Electronic Supplementary Information

Iron-substituted SBA-15 microparticles: A peroxidase-like catalyst for H$_2$O$_2$ detection

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Reaction equation for oxidation of TMB by H$_2$O$_2$ in the presence of Fe-SBA-15:

Fe$^{3+}$-SBA-15 + H$_2$O$_2$→Fe$^{3+}$-SBA-15-H$_2$O$_2$·→Fe$^{2+}$-SBA-15 + HO$_2$·

Fe$^{2+}$-SBA-15 + H$_2$O$_2$→Fe$^{3+}$-SBA-15 + HO·

HO· + TMB→oxTMB+ H$_2$O

HO$_2$· + TMB→oxTMB + H$_2$O
**Fig. S1** UV-vis spectra of ABTS solution (black line), ABTS-H$_2$O$_2$ (red line), and ABTS-H$_2$O$_2$-Fe-SBA-15 (green line) in pH 4.0 acetate buffer. Inset: Photographs of ABTS solution, ABTS-H$_2$O$_2$, and ABTS-H$_2$O$_2$-Fe-SBA-15 (from left to right), (ABTS, 0.1 mM; H$_2$O$_2$, 44 mM; Fe-SBA-15, 1 mg/mL).
**Fig. S2** Time-dependent UV-vis spectra of TMB-H$_2$O$_2$-Fe-SBA-15 solution at 30°C.
Fig. S3 UV-vis spectra of TMB solution in the presence of 5 μL of H₂O₂ and 100 μL of SBA-15 dispersion. Inset: photograph of 0.1 mM TMB solution by adding 5 μL of H₂O₂ and 100 μL of SBA-15 dispersion.
**Fig. S4** UV-vis spectra of TMB-H$_2$O$_2$-Fe$^{3+}$ solution (black line), and TMB-H$_2$O$_2$-Fe-SBA-15 (red line) in pH 4.0 acetate buffer. Inset: Photographs of TMB-H$_2$O$_2$-Fe$^{3+}$ solution (left), and TMB-H$_2$O$_2$-Fe-SBA-15 (right), (TMB, 0.1 mM; H$_2$O$_2$, 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$_2$O$_2$ concentration on the catalytic activity of Fe-SBA-15 microparticles and HRP.