Electronic Supplementary Information

Iron-substituted SBA-15 microparticles: A peroxidase-like catalyst for H_2O_2 detection

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Reaction equation for oxidation of TMB by H_2O_2 in the presence of Fe-SBA-15:

Fe^{3+}-SBA-15 + $H_2O_2 \rightarrow Fe^{3+}$-SBA-15-$H_2O_2\cdot \rightarrow Fe^{2+}$-SBA-15 + $HO_2\cdot$

Fe^{2+}-SBA-15 + $H_2O_2 \rightarrow Fe^{3+}$-SBA-15 + $HO\cdot$

$HO\cdot$ + TMB$\rightarrow$oxTMB+ H_2O

$HO_2\cdot$ + TMB$\rightarrow$oxTMB + H_2O

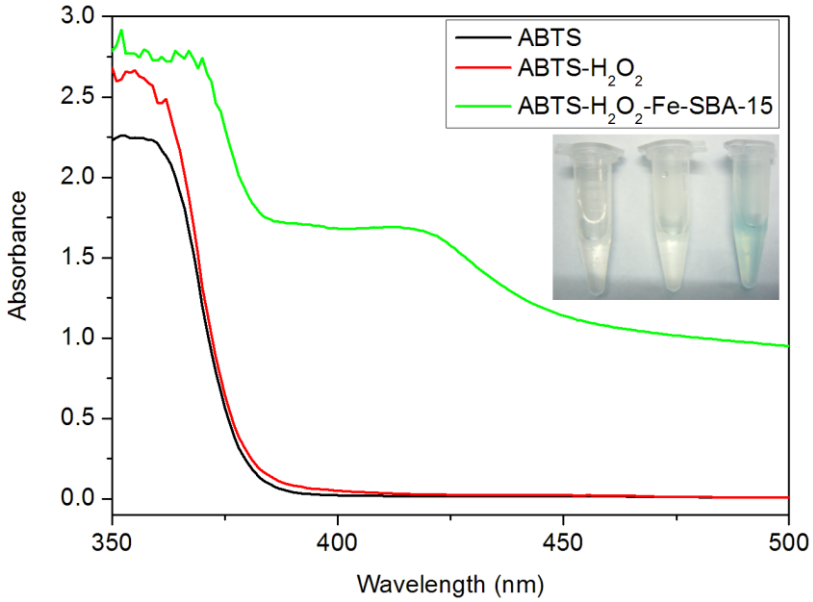

Fig. S1 UV-vis spectra of ABTS solution (black line), ABTS-H_2O_2 (red line), and ABTS-H_2O_2-Fe-SBA-15 (green line) in pH 4.0 acetate buffer. Inset: Photographs of ABTS solution, ABTS-H_2O_2, and ABTS-H_2O_2-Fe-SBA-15 (from left to right), (ABTS, 0.1 mM; H_2O_2, 44 mM; Fe-SBA-15, 1 mg/mL).

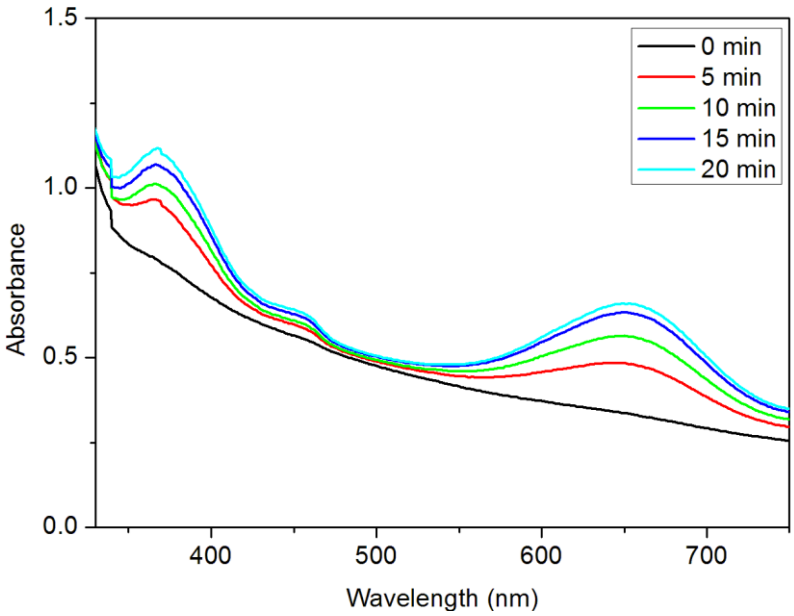

Fig. S2 Time-dependent UV-vis spectra of TMB-H_2O_2-Fe-SBA-15 solution at 30ºC.

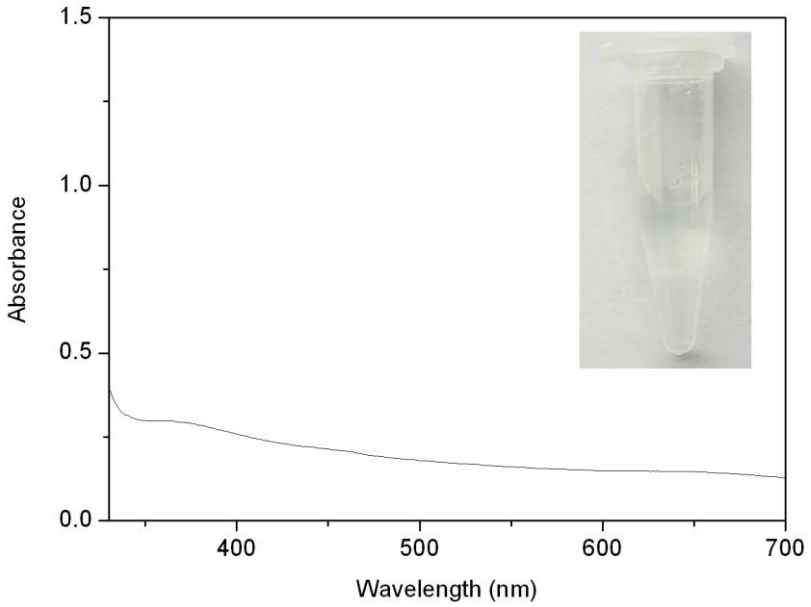

Fig. S3 UV-vis spectra of TMB solution in the presence of 5 μL of H_2O_2 and 100 μL of SBA-15 dispersion. Inset: photograph of 0.1 mM TMB solution by adding 5 μL of H_2O_2 and 100 μL of SBA-15 dispersion.

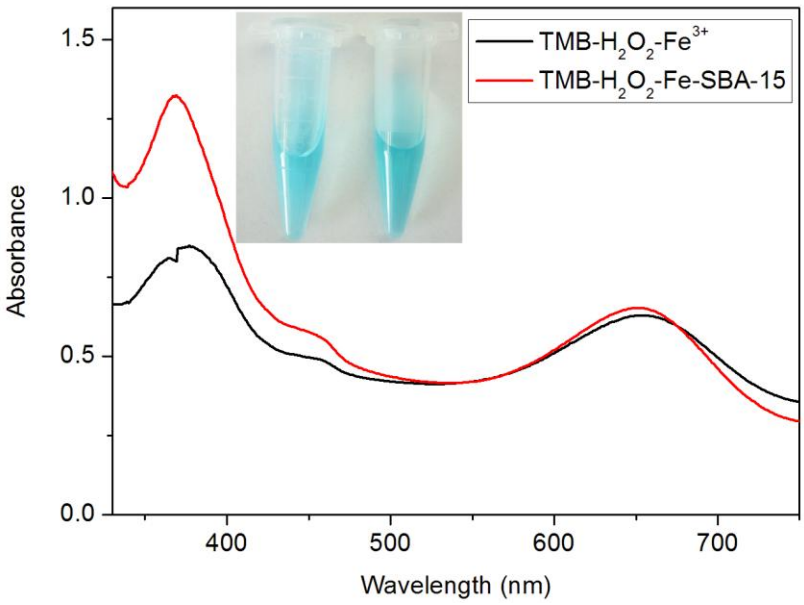

Fig. S4 UV-vis spectra of TMB-H_2O_2-Fe^{3+} solution (black line), and TMB-H_2O_2-Fe-SBA-15 (red line) in pH 4.0 acetate buffer. Inset: Photographs of TMB-H_2O_2-Fe^{3+} solution (left), and TMB-H_2O_2-Fe-SBA-15 (right), (TMB, 0.1 mM; H_2O_2, 44 mM; Fe-SBA-15, 1 mg/mL; Fe^{3+}: 47.6 μM).

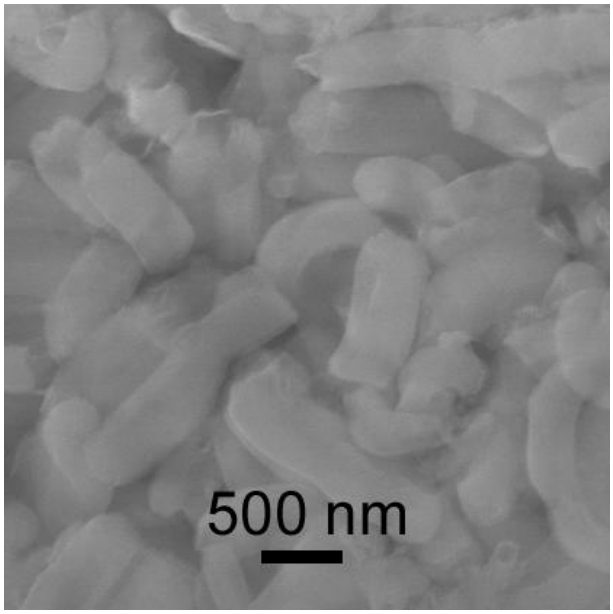

Fig. S5 The SEM image of Fe-SBA-15 microparticles after addition of TMB solution.

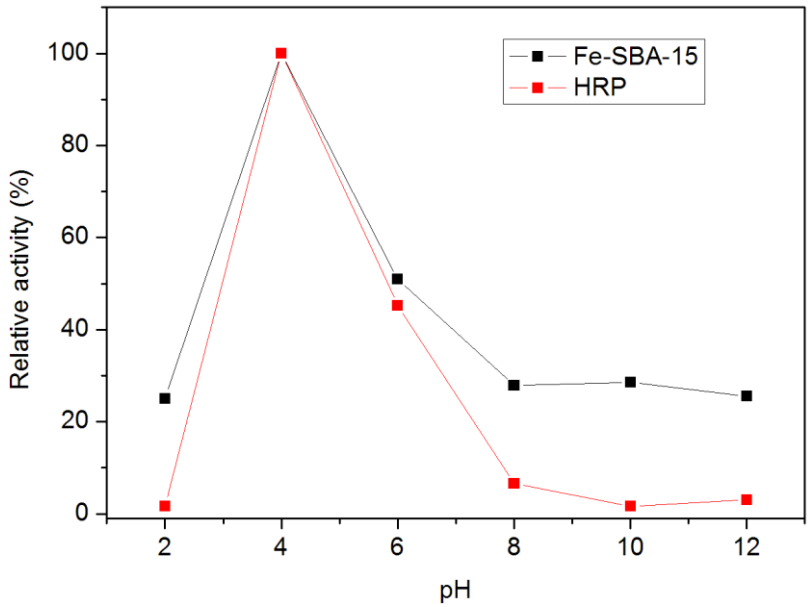

Fig. S6 The effect of pH value on the catalytic activity of Fe-SBA-15 microparticles and HRP.

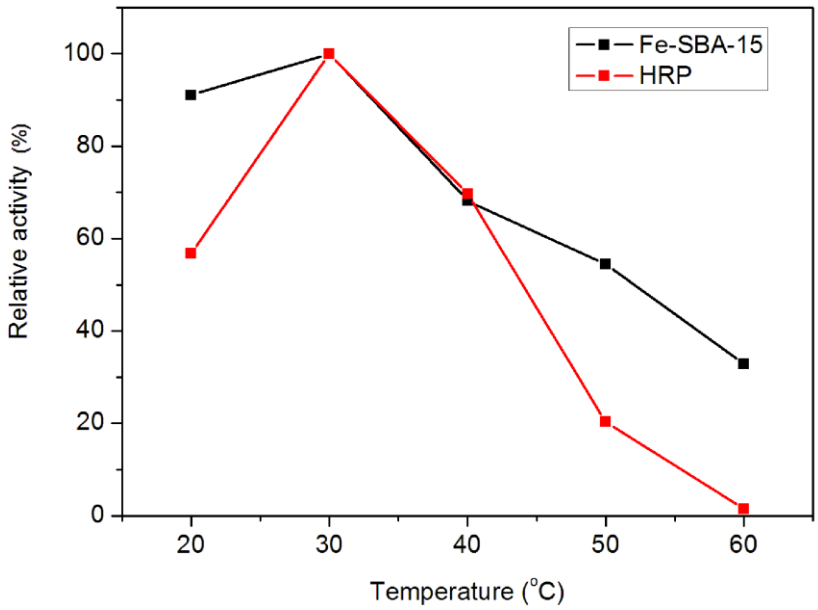

Fig. S7 The effect of temperature on the catalytic activity of Fe-SBA-15 microparticles and HRP.

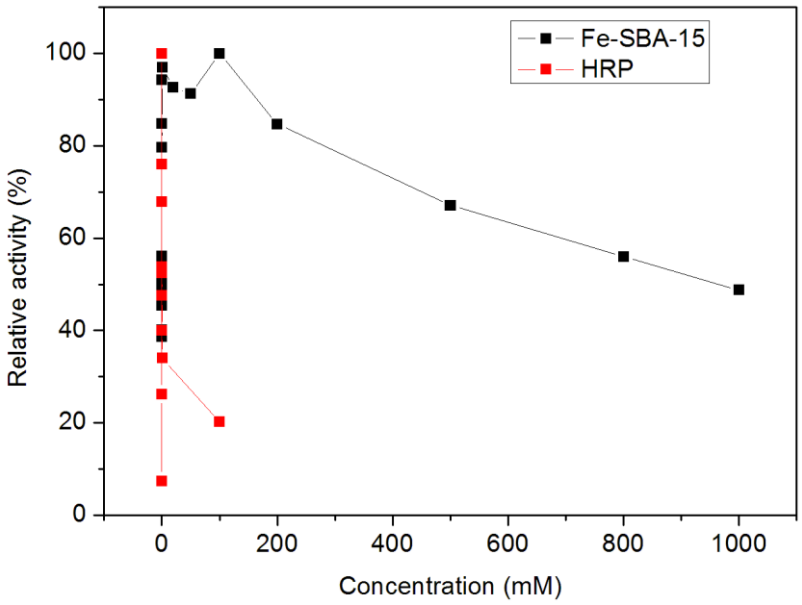

Fig. S8 The effect of H_2O_2 concentration on the catalytic activity of Fe-SBA-15 microparticles and HRP.