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Electronic Supplementary Information

Supercapacitor and Photocatalytic Performances of Hydrothermally-derived Co₃O₄/CoO@ Carbon Nanocomposite

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Fig. S1 (a) Powder XRD pattern and (b) Raman spectrum of the acid-leached Co_3O_4/CoO (*a*) carbon samples

The acid-leached sample was confirmed to contain mostly carbon as evidenced from XRD and Raman studies.



Fig. S2 FT-IR spectra recorded for the hydrothermally-derived Co_3O_4/CoO (*a*) carbon matrix and pyrolysed salen complex.

For the Co₃O₄/CoO @ carbon sample, the bands at 3736 and 3623 cm⁻¹ are ascribed to N-H group. The peaks at 1562, 1348 and 1083 cm⁻¹ are attributed to C=C, C=N and C-N bonds, respectively. In addition, the peak at 665 and 510 cm⁻¹ is ascribed to the Co-O bond. Thus, the hydrothermally-derived sample has N-H, C-N and C=N bonds in it along with Co-O. Interestingly, as-pyrolyzed salen complex has the peaks at 3500, 1348 and 1083 cm⁻¹. These bands are assigned to N-H, C=N and C-N bonds, respectively. This means that the N-H, C=C and C-N bonds are present in both as-pyrolyzed sample and hydrothermally treated sample. This clearly indicates that the salen acts as source of the carbon as well as nitrogen moiety.

Thus, the comparison of FT-IR spectra recorded for the hydrothermally-derived Co_3O_4/CoO @ carbon matrix and pyrolysed salen complex confirmed that the N-H and C-N have resulted from salen and not from the urea.