Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Highly efficient colorimetric detection of cancer cells utilizing Fe-MIL-101 with intrinsic peroxidase-like catalytic activity over broad pH range

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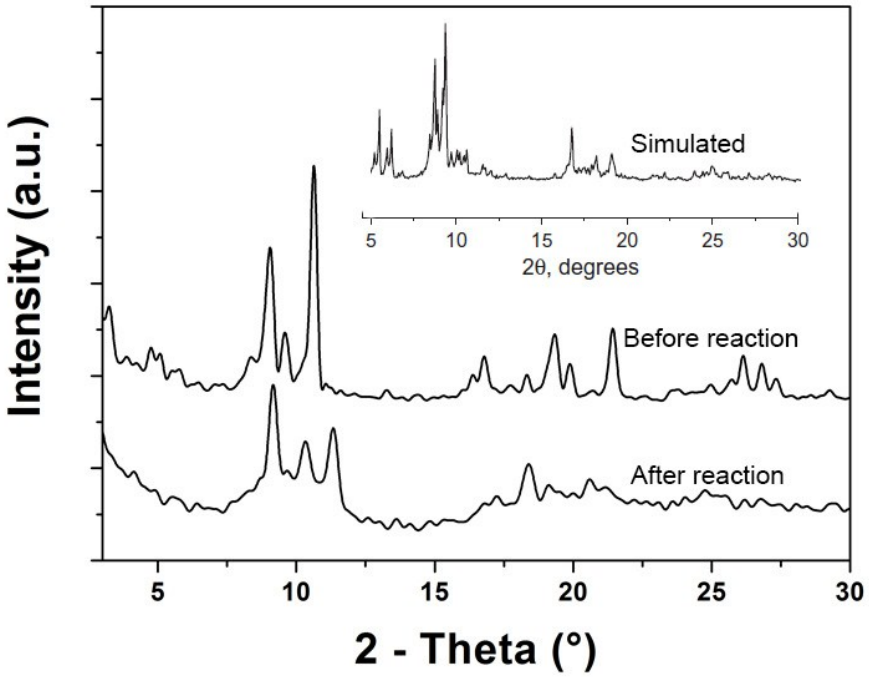

Fig.S1 Powder XRD patterns of Fe-MIL-101 before and after reacted with TMB and H_2O_2 solution at pH 4.0.

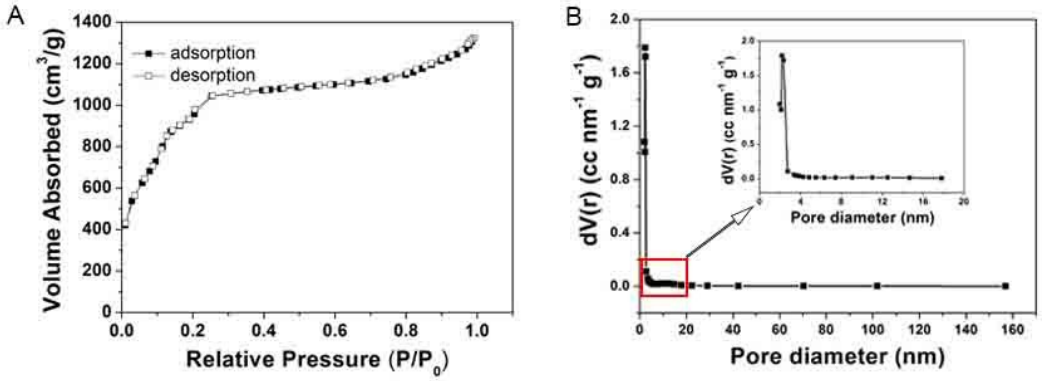

Fig.S2 (A) N_2 adsorption/desorption isotherm of Fe-MIL-101. (B) The BJH pore-size distribution, inset: the pore size distribution of Fe-MIL-101 at the range at 2-20 nm.

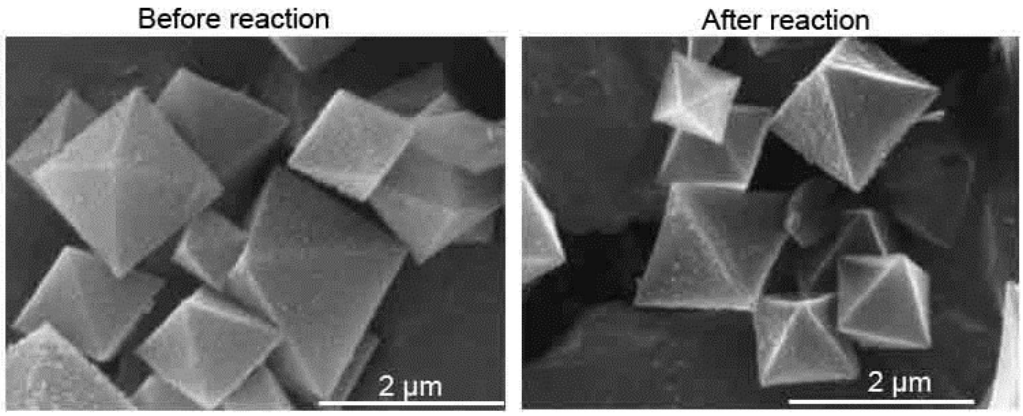

Fig.S3 SEM of Fe-MIL-101 before and after reacted with TMB and H_2O_2 solution at pH 4.0.

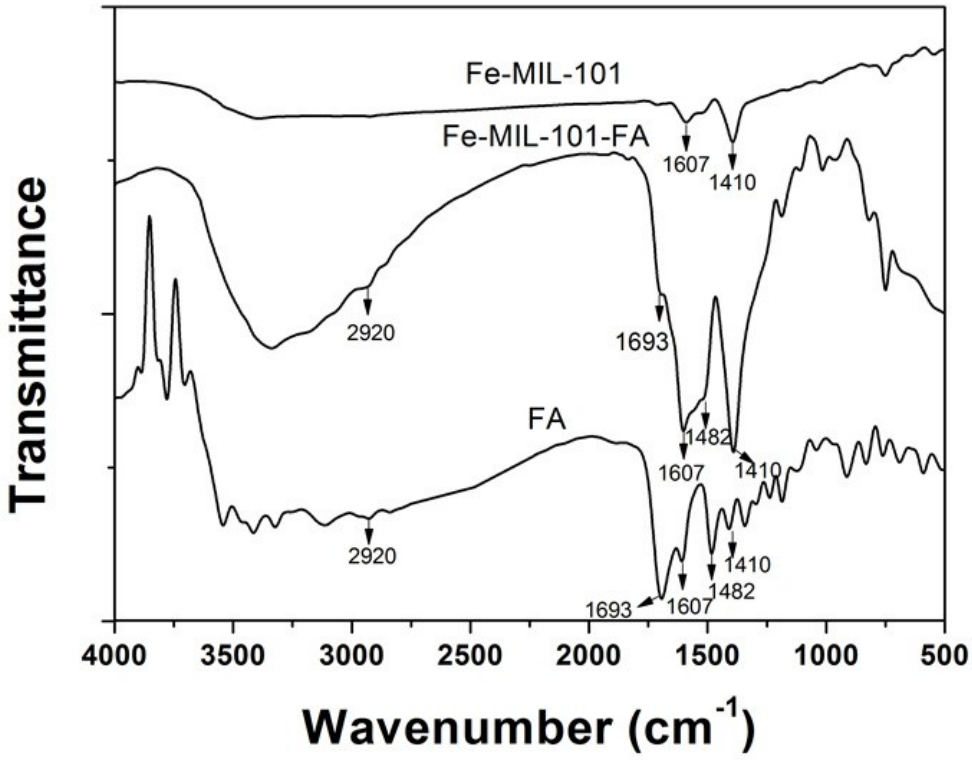

Fig.S4 FT-IR spectra of Fe-MIL-101, Fe-MIL-101-FA and FA.

Table S1 The size and zeta potential of Fe-MIL-101and Fe-MIL-101-FA in PBS and in DMEM cell culture medium +10%FBS.

Materials	Size (nm)	Zeta potential (mV)	
		PBS	DMEM+10%FBS
Fe-MIL-101	1368 ± 70	□22.4 ± 1.1	□0.071 ± 0.01
Fe-MIL-101-FA	1620 ± 18	□17.6 ± 0.7	0.154 ± 0.03

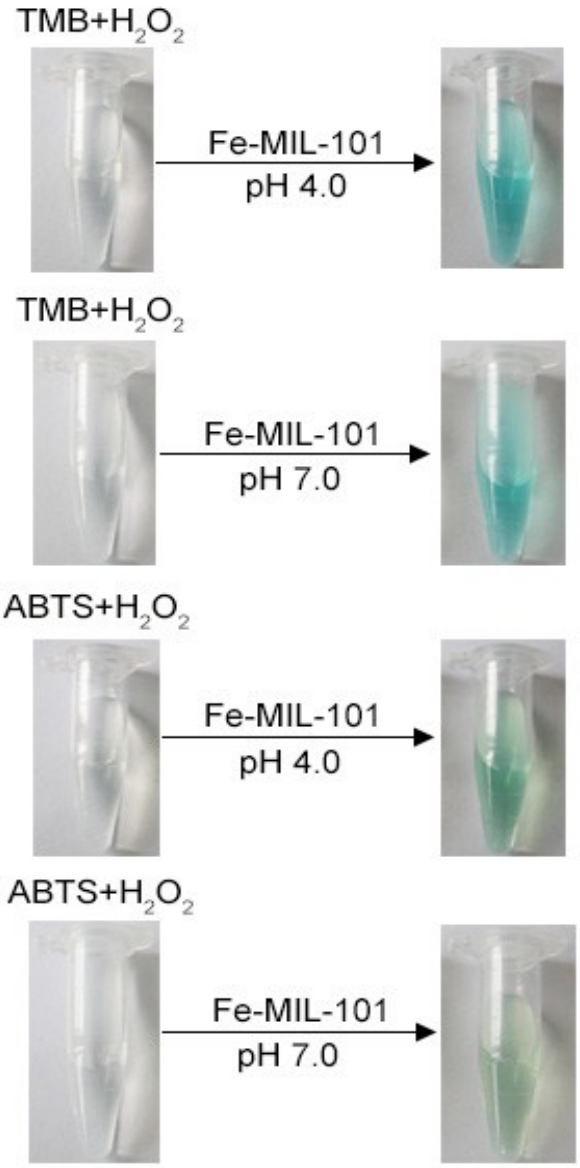

Fig.S5 Typical photographs of oxidation of TMB and ABTS by H_2O_2 catalyzed by Fe-MIL-101in acetate buffer (pH 4.0) and borate (pH 7.0) solution.

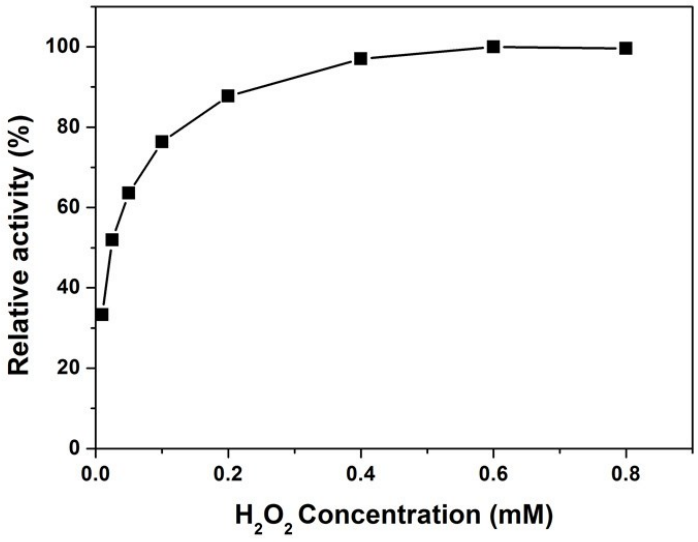

Fig.S6 The effect of H_2O_2 concentration on the peroxidase-like activity of Fe-MIL-101. Experiments were carried out using 20 μg mL^{-1} Fe-MIL-101in 5 mL buffer with 0.2 mM TMB as a substrate and the reaction time was 5 min.

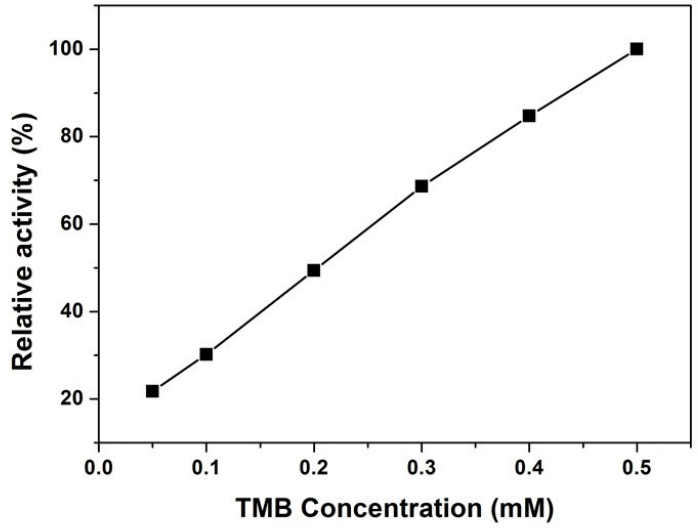

Fig.S7 The effect of TMB concentration on the peroxidase-like activity of Fe-MIL-101. Experiments were carried out using 20 μg mL^{-1} Fe-MIL-101 in 5 mL buffer with 0.4 mM H_2O_2 as a substrate and the reaction time was 5 min.

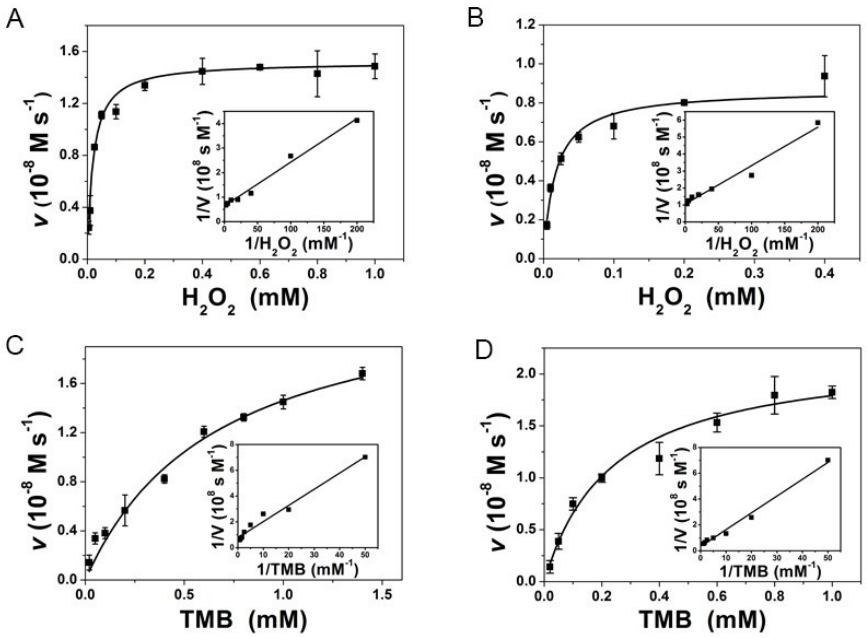

Fig.S8 Steady-state kinetic assays of the Fe-MIL-101-FA. (A, C) The concentration of TMB was 0.2 mM and the H_2O_2 concentration was varied in acetate buffer at pH 4.0 (A) and borate buffer at pH 7.0 (C); inset: double-reciprocal plots of activity of Fe-MIL-101-FA. (B, D) The concentration of H_2O_2 was 0.2 mM and the TMB concentration was varied in acetate buffer at pH 4.0 (B) and borate buffer at pH 7.0 (D), inset: double-reciprocal plots of activity of Fe-MIL-101-FA. Error bars shown represent the standard error derived from three repeated measurements.

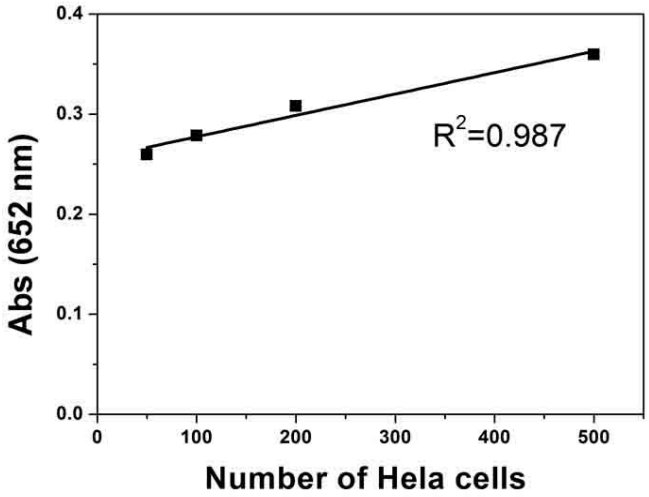

Fig.S9 The relationship between the numbers of Hela cells and the absorbance intensity at 652 nm generated from the colorimetric assay using FA-conjugated Fe-MIL-101.

Table S2 Comparison of the kinetic parameters of different nanomaterials that mimic peroxidase at pH 4.0.

Catalysts	Substrates	K_m(mM)	V_{max} (M s^{-1})	Ref.
Fe NPs	TMB	0.38	$2.38\times10\text{-}^{7}$	1
Fe NPs	H_2O_2	0.32	4.1×10^{-7}	1
Co NPs	TMB	5.09	9.98×10^{-8}	1
Co NPs	H_2O_2	1.14	1.72×10^{-8}	1
Fe0.5Co0.5 NPs	TMB	1.79	4.56×10^{-7}	1
Fe0.5Co0.5 NPs	H_2O_2	0.06	1.32×10^{-7}	1
5-Fe-MSN	TMB	0.122	3.31×10-7	2
5-Fe-MSN	H_2O_2	6.67	3.26×10^{-7}	2
FeS	TMB	0.13	/	3
FeS	H_2O_2	7.2	/	3
$ZnFe_2O_4$ MNPs	TMB	0.85	1.33×10^{-8}	4
$ZnFe_2O_4$ MNPs	H_2O_2	1.66	7.74×10^{-8}	4
BSA-Au	TMB	0.00253	6.23×10^{-8}	5
BSA-Au	H_2O_2	25.3	7.21×10^{-8}	5
$CuInS_2$	H_2O_2	2.01	9.78×10^{-8}	6
RET2-Pt2.9	TMB	0.056	5.82×10^{-7}	7
RET2-Pt2.9	H_2O_2	48.0	5.68×10^{-7}	7
Au@Pt0.17	TMB	0.0095	1.02×10^{-7}	8
Au@Pt0.25	TMB	0.027	1.81×10^{-7}	8
WS_2 nanosheets	TMB	1.83	4.31×10^{-8}	9
WS_2 nanosheets	H_2O_2	0.24	4.52×10^{-8}	9
GO-COOH	TMB	0.024	3.45×10^{-8}	10
GO-COOH	H_2O_2	3.9	3.85×10^{-8}	10
GO_MNP-10	TMB	0.144	1.62×10^{-7}	11
PBMNPs	TMB	0.307	1.06×10^{-6}	12
PBMNPs	H_2O_2	323.6	1.17×10^{-6}	12

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