Electronic Supplementary Information

Template-free synthesis of Fe_3O_4 nanorod bundles and its highly efficient peroxidase mimetic activity for degradation of organic dye pollutants with H_2O_2

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Characterization:

The powder XRD pattern was recorded in the 2θ range of 10-70° with an automated X-ray diffractometer (Model ULTIMA IV, Rigaku, Japan) using Cu Kα radiation (λ=1.5418Å) at a scan rate of 3°/min. The FT-IR spectra (4000–400 cm^{-1}) were recorded as KBr pellet in a Shimadzu IR affinity-1 spectrophotometer. Thermal analysis was carried out with thermal analyzer (Model SDT Q600) under N_2 atmosphere with a heating rate of 10 °C/min. The magnetic property of the material was tested on a Lake Shore CRYOTRONICS (Model 7410 series) vibrating-sample magnetometer (VSM) at 298 K. The morphology of the samples was examined using Hitachi S-4800 field emission scanning electron microscopy (FE-SEM). The TEM images were taken using JEOL (Model JEM-2011). Zeta potential was measured in a Malvern Zetasizer, Nano ZS (Prior to measurement a definite amount of sample was dispersed in double distilled water). pH was measured with EUTECH pH 700 instrument.

Typical procedure for recyclability study:

The recyclability of Fe_3O_4 nanorod catalyst was studied for three cycles. The Photo Fenton-like degradation reaction using Fe_3O_4 nanorod catalyst was performed using the same aforementioned procedure. Prior to reuse, the used Fe_3O_4 nanorod catalyst was collected under magnetic field, washed with distilled water and ethanol and then dried in vacuum desiccators.

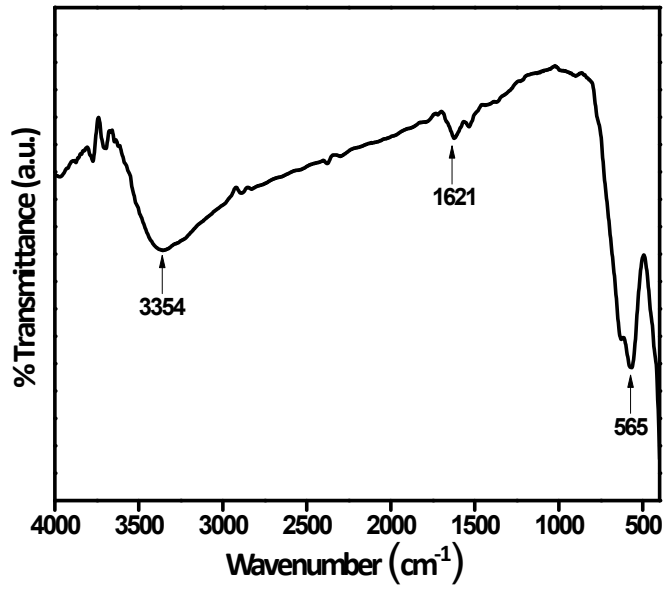

Fig. S1 FT-IR spectra of Fe_3O_4 nanorod bundles.

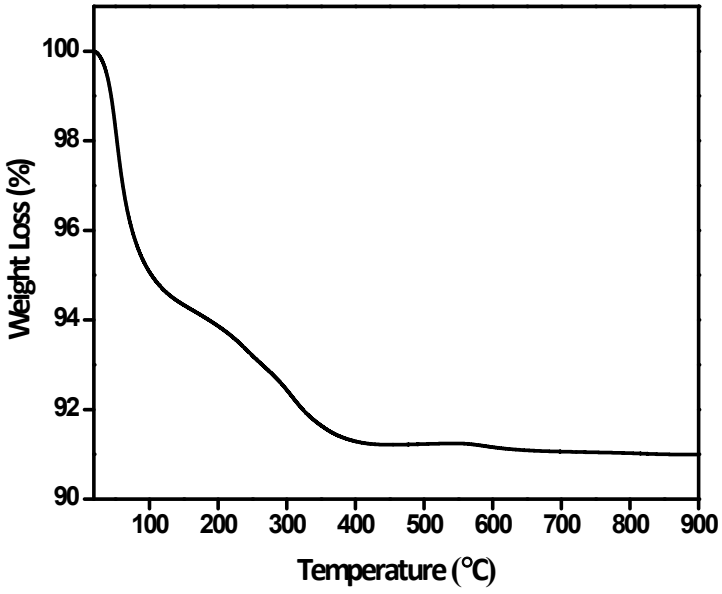

Fig. S2 TGA curve of Fe_3O_4 nanorod bundles.

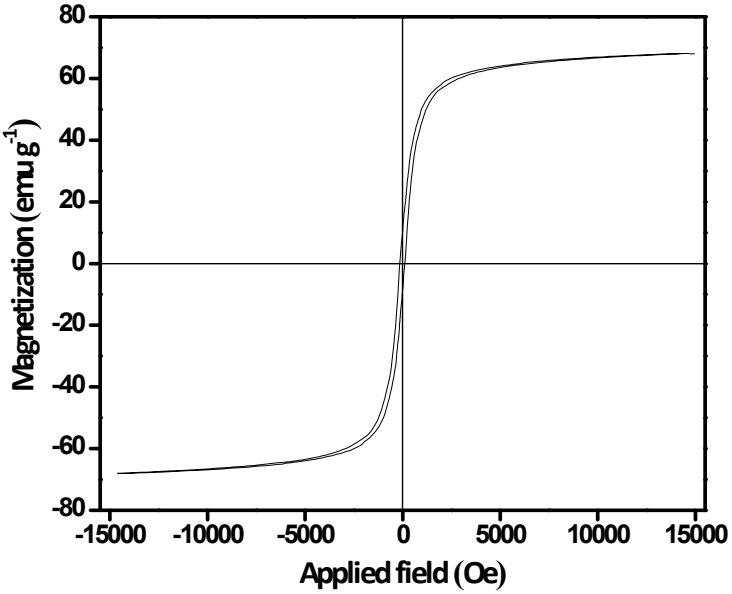

Fig. S3 Room temperature magnetization hysteresis loop of Fe_3O_4 nanorod bundles.

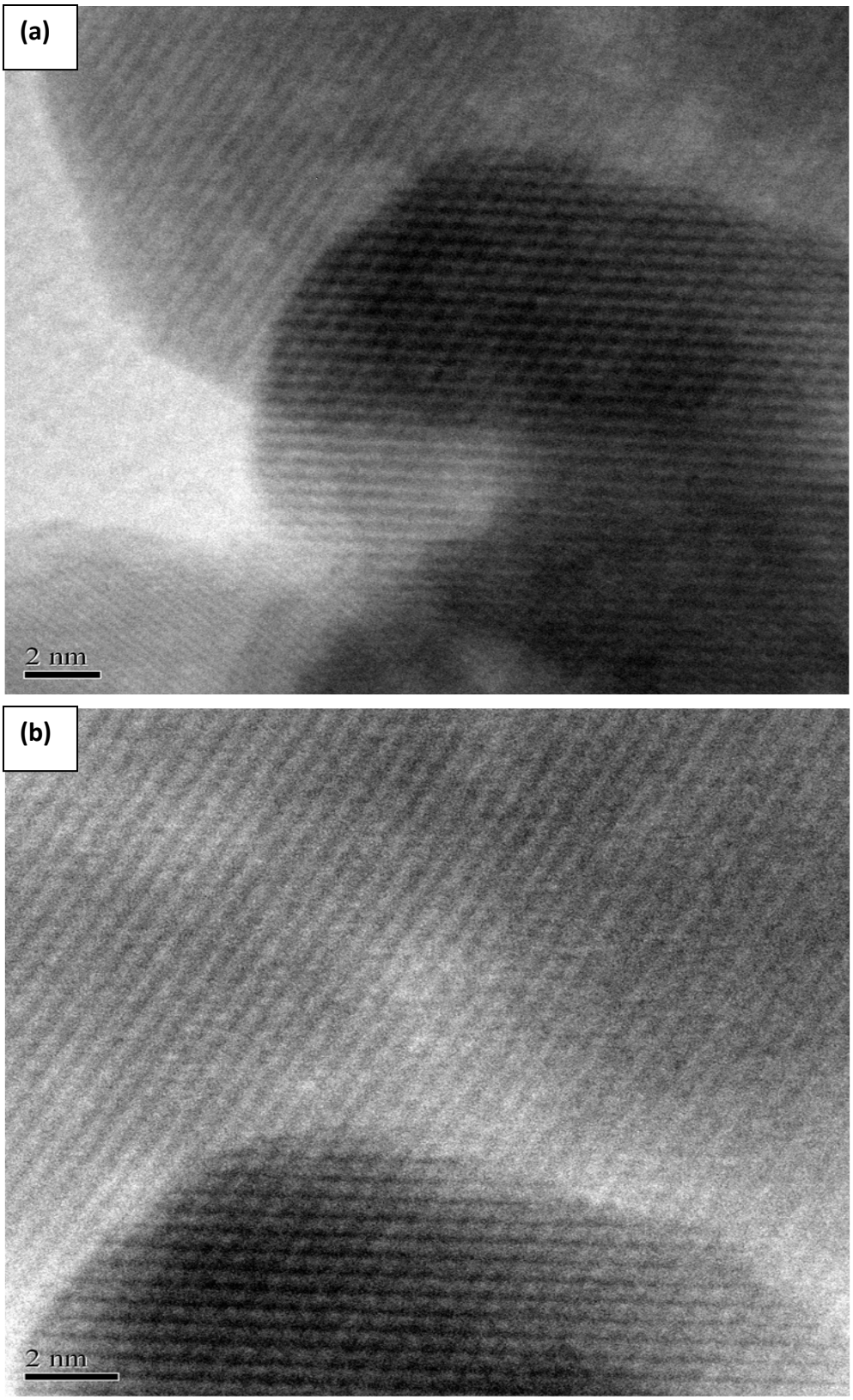

Fig. S4 (a) and (b) HRTEM image showing the lattice fringes of the as-synthesized Fe_3O_4 nanorods.

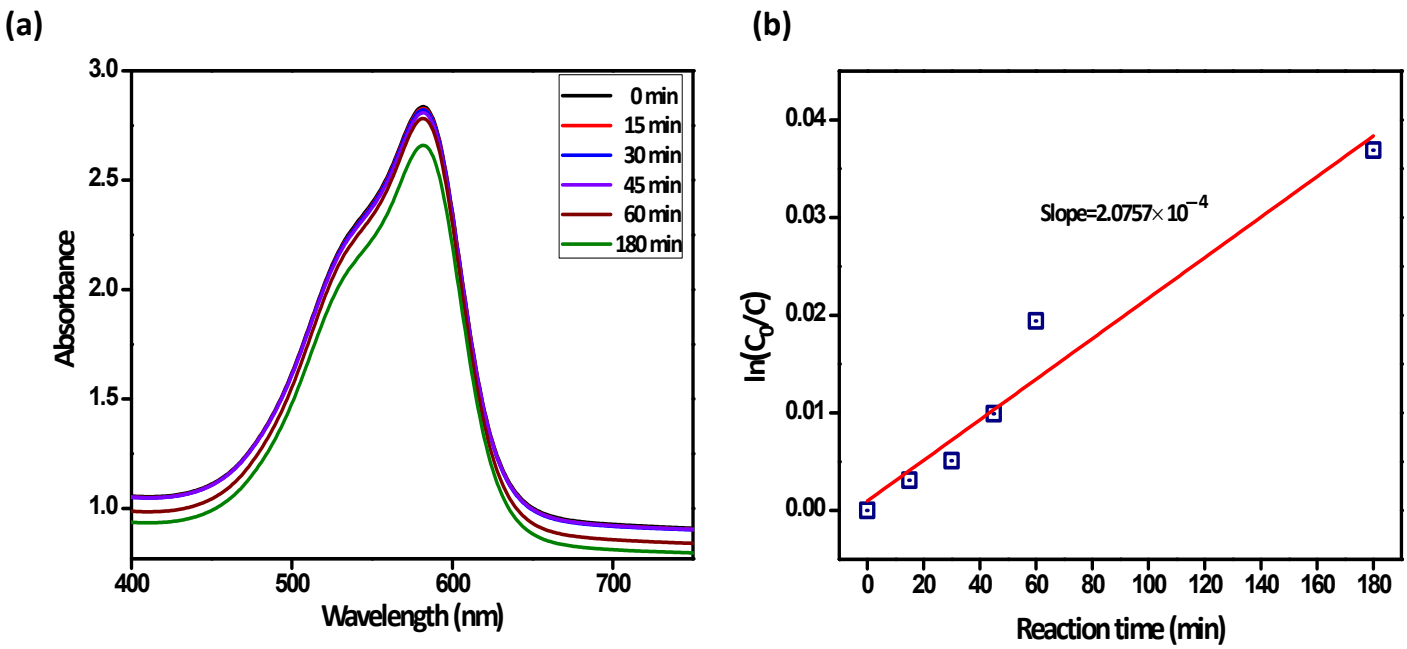

Fig. S5 (a) UV-vis absorption spectra of CV dye during Photo Fenton-like degradation process at successive time interval using only Fe_3O_4 nanorods catalyst and (b) its Pseudo first order kinetics curve.

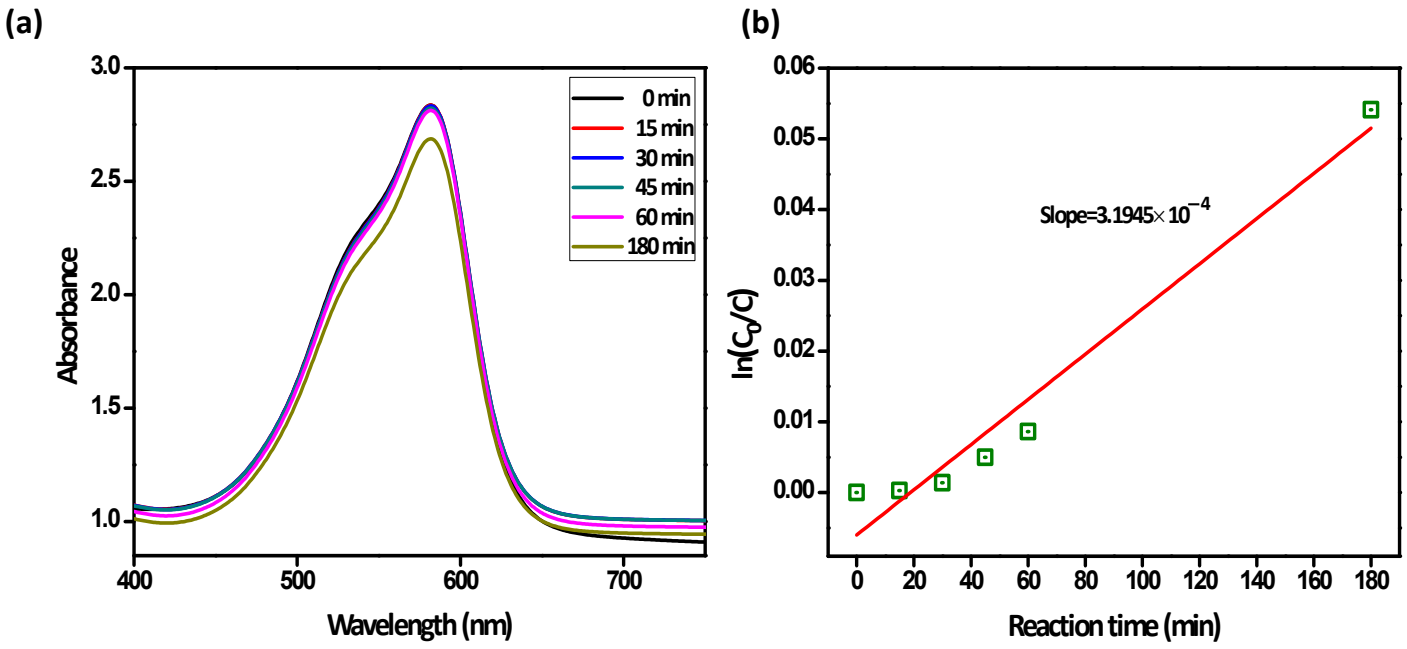

Fig. S6 (a) UV-vis absorption spectra of CV dye during Photo Fenton-like degradation process at successive time interval using only H_2O_2 and (b) its Pseudo first order kinetics curve.

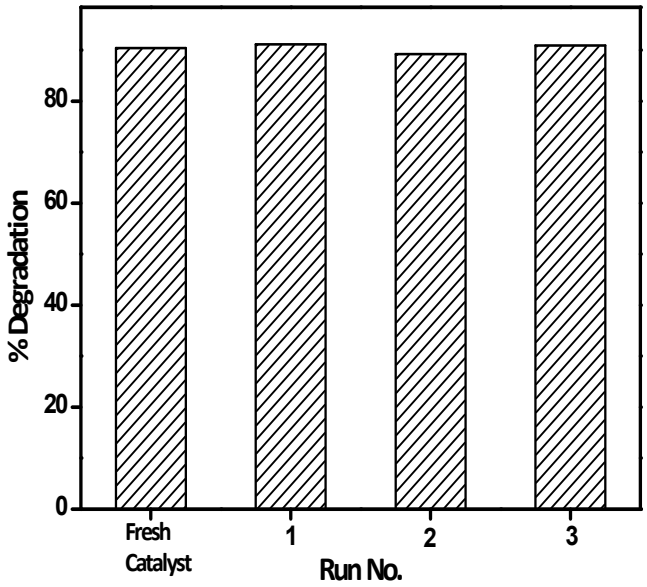

Fig. S7 Recyclability study of Fe_3O_4 nanorod bundles catalyst for degradation of CV dye.

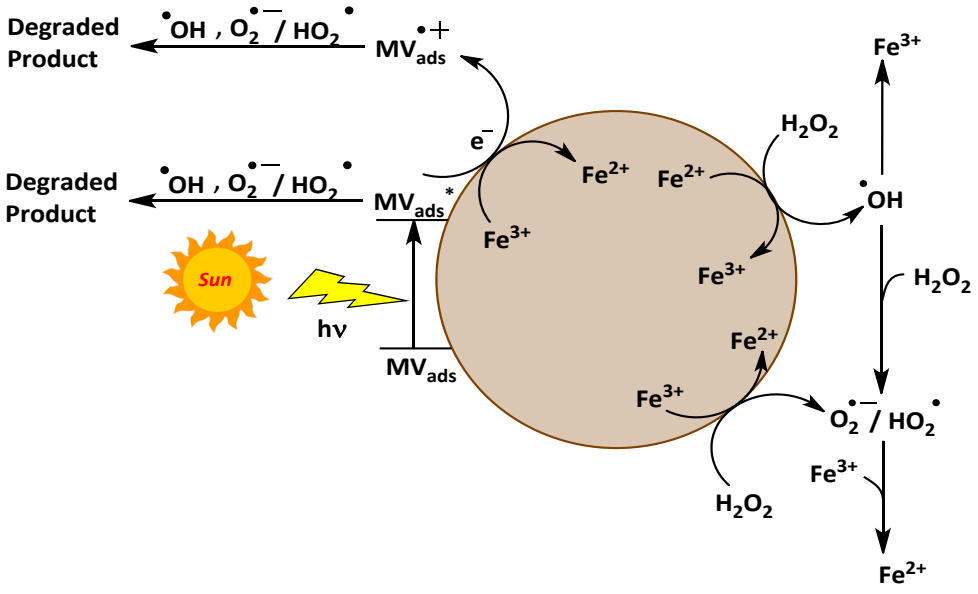

Fig. S8 A tentative mechanism for the activation H_2O_2 on the Fe_3O_4 nanorod bundles catalyst for degradation of CV dye under solar light.