

Supplementary Information

High efficiency of mechanothesized Zn-based metal-organic frameworks in photodegradation of congo red under UV and visible light

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Table S1. Photocatalytic properties of TMU-6 in presence of various concentrations of CR.

[CR] (ppm)	Removal % (Blank)	T _{dark} (min)	Adsorption %	T _{Removal} (min)	Removal %
50	0	50	98.8	-	-
100	0.005	35	39.4	90	98.3
150	0.005	40	41.2	180	87.5
200	0.006	40	42.8	180	75.4

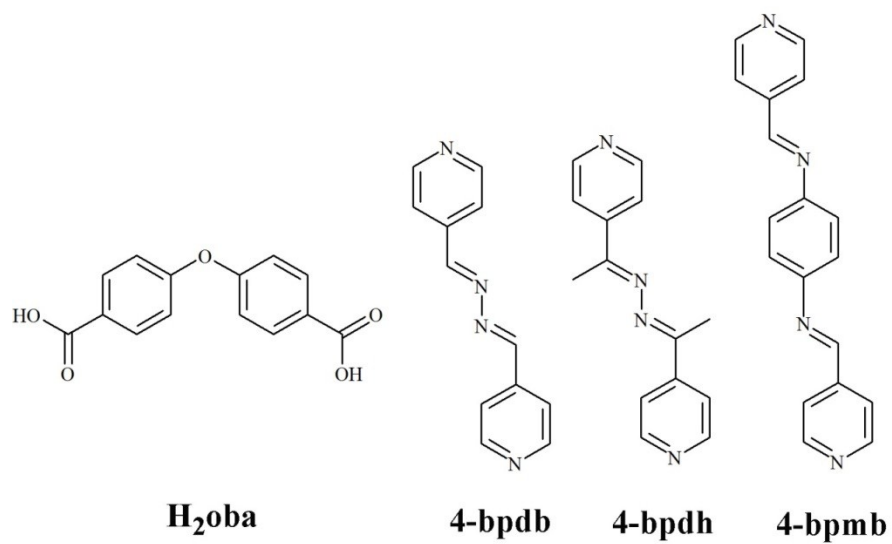


Fig. S1. Chemical structure of H₂oba, 4-bpdb, 4-bpdh and 4-bpmb.

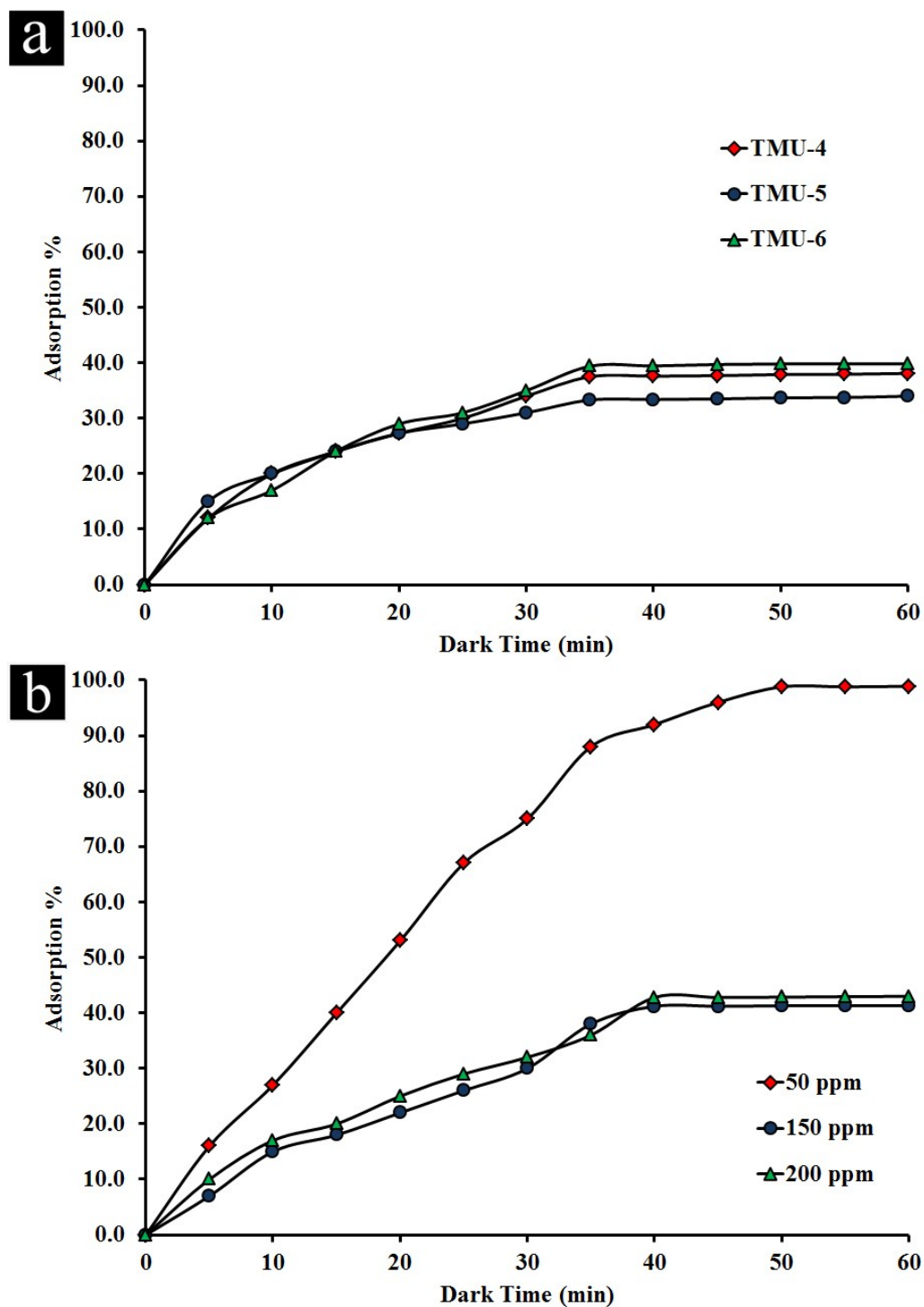


Fig. S2. The dark adsorption curves for a) TMU-4, TMU-5 and TMU-6 in presence of 100 ppm CR, b) TMU-6 in presence of various concentrations of CR.

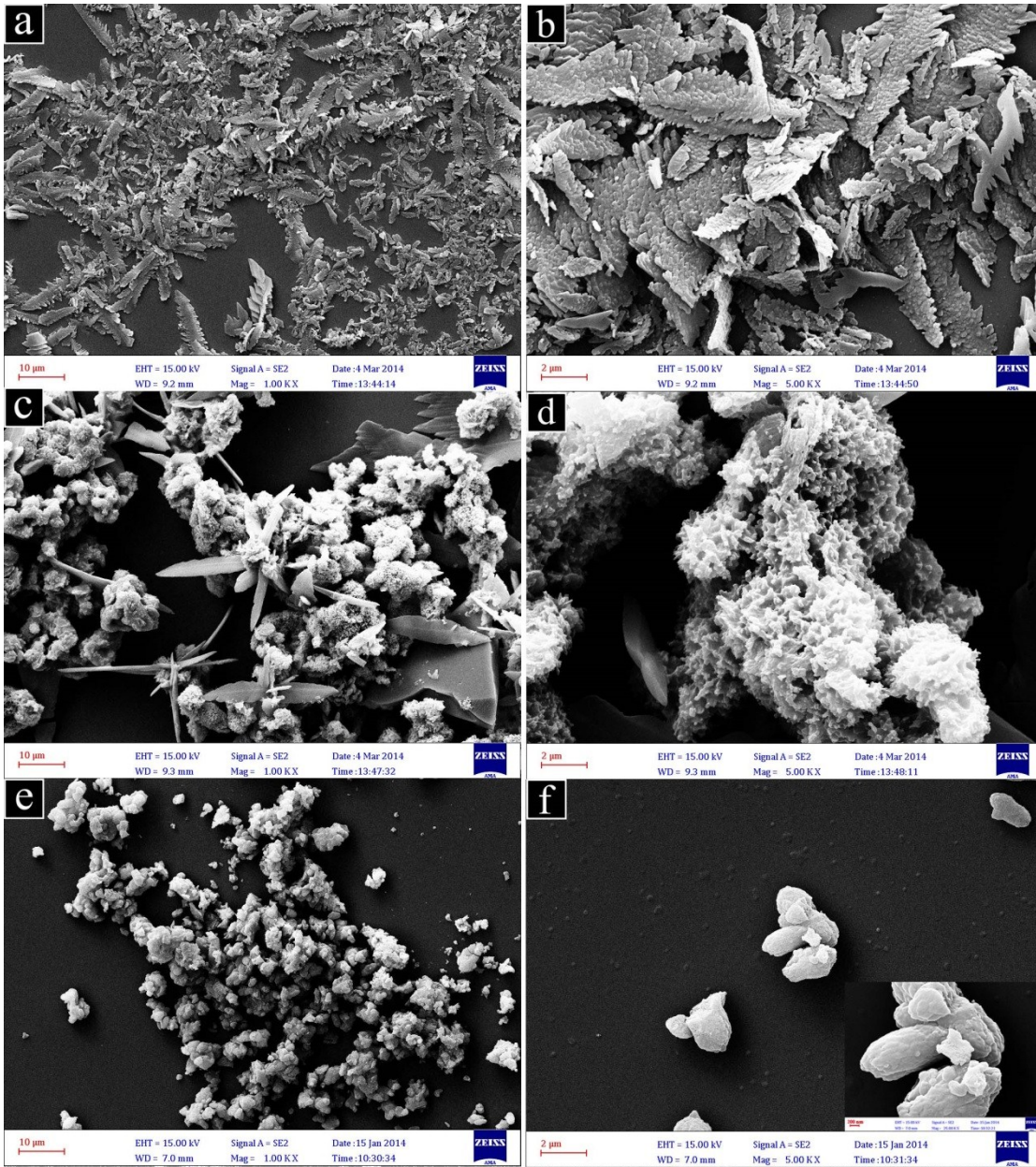


Fig. S3. FE-SEM images of (a and b) TMU-4 (c and d) TMU-5 and (e and f) TMU-6 synthesized by mechanochemical reaction (inset is high-magnification image, scale 200 nm).

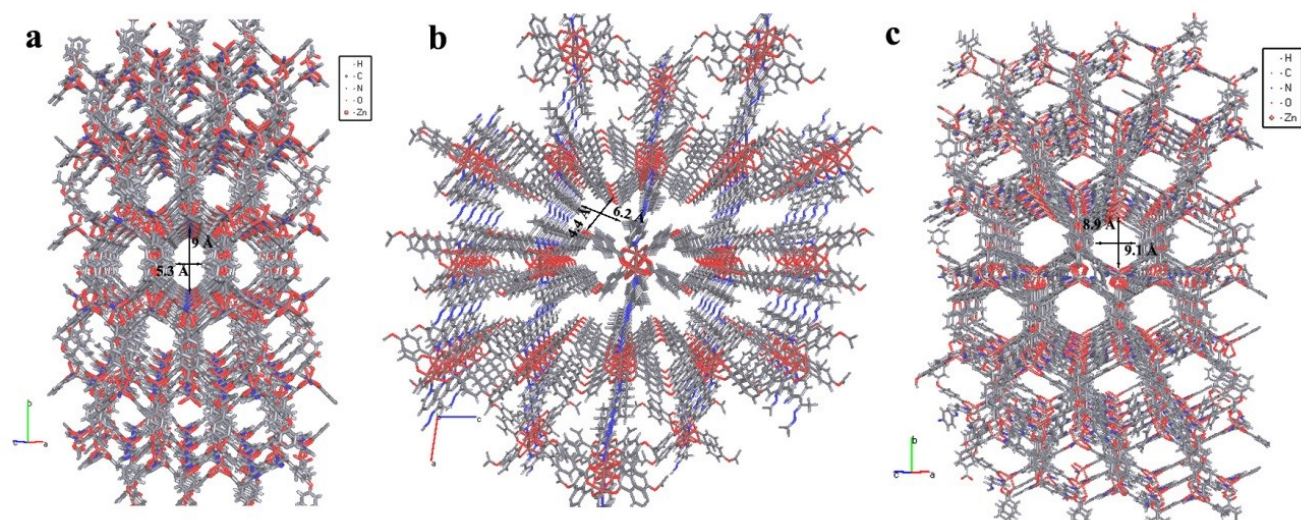


Fig. S4. Perspective views of the a) TMU-4, b) TMU-5 and c) TMU-6 structural units.

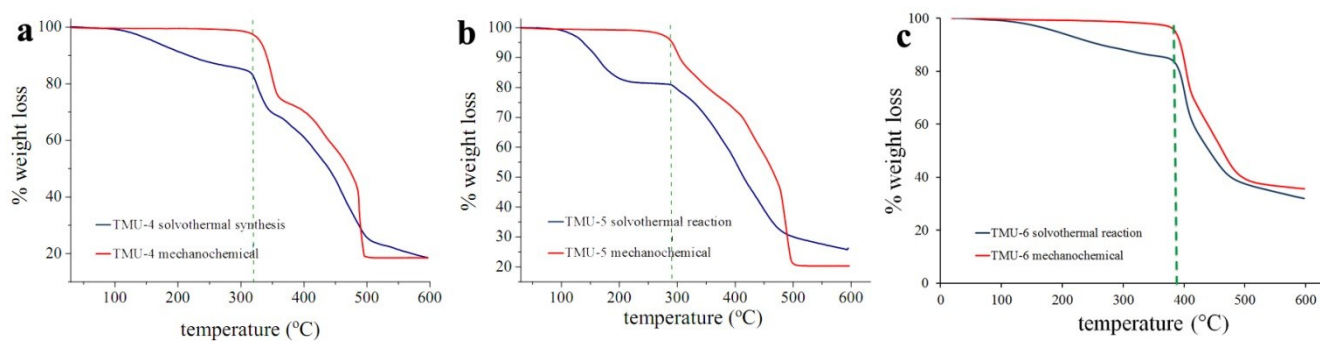


Fig. S5. Thermogravimetric profiles of (a) **TMU-4**, (b) **TMU-5** and (c) **TMU-6** isolated by either solvothermal reaction or mechanochemical synthesis. The TGA curve of **TMU-4** (solvothermal reaction) shows a plateau in the range of 30 to 100 °C followed by a continuous loss of 16.5% (expected: 14.6%) up to 315 °C, which can be ascribed to removal of the guest DMF molecules. Similarly, the TGA profile of **TMU-5** also shows a plateau in the range of 30 to 100 °C and a loss of DMF molecules of 18% (expected: 19.9%) in the temperature range of 100 to 190 °C. **TMU-5** is thermally stable up to 290 °C, above which point it begins to decompose. Also **TMU-6** shows a plateau in the range of 30 to 100 °C and a loss of DMF molecules of 16% (expected: 19%) in the temperature range of 100 to 380 °C. The TGA profiles of the mechanochemical synthesized **TMU-4**, **TMU-5** and **TMU-6** show plateaus in the range of 30 to 315 °C, 30 to 290 °C and 30 to 380 °C, respectively, reveal that the first weight loss is correctly attributed to loss of DMF guest molecules.

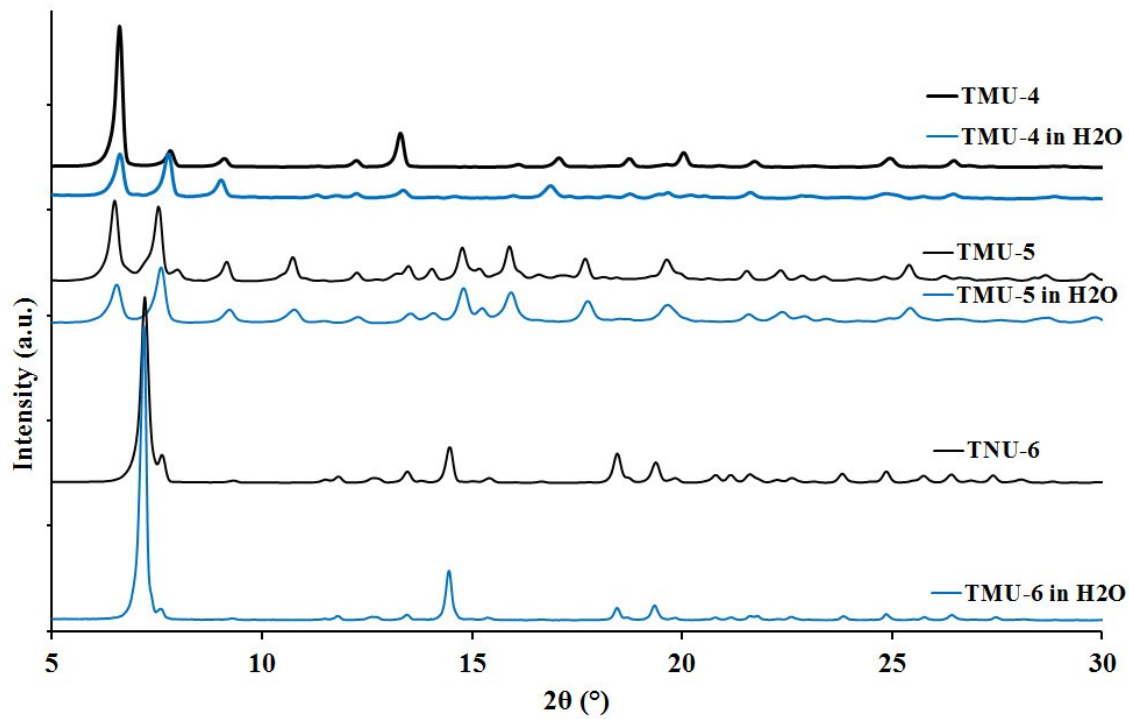


Fig. S6. Comparison of XRPD patterns for TMU-4, TMU-5 and TMU-6 before and after immersing in H₂O for 24 h.

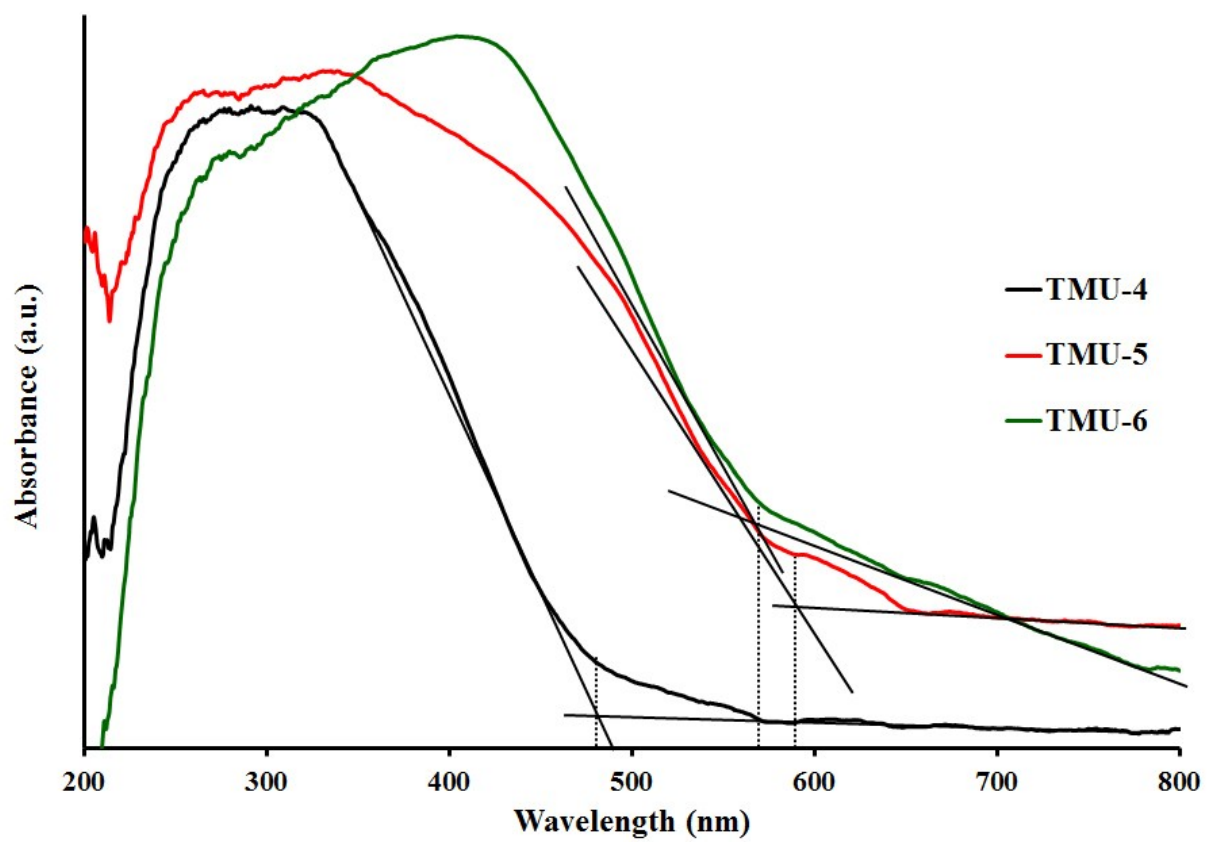


Fig. S7. UV-vis diffuse reflectance spectra of the MOFs.

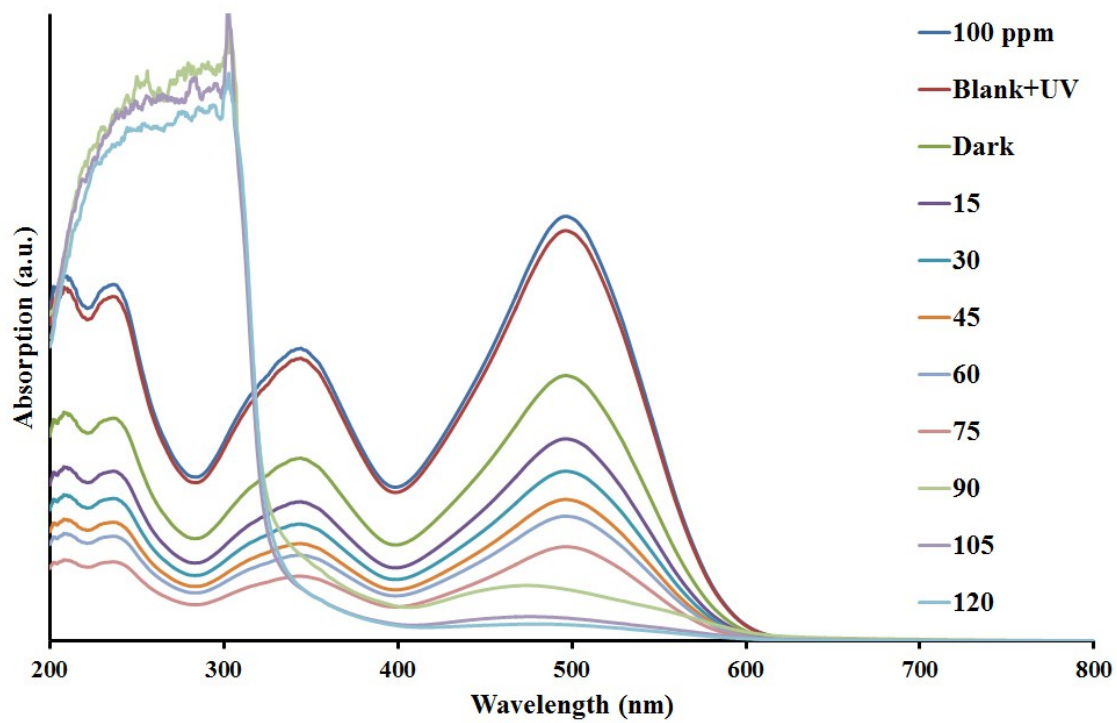


Fig. S8. Absorption spectra of a solution of 100 ppm CR in the presence of TMU-4 under UV light irradiation for 120 min.

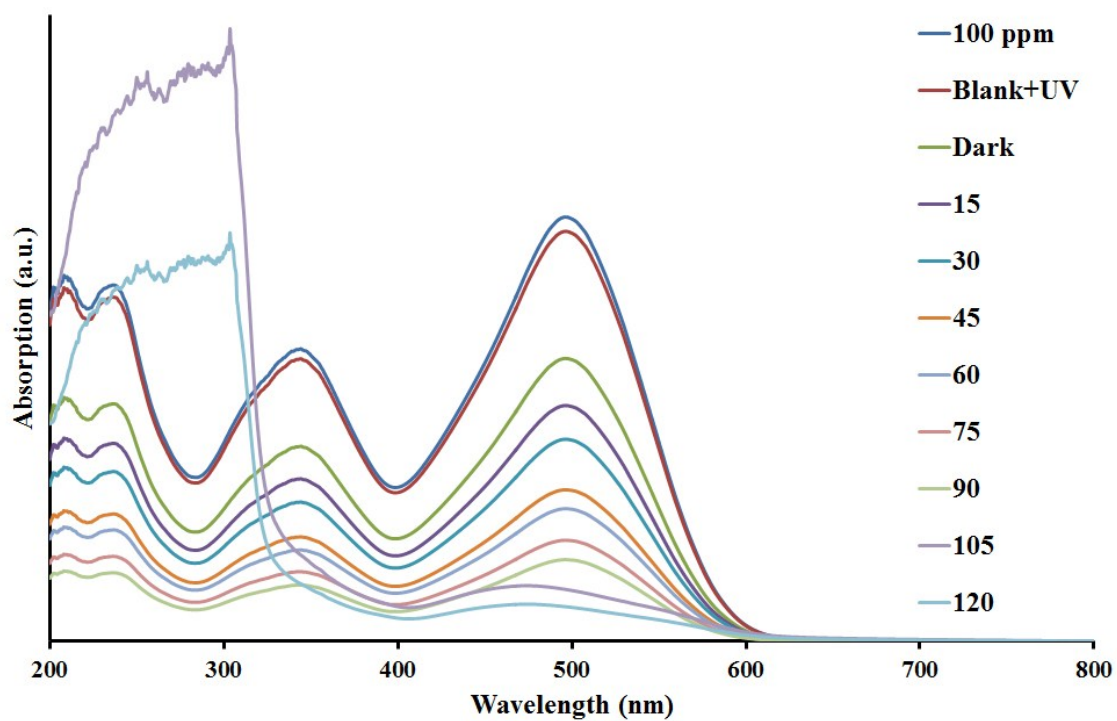


Fig. S9. Absorption spectra of a solution of 100 ppm CR in the presence of TMU-5 under UV light irradiation for 120 min.

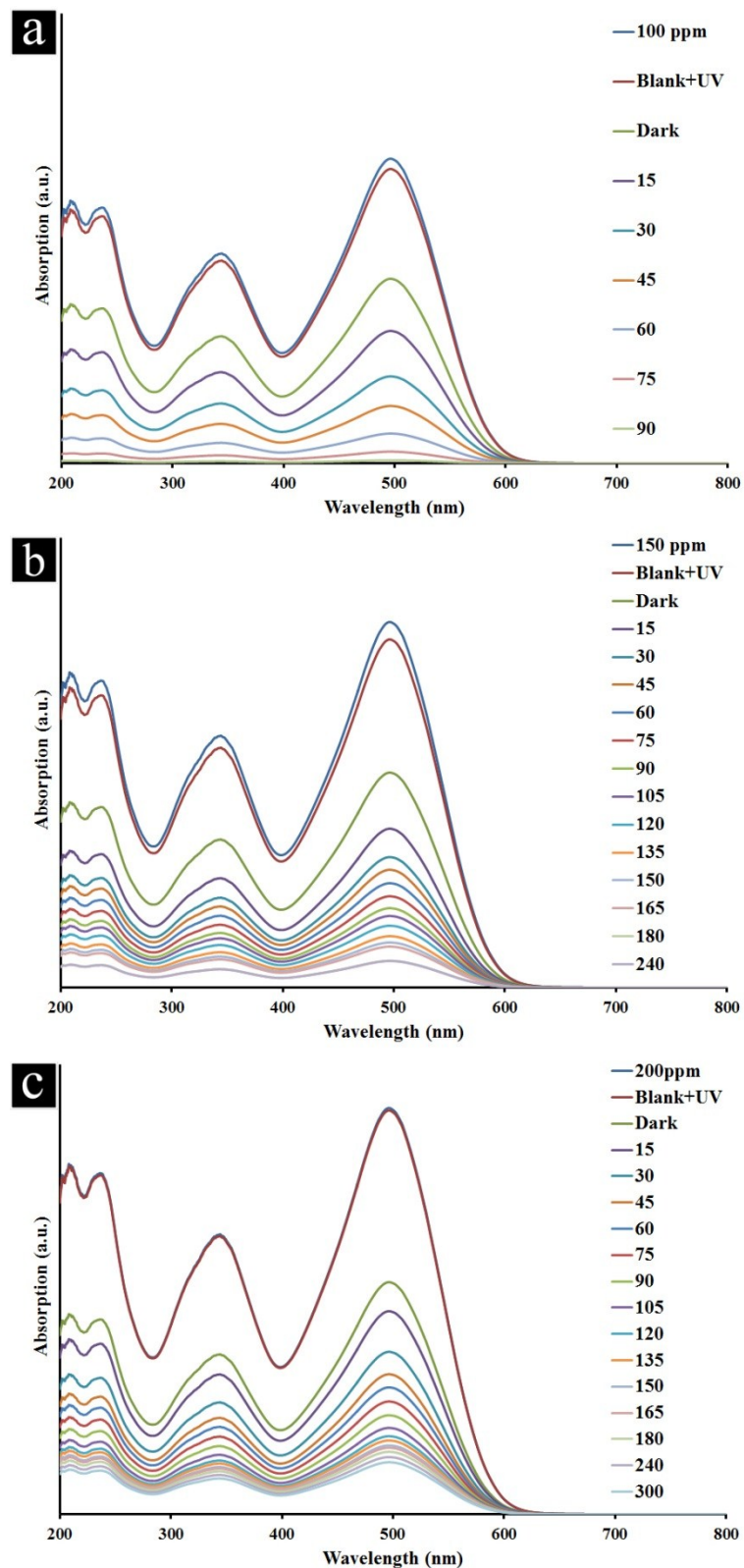


Fig. S10. Absorption spectra of a solution of CR with various concentrations in the presence of TMU-6 under UV-light irradiation. a) 100 ppm for 90 min, b) 150 ppm for 240 min and c) 200 ppm of CR for 300 min.

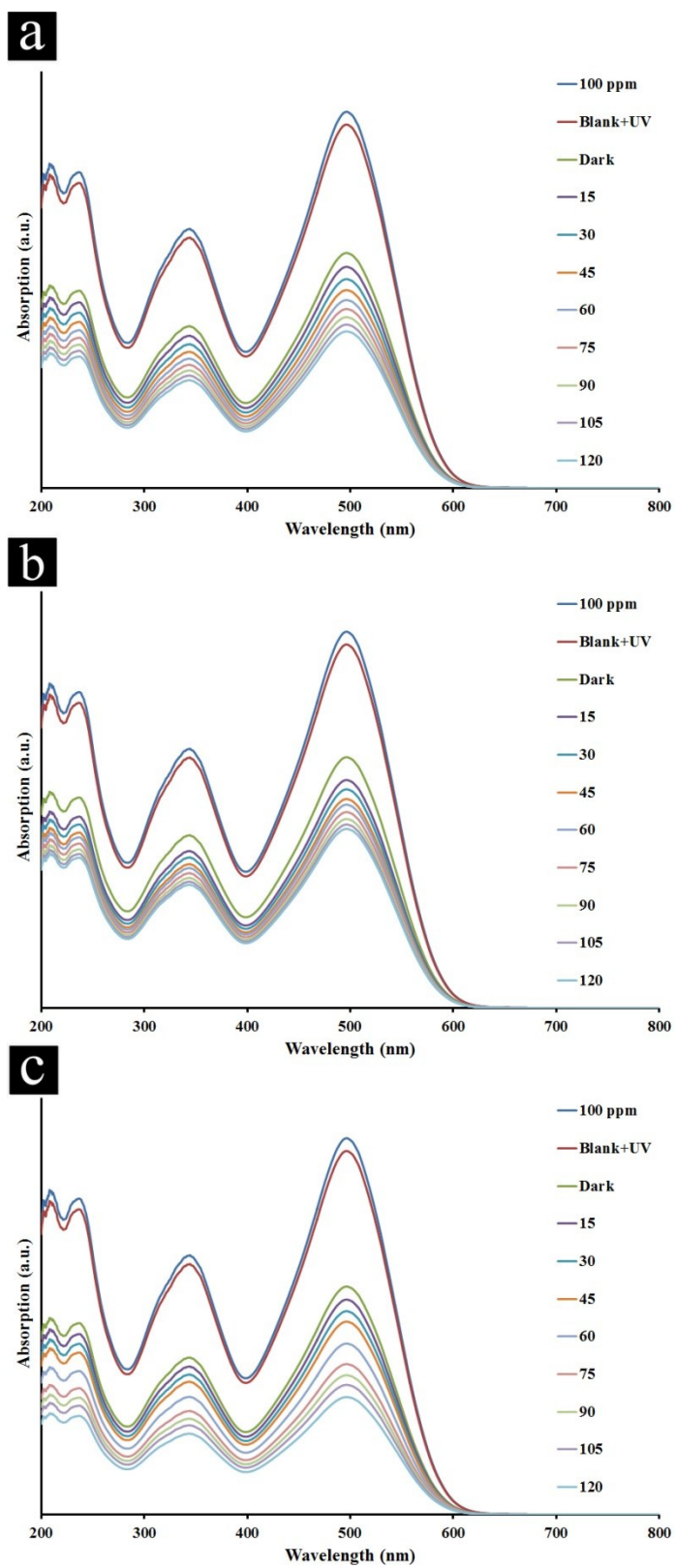


Fig. S11. Absorption spectra of a solution of 100 ppm CR in the presence of TMU-4, TMU-5 and TMU-6 under visible light irradiation for 120 min.

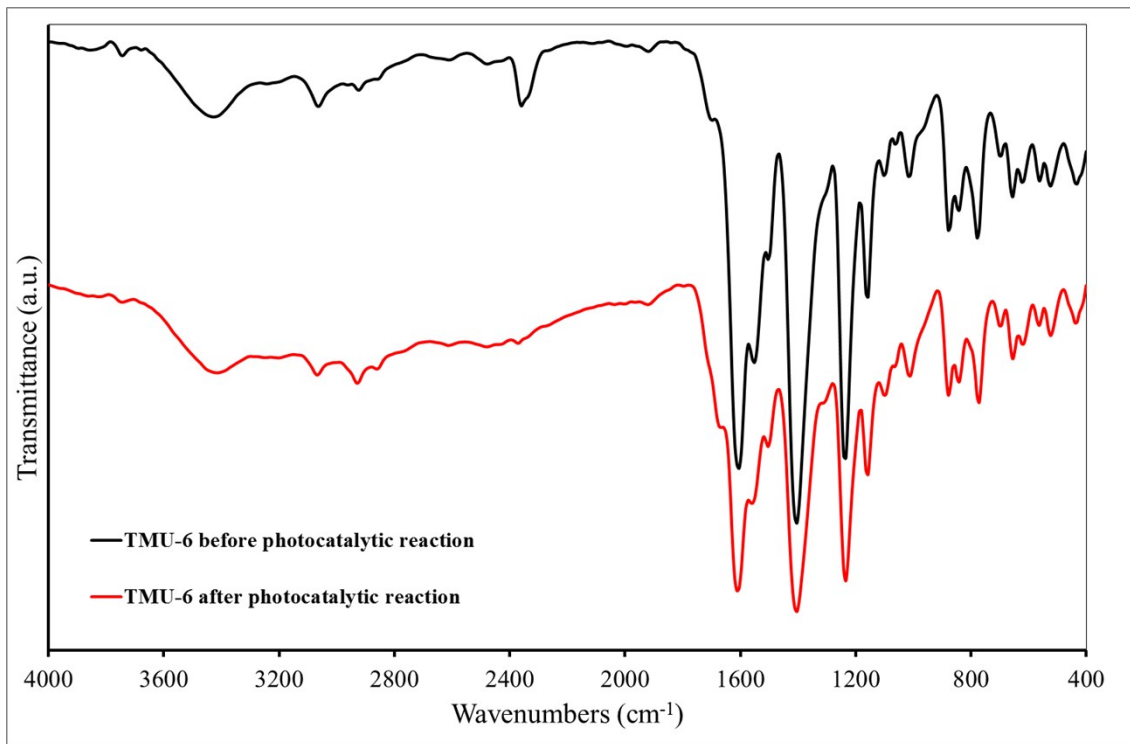


Fig. S12. IR spectra for TMU-6 before and after repeating the reaction for four cycles.