Electronic Supplementary Material (ESI) for RSC Advances.

Supported Information

ZnO as an efficient nucleating agent and morphology template for rapid, facile and scalable synthesis of MOF-46 and ZnO@MOF-46 with selective sensing properties and the enhanced photocatalytic ability

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Table S1. Crystal data and single crystal X-ray diffraction refinement details for MOF-46

Empirical formula	$C_{11}\ H_{14}\ N_3\ O_5\ Zn$
Formula mass	333.62
T (K)	298(2)
Wavelength (Å)	0.71073
Crystal system	Monoclinic
Space group	C 2/m
a (Å)	11.2043(9)
b (Å)	15.0516(12)
c (Å)	8.0275(7)
α (°)	90.00
β (°)	111.7060(10)
γ (°)	90.00
V ($Å^3$)	1257.79(18)
Z	4
D_{Calcd} (g cm^{-3})	1.762
μ (mm^{-1})	1.977

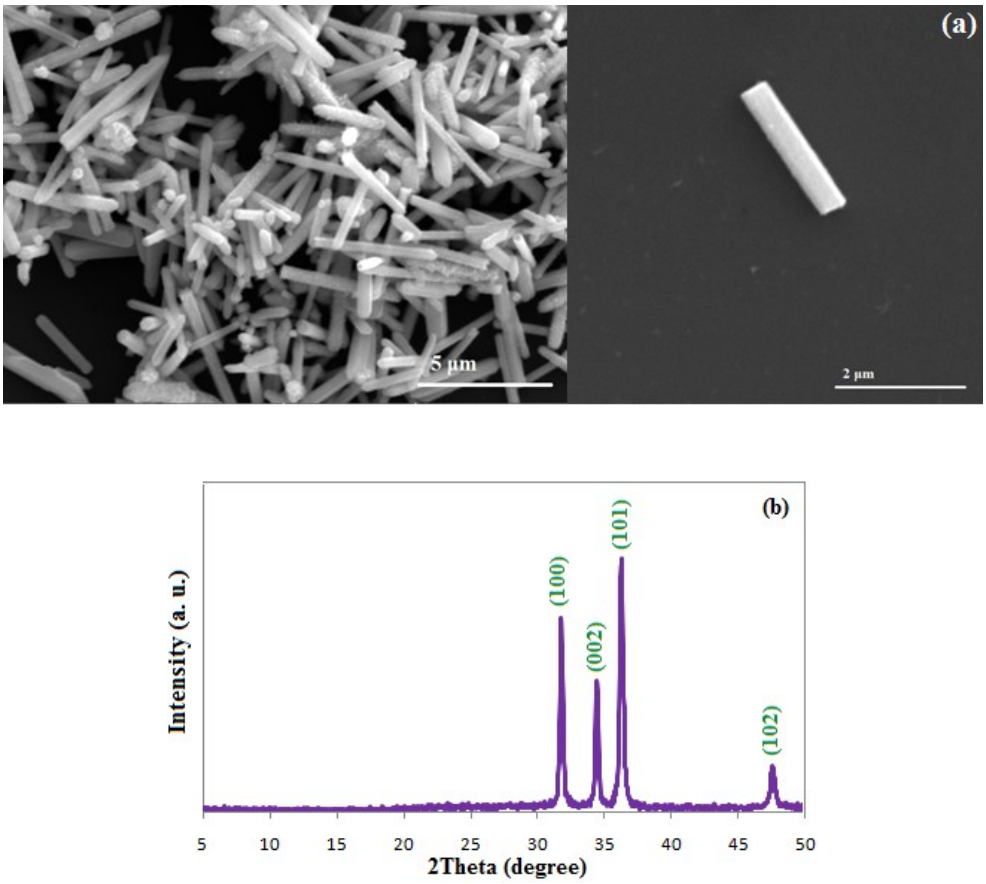

Fig.S1. (a) SEM images of ZnO synthesized by hydrothermal method after calcination at 500 ºC; (b) XRD pattern of prepared ZnO.

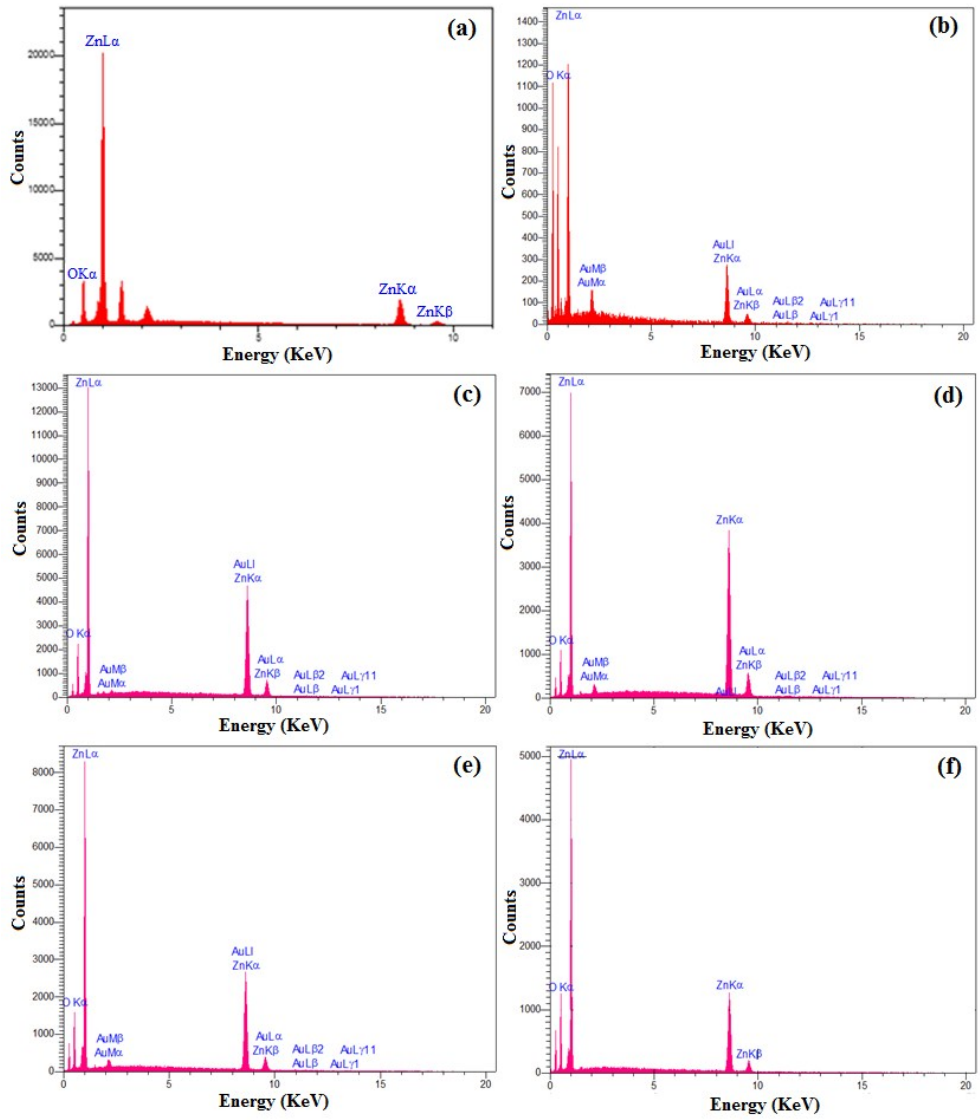

Fig. S2. Energy dispersive X-ray spectroscopy (EDX) of (a) ZnOnanorods,(b) MOF-46 microcrystals, (c) ZnO@MOF-46 prepared at 6 h, (d) ZnO@MOF-46 prepared at 12 h, (e) ZnO@MOF-46 prepared at 24 h and (f) ZnO@MOF-46 prepared at 48 h.

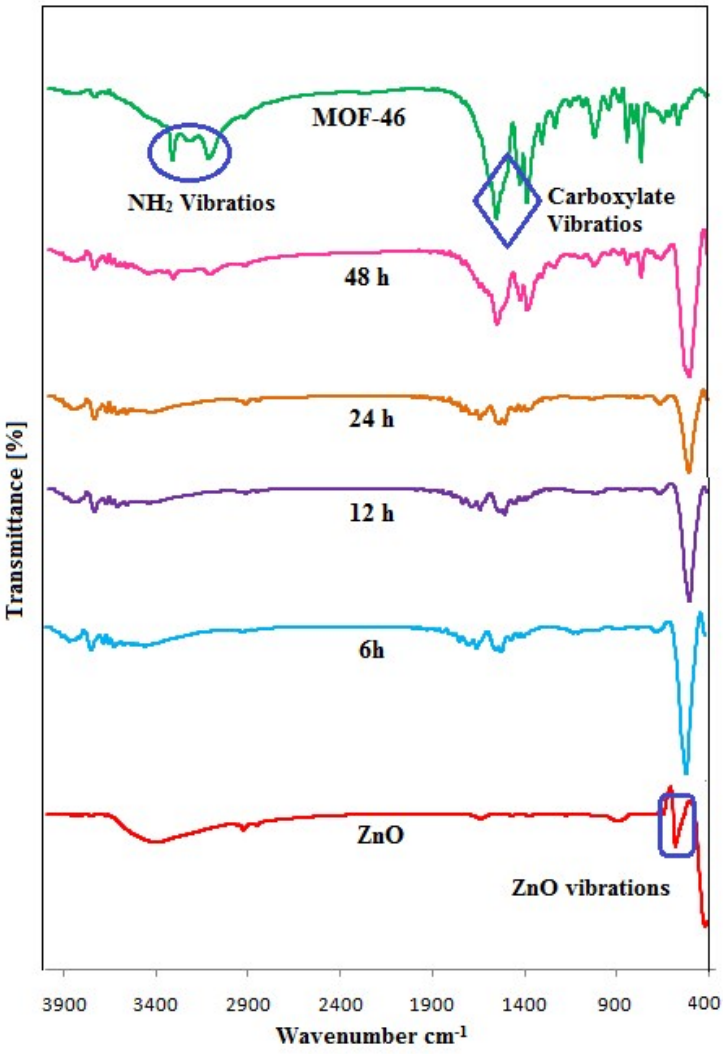

Fig. S3. IR spectra of ZnO, ZnO@MOF-46 core-shell sample prepared at 6, 12, 24 and 48h and MOF-46.

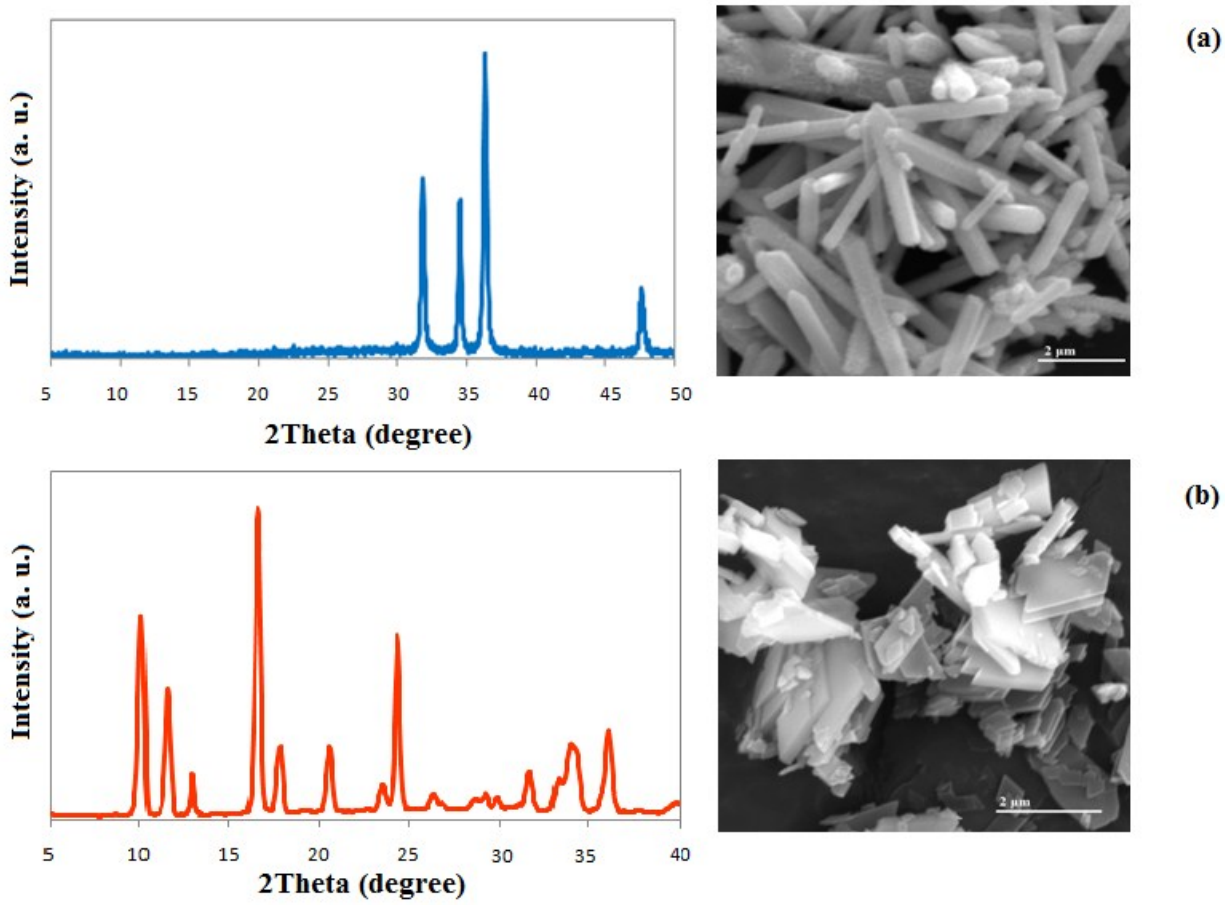

Fig. S4. XRD patterns and SEM images of sample as a function of solvents (a) only DMF (b) H_2O/DMF (2:1).

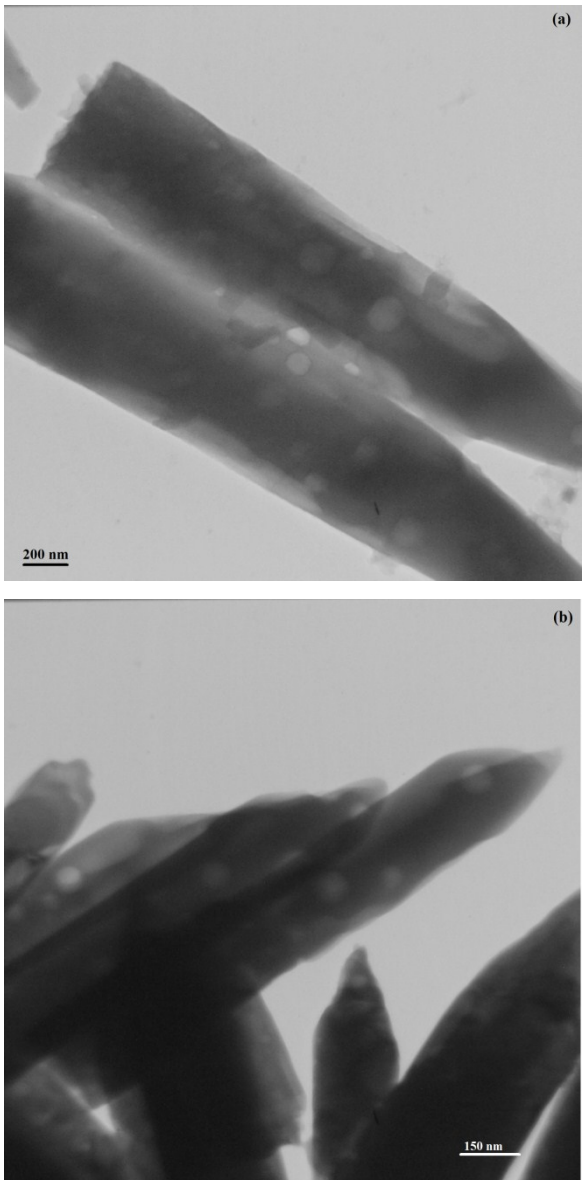

Fig. S5. ZnO@MOF-46 core-shell structures obtained during 48 h in ZnO to 2-aminoterephthalic acid molar ratio (a) 2:1 and (b) 1:2.

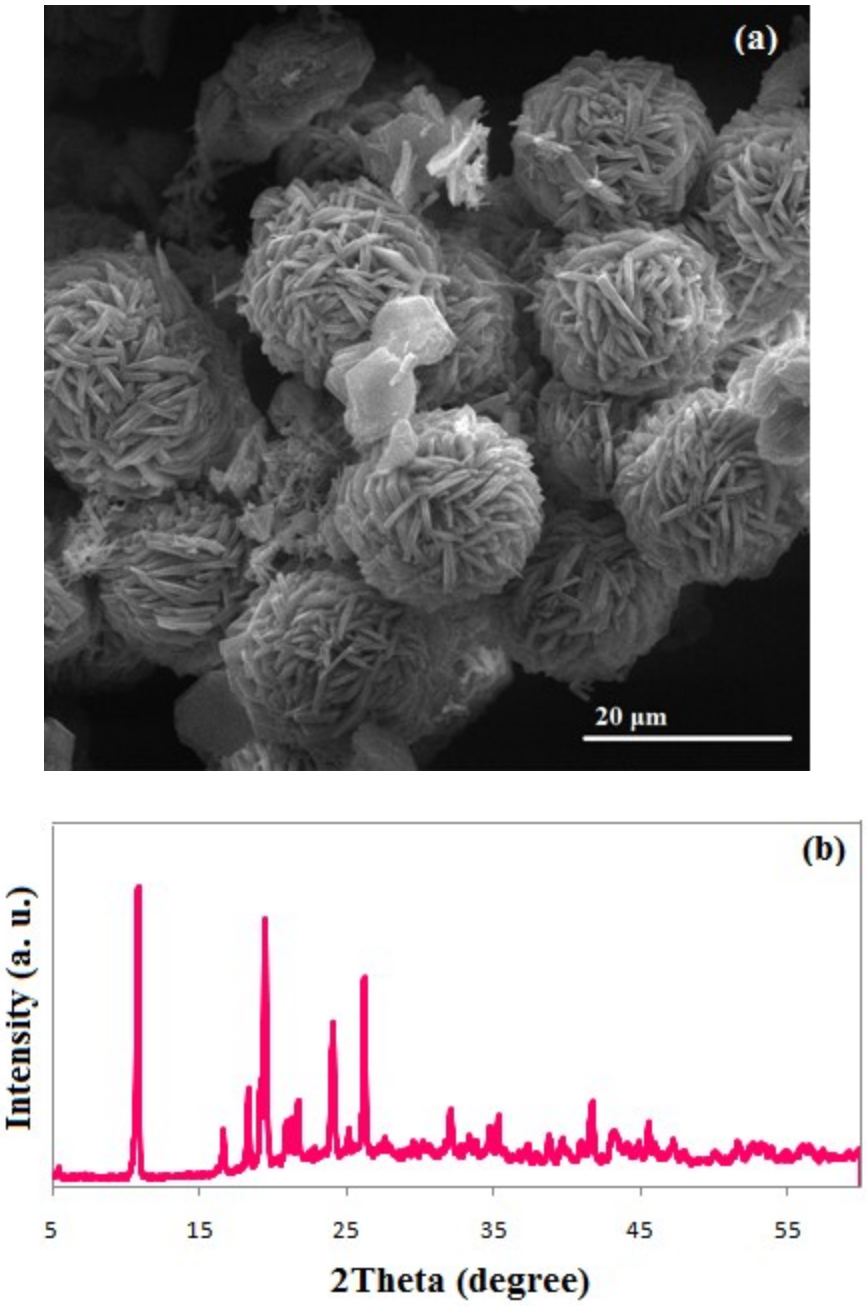

Fig. S6. (a) SEM image and (b) XRD pattern of obtained sample by solvothermal method.

(Experimental condition: 2-aminoterephthalic acid (181 mg, 1 mmol) and ZnO (82.00 mg, 1mmol) into a Teflon-lined stainless-steel autoclave containing solvent composition DMF/H_2O (48ml, 3:1). The autoclave was transferred to an oven and heated at 70°C for different reaction times (6, 12, 24 and 48 h)).

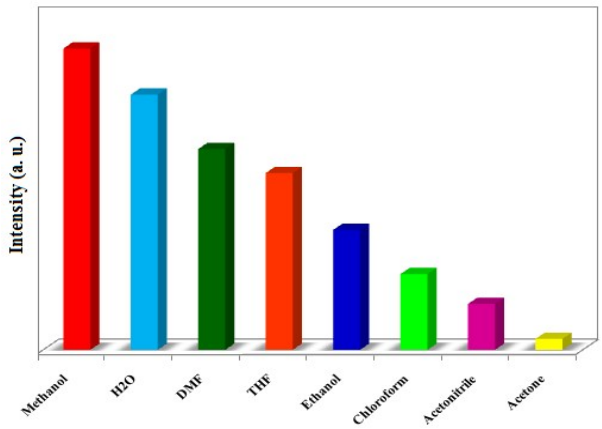

Fig. S7. Emission Intensities of ZnO@MOF-46 in different solvents.

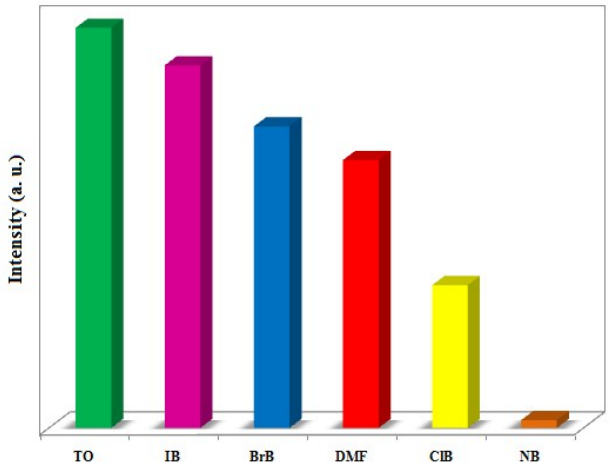

Fig. S8. Emission Intensities of ZnO@MOF-46 in DMF.

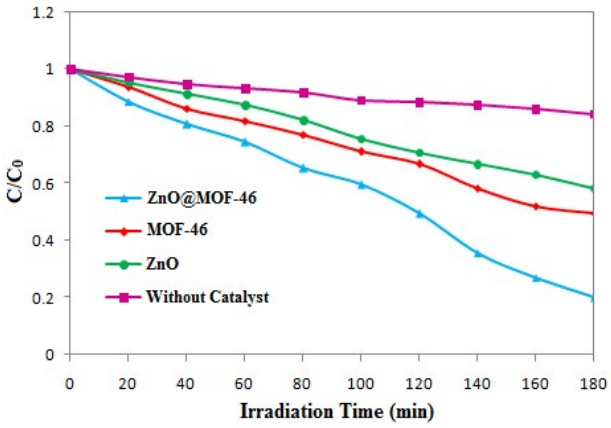

Fig. S9. Concentration changes of MB at different time intervals without catalyst and with ZnO@MOF-46, MOF-46 and ZnO as photocatalysts.

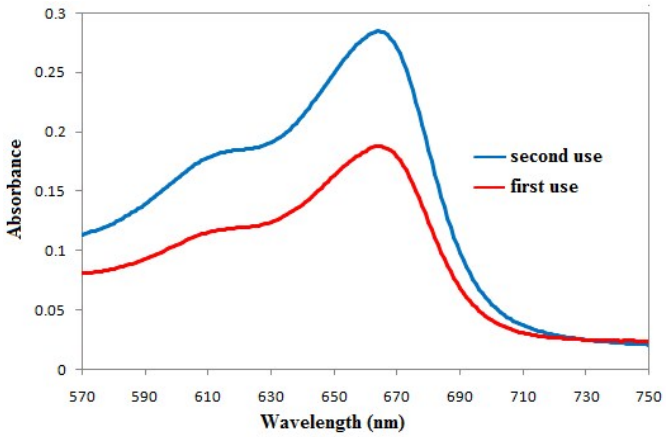

Fig. S10. Reusability of ZnO@MOF-46 in photodegradation of MB solution under Hg lamp (first use is fresh ZnO@MOF-46 cycle and second use is reused ZnO@MOF-46 cycle).

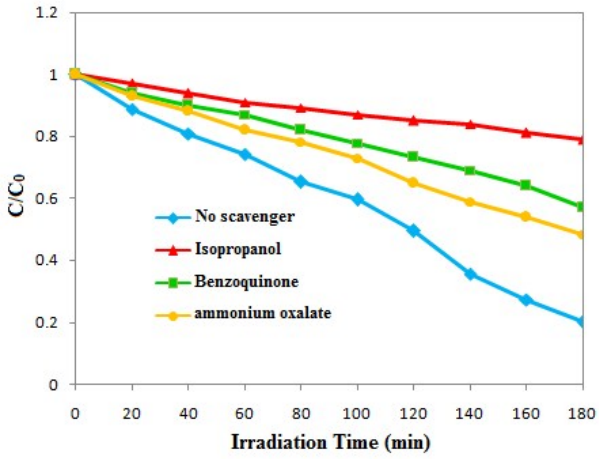

Fig. S11. Effect of different scavengers on the degradation of methylene blue in the presence of ZnO@MOF-46 as photocatalyst.

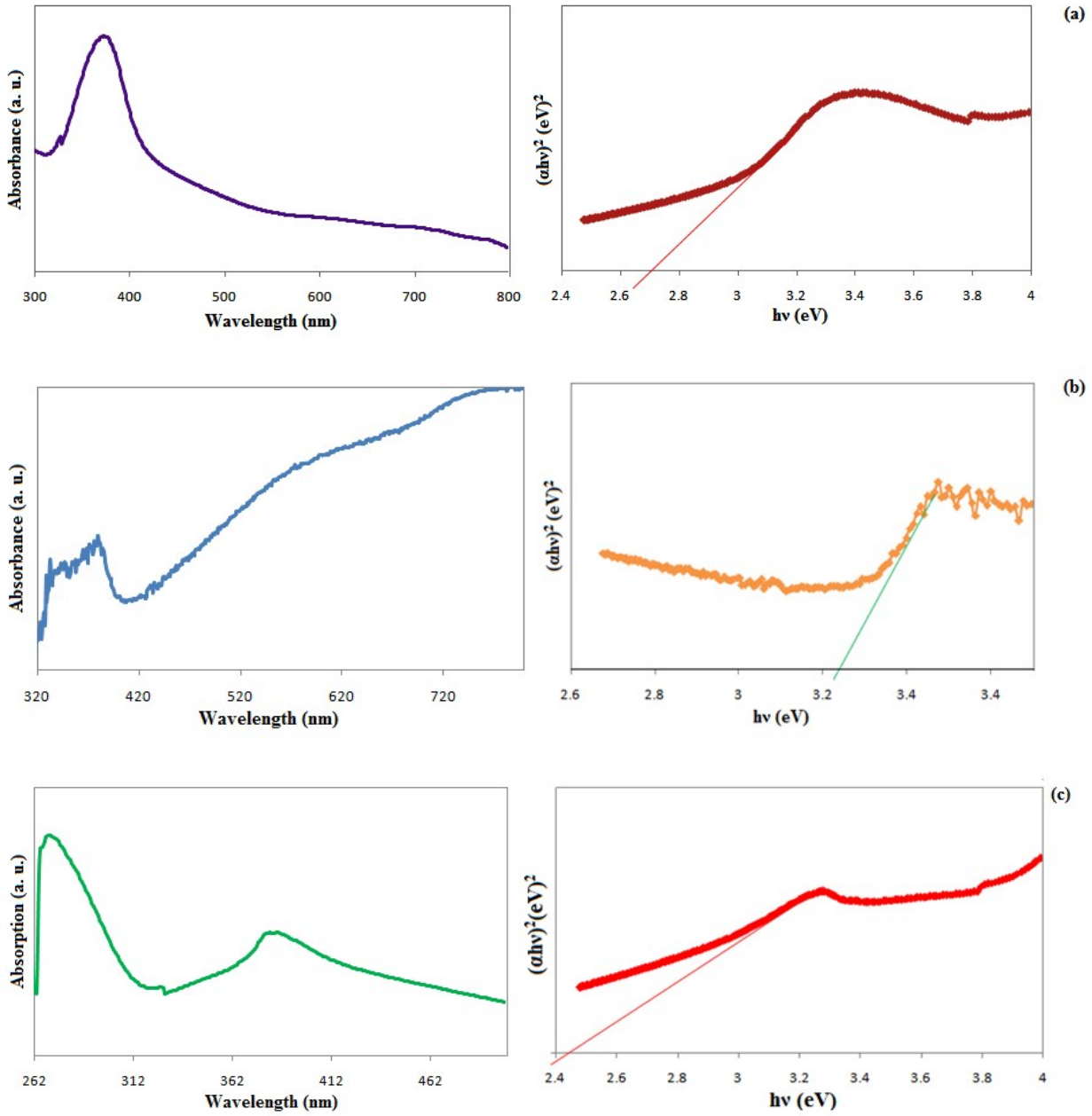

Fig. S12. UV–vis spectrum and $(\alpha h\nu)^2 - h\nu$ curve of (a) MOF-46 and (b) ZnO rods (c) ZnO@MOF-46.

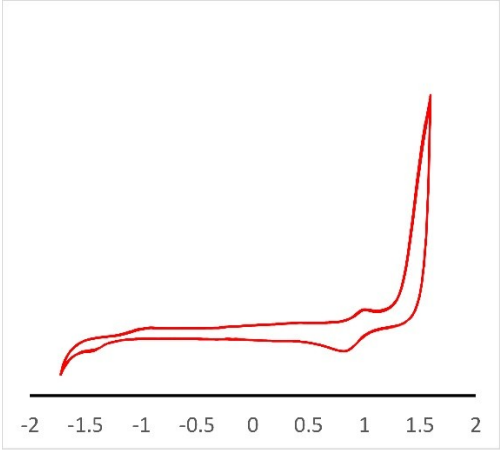

Fig. S13. Cyclic voltammetry of MOF-46.

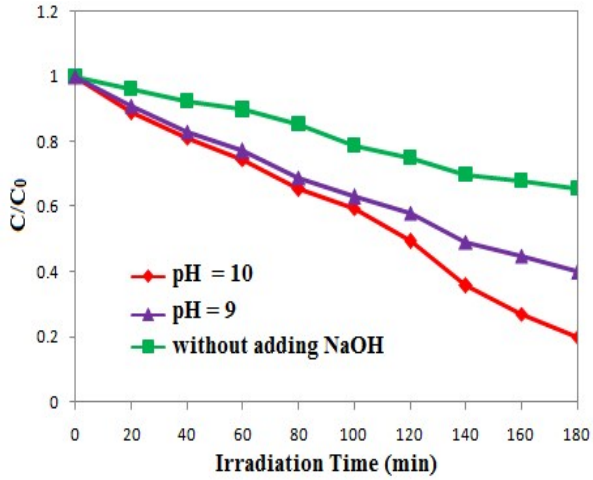

Fig. S14. Concentration changes of MB at different time intervals without adding NaOH, pH = 9 and pH = 10 with ZnO@MOF-46 photocatalyst.