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Supplementary Information

Ru(II)-metal complex immobilized mesoporous SBA-15 hybrid for visible light induced photooxidation of chlorophenolic compounds in aqueous medium

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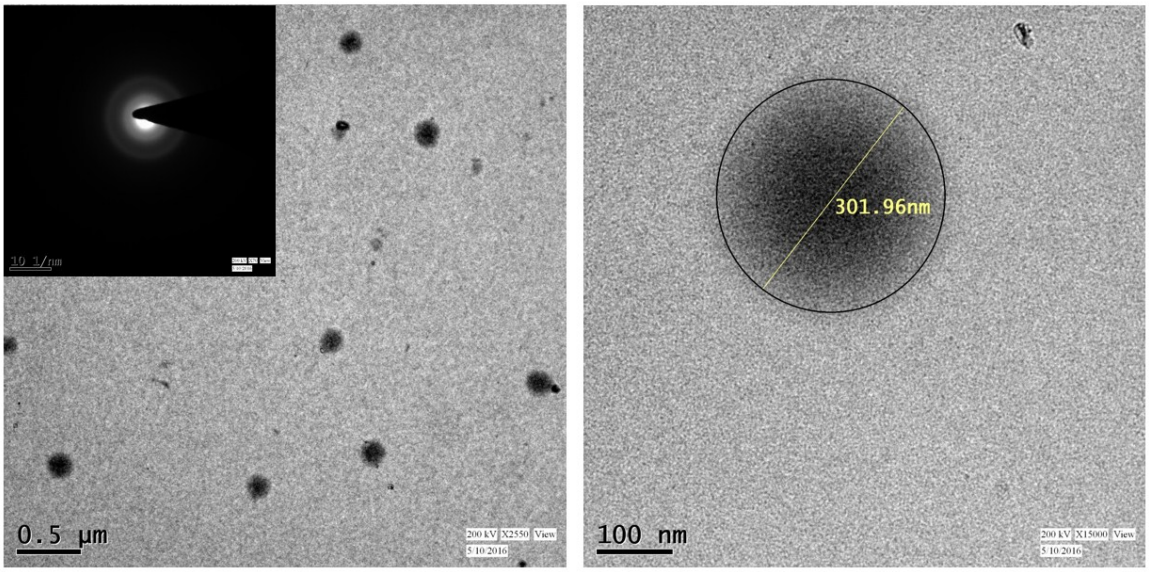


Fig. S1: TEM image of the photocatalyst, inset diagram provides the SAED pattern of the hybrid material

Preparation of the calibration curve for the measurement of 2,4-DCP in reaction medium:

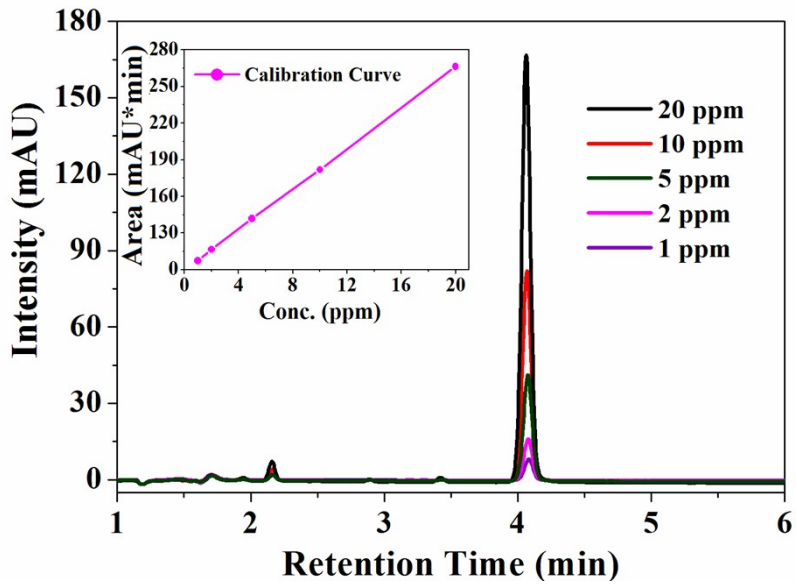


Fig. S2: HPLC chromatogram of 2,4-DCP at different concentration and the inset provides the Calibration curve

In order to obtain the %degradation of the model compound 2,4-DCP, a calibration curve of 2,4-DCP was done. From the Stock solution of 2,4-DCP of concentration 100 ppm, different concentration of 2,4-DCP basic solution were prepared in water. The absorbance value of these 2,4-DCP solution was recorded using HPLC (Thermo Scientific Evolution) at the retention time of 4.1 min (Fig. S2). Based on this HPLC profile diagram, the calibration curve was plotted against intensity (λmax= 284 nm) versus concentration of 2,4-DCP.

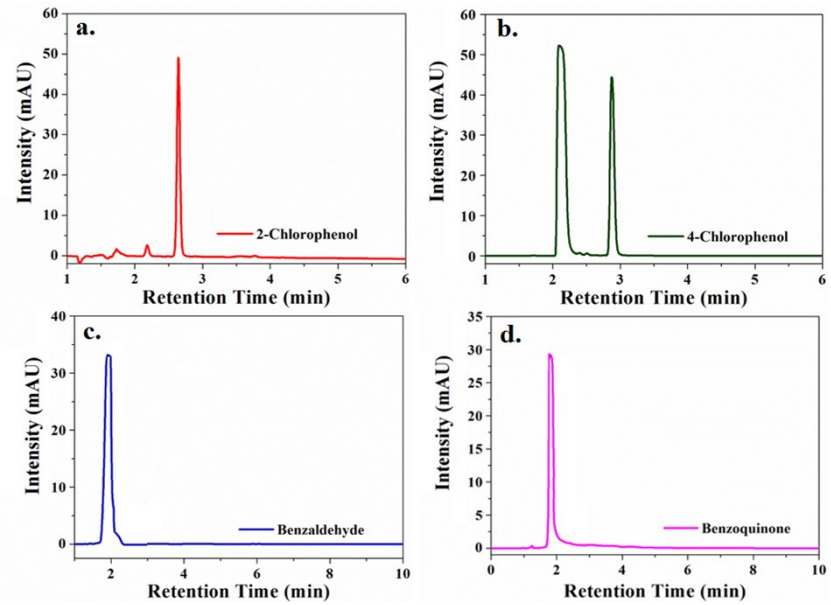


Fig. S3: HPLC chromatogram of different compounds in order to identify the intermediates (a) 2-chlorophenol, (b) 4-chlorophenol, (c) benzaldehyde, (d) benzoquinone

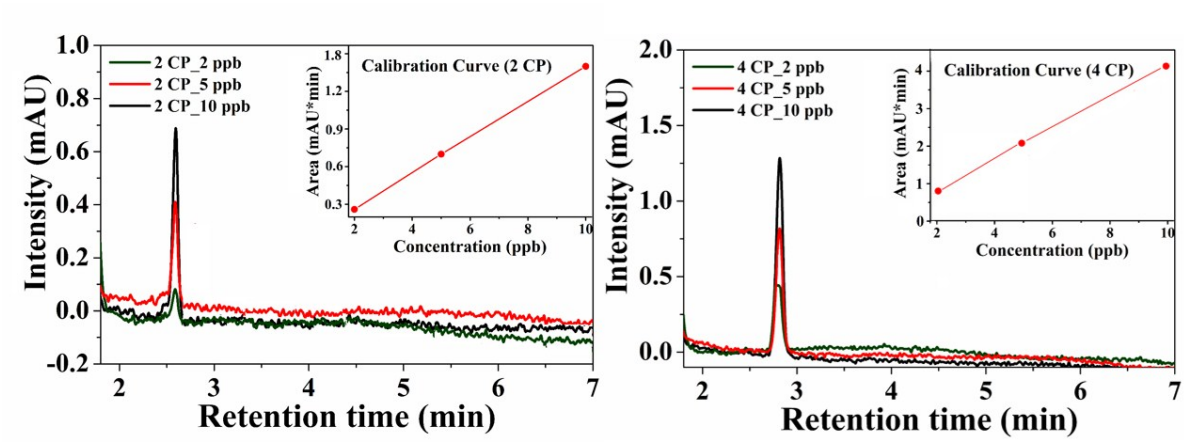


Fig. S4: HPLC chromatogram of 2-chlorophenol (2 CP) and 4-chloroform (4-CP), insets provide the calibration curve.

Reaction time (min)		**Area (mAU*min)**	
		2,4-DCP (retention time = 4.1 min)	**Intermediate** (retention time = 2.6 min)
0 min		233.085	-
30 min		170.724	3.17
60 min		108.240	2.87
90 min		59.370	2.04
120 min		39.278	1.54
150 min		29.643	0.70
Calibration std. (4-CP)	**10 ppb**	-	3.072
	5 ppb		1.944
	2 ppb		0.65

Table 1: HPLC chromatogram data of different area under the curve reflecting the stoichiometry of the initial and final concentration of 2,4-DCP and the intermediate 4-CP.

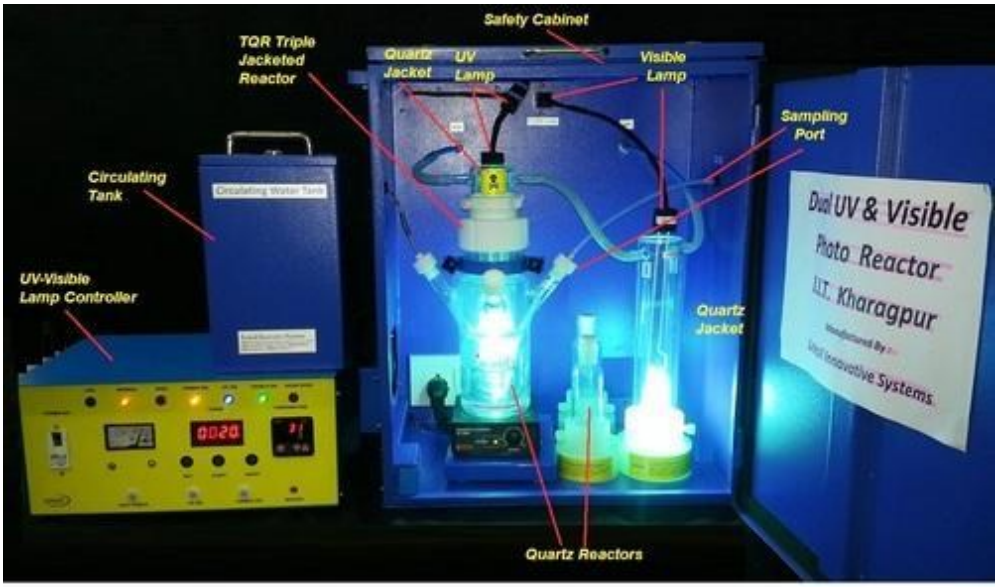
Measurement of the intensity of 250 W tungsten photo-reactor lamp by using potassium ferrioxalate as an actinometer

The intensity (I_0) (photon flux) of the lamp (250 W tungsten photo-reactor lamp) used in this photocatalytic study was measured by following a standard procedure utilizing potassium ferrioxalate as the actinometer.[1] In a this method, 10 ml (V_1) of 0.006 M solution of potassium ferrioxalate was taken in a 15 ml pyrex vial and placed 5 cm away from the visible light source. The ferrioxalate solution (V_1) was irradiated under stirring condition. After 1 min, 1 ml (V_t) of the irradiated solution was transferred into a 10 ml (V_3) volumetric flask containing a mixture of 4 ml of 0.1% 1,10- phenanthroline solution and 0.5 ml of buffer solution (stock solution: 82 g NaOAc, 10 ml conc. H_2SO_4, diluted to 1 L with distilled water) which was then diluted to the mark by distilled water. A reference was also prepared in the same way except that it has not been irradiated. Both solutions are kept in the dark for an hour until full colour development was achieved. Then, absorption spectra of these solutions were recorded by using UV-Vis spectrophotometer. Then the absorbance of the first (A_l) minus that of the second (A_d) sample is measured at 510 nm (1 cm path length, ε_{510} = 11100 $dm^3\ mol^{-1}\ cm^{-1}$).The intensity (I_0) was calculated from the following eq. (1).

$$I_0 = N_A \frac{(A_1 - A_0) \times V_1 \times V_3 \times 10^3}{\phi_\lambda \times \varepsilon_{510} \times V_t \times t} \quad \text{.....Eq. (1)}$$

where, ϕ_λ= 1.11, at 435 nm and N_A is the Avogadro number.

It was found that from the above eq. (1), the intensity of the lamp (250 W tungsten lamp) used, is 4.221×10^{16} einstein/s.



Pictorial depiction of the photoreactor we have used for the photocatalytic reaction purpose. Xenono lamp has been used for UV irradiation and the tungsten lamp has been used as the Visible light source. We have used the tungsten lamp for our experimental purpose.

Reference:

1. (a) C. G. Hatchard, C. A. Parker, A new sensitive chemical actinometer. II. Potassium ferrioxalate as a standard chemical actinometer, *Proc. R. Soc. London, Ser. A*, 1956, **235**, 518; (b) R. Ananthakrishnan, S. Gazi, $[Ru(bpy)_3]^{2+}$ aided photocatalytic synthesis of 2-arylpyridines via Hantzsch reaction under visible irradiation and oxygen atmosphere, *Catal. Sci. Technol.*, 2012, **2**, 1463.