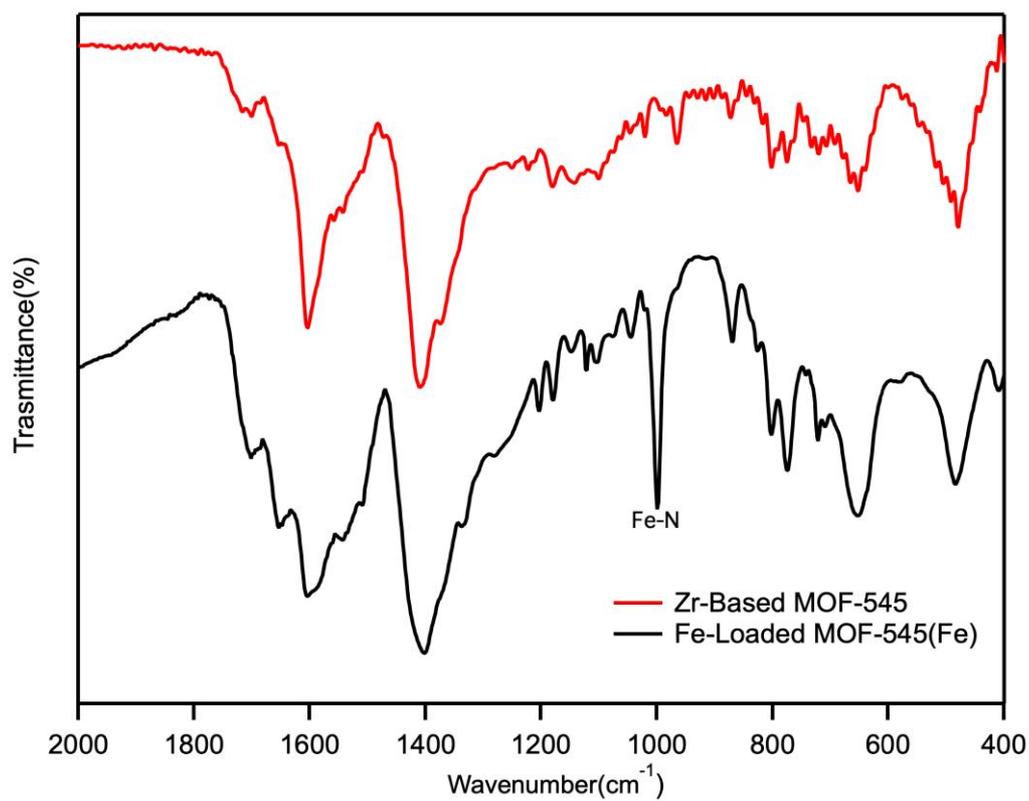
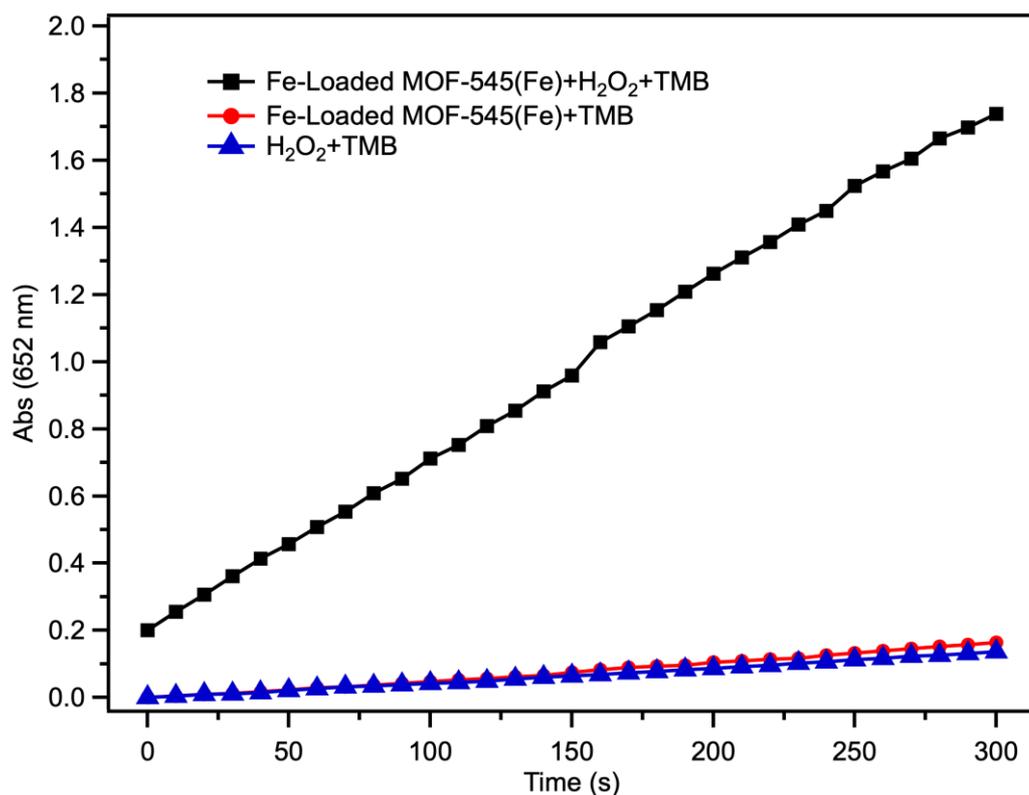


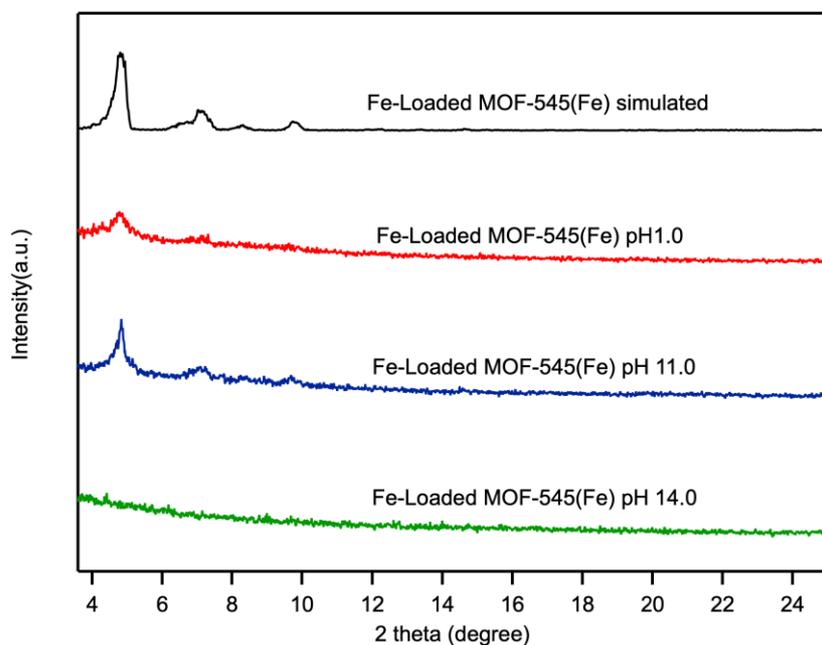
Supporting information



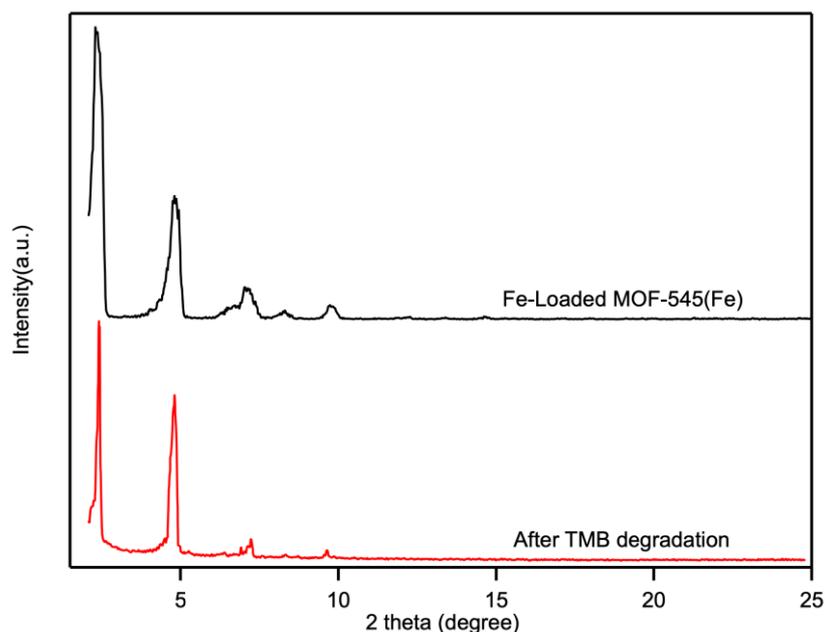
**Figure S1.** FT-IR spectra of Zr-Based MOF-545 (red) and Fe-Loaded MOF-545(Fe) (black line)



**Figure S2.** Testing the peroxidase-like activity of Fe-Loaded MOF-545(Fe)



**Figure S3.** X-ray diffraction (XRD) patterns of Fe-Loaded MOF-545(Fe) reaction at different pH. The simulated Fe-Loaded MOF-545(Fe) (black line), Fe-Loaded MOF-545 (Fe) at pH 1.0 (red), pH 11.0 (blue) and pH 14.0 (green), respectively.



**Figure S4.** X-ray diffraction (XRD) patterns of Fe-Loaded MOF-545(Fe) degrade TMB. The simulated Fe-Loaded MOF-545(Fe) (black line), the pattern of after TMB degradation (red).

**Table S1** Compare the peroxidase-like activity of Fe<sup>3+</sup>, TCPP-Fe and Zr-based MOF-545

	Fe <sup>3+</sup>	TCPP-Fe	Zr-based MOF-545	Fe-Loaded MOF-545(Fe)
H <sub>2</sub> O <sub>2</sub>	+	-	+	+
TMB	8.29%	0	6.85%	11.03%

### 2.1 The equilibrium calculation for adsorption amount and adsorption capacity of MO and MB

Define initial time, any time  $t$ , equilibrium absorbance value is  $A_0$ ,  $A_t$ ,  $A_e$ , respectively. Adsorption amount and adsorption capacity was obtained by the following equation:

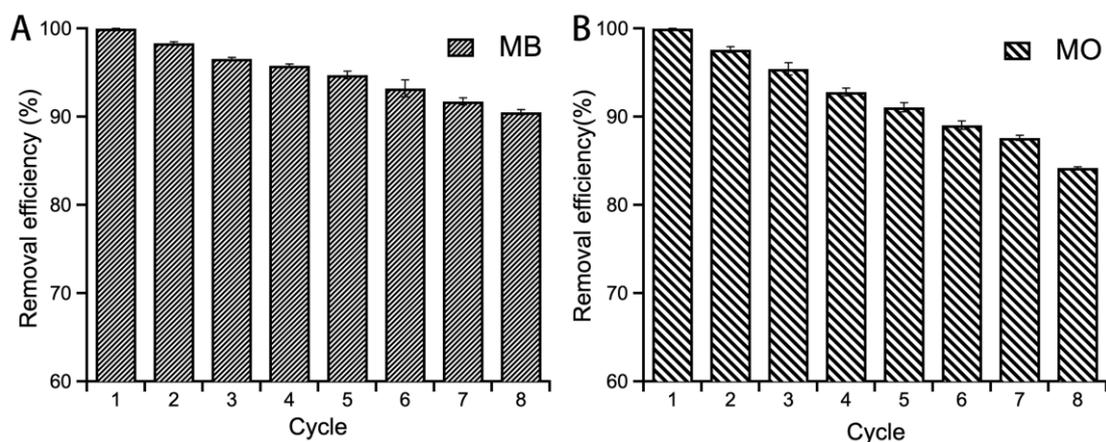
$$C_t = \frac{A_t}{A_0} \times C_0 \quad (1)$$

$$C_e = \frac{A_e}{A_0} \times C_0 \quad (2)$$

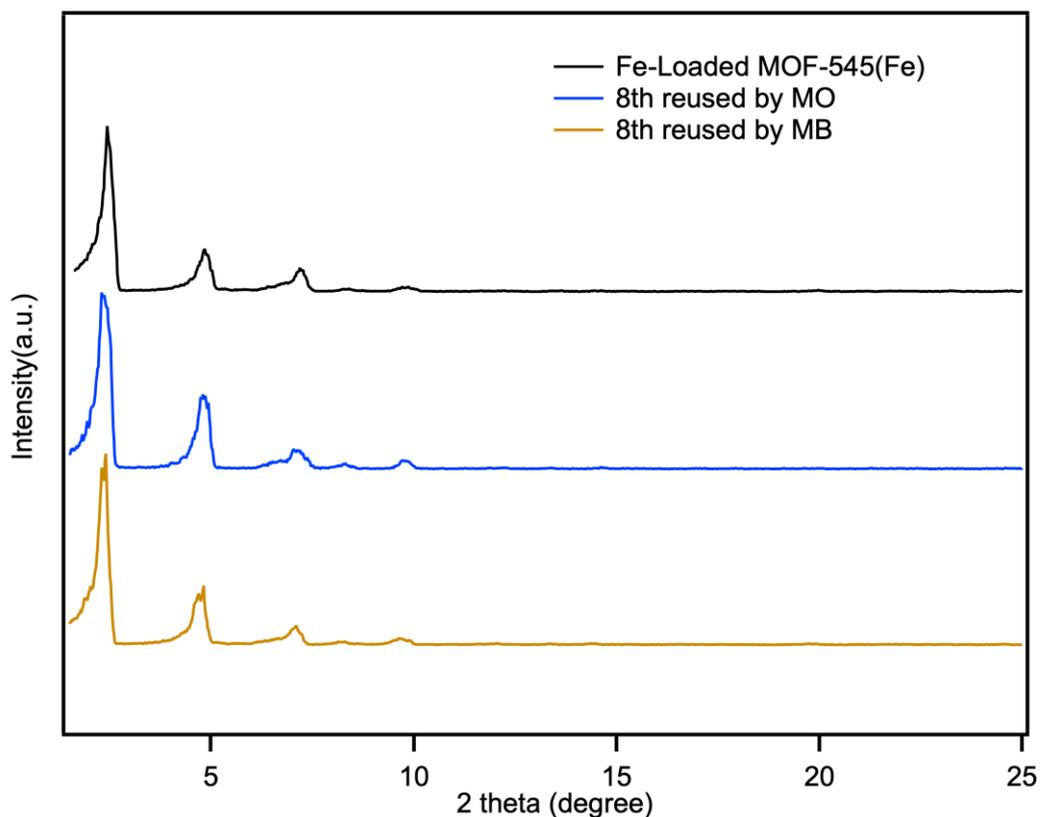
$$q_t = \frac{C_0 - C_t}{m} \times V \quad (3)$$

$$q_e = \frac{C_0 - C_e}{m} \times V \quad (4)$$

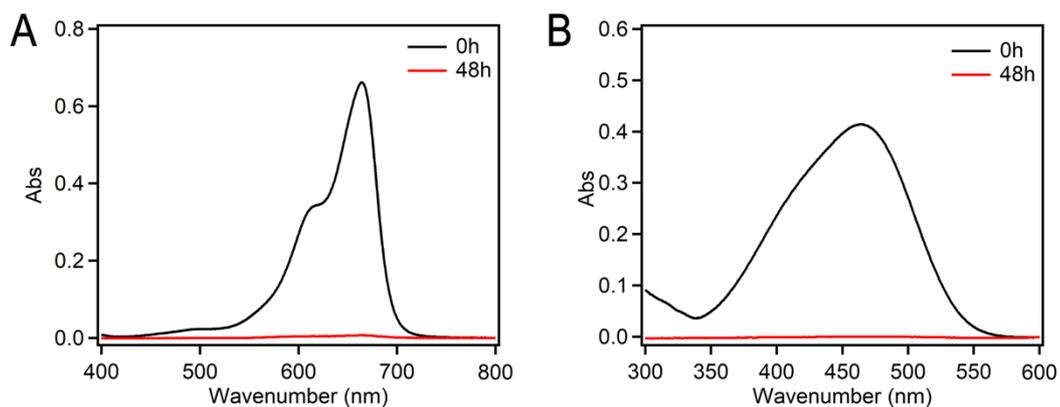
In Equation (1)(2),  $C_0$ ,  $C_t$  and  $C_e$  (mg·L<sup>-1</sup>) were represent the dyes concentrations at initial time, any time  $t$  and equilibrium time in the solution, respectively. In Equation (3)(4),  $q_t$  (mg·g<sup>-1</sup>) is measured adsorption amount of MOF-545(Fe) at time  $t$ ,  $q_e$  (mg·g<sup>-1</sup>) was adsorption capacity when adsorption equilibrium is reached.  $V$  (L) was the volume of the dye solution and  $m$  (g) was the mass of MOF-545(Fe).  $C_0$  was determined prior to the adsorption by measuring the amount of added dye.



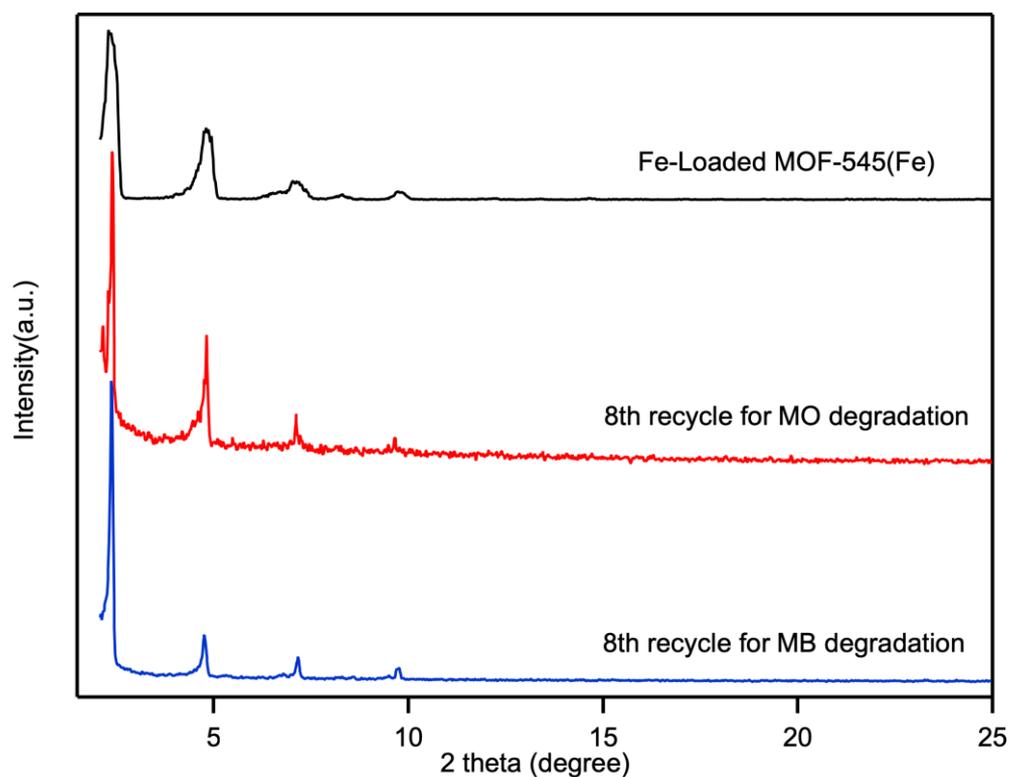
**Figure S5.** Repeatability test of Fe-Loaded MOF-545(Fe) for removal of MB and MO. The maximum capacity of MB (A) and MO (B) is defined as 100% of the first cycle.



**Figure S6.** X-ray diffraction (XRD) patterns of Fe-Loaded MOF-545(Fe) for removal of MB and MO reused 8 times with adsorption. The standard Fe-Loaded MOF-545(Fe) (black line), remove MO 8 times of Fe-Loaded MOF-545(Fe) (blue) and remove MB (yellow) 8 times of Fe-Loaded MOF-545(Fe).



**Figure S7.** The experiment of Fe-Loaded MOF-545(Fe) remove MB(A) and MO(B) by degradation. (A) The spectra of MB for degradation 48h. (B) The spectra of MO for degradation 48h.



**Figure S8.** X-ray diffraction (XRD) patterns of Fe-Loaded MOF-545(Fe) for removal of MB and MO reused 8 times by degradation. The simulated Fe-Loaded MOF-545(Fe) (black line), remove MO 8 times of Fe-Loaded MOF-545(Fe) (red line) and remove MB (blue line) 8 times of Fe-Loaded MOF-545(Fe).