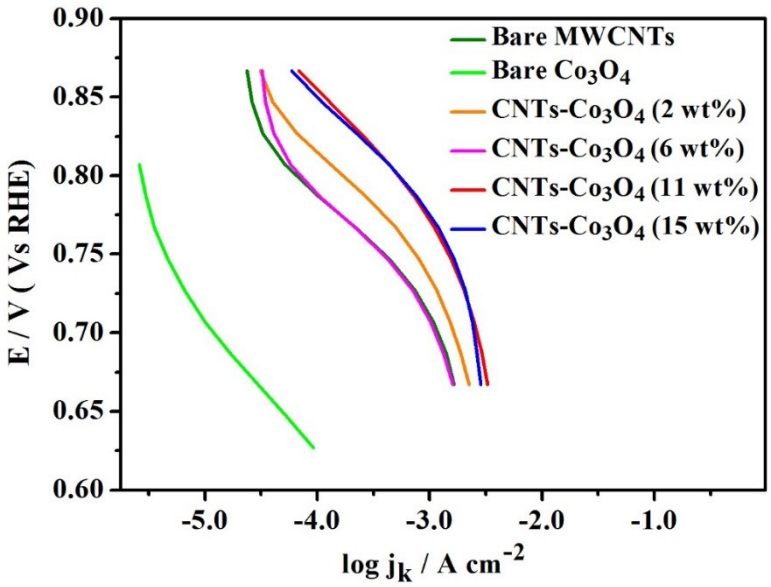

Fig. S8 Tafel plots for various catalysts studied in this work as mentioned in the figure.

Table ST1: Electrode kinetic parameters, like, Tafel slope, n-value and % of peroxide produced for various CNTs-Co_3O_4 catalysts studied in this work.

Sample	n-value in ORR (KL plot method)	n-value in ORR (RRDE method)	% of H_2O_2	Tafel slope / mV decade^{-1}
MWCNTs-Co_3O_4(0wt%)	2.00	2.66	17	82
MWCNTs-Co_3O_4(2wt%)	2.20	2.25	71	68
MWCNTs-Co_3O_4(6wt%)	2.45	2.99	72	68
MWCNTs-Co_3O_4(11wt%)	3.80	3.52	31	77
MWCNTs-Co_3O_4(15wt%)	3.50	3.57	27	69