Supporting information

Tailoring Cysteine Detection in Colorimetric Technique Using Co/Fe-Functionalized Mesoporous Silica Nanoparticles

M. Aghayan [a], A.Mahmoudi[a,*], M. Reza Sazegar [a], F. Adhami[b]

[a]Dept. of Chemistry, Faculty of science, Islamic Azad University, North Tehran Branch, Tehran, Iran
[b.]Dep. of chemistry, Faculty of science, Islamic Azad University, Yadegar-e-Imam Khomeini (RAH), Shahre rey Branch, Tehran, Iran.

* Corresponding Authors
E-mail: mahmoudiali.ac@gmail.com
Tel.: +98 9123377127
E-mail: m_r_sazegar@yahoo.com
Tel.: +98 9120335814

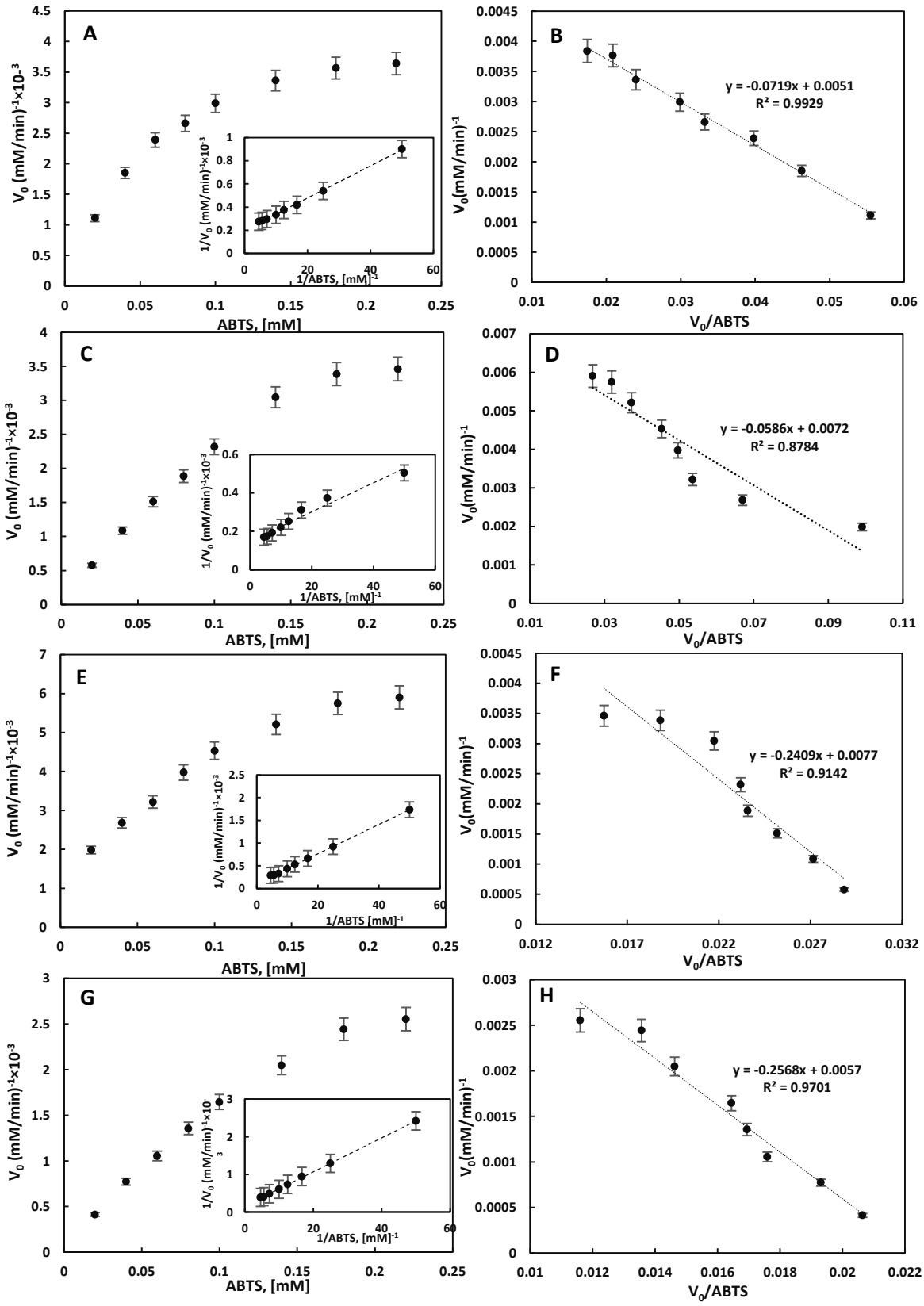

Fig. S1 Steady-state kinetic analyses using Michaelis–Menten model, Eadie-Hofstee and Lineweaver–Burk model (insets) for Fe-MSN (A, B), Co/Fe-MSN (1%) (C, D), Co/Fe-MSN (3%) (E, F), Co/Fe-MSN (5%) (G, H) for variation of ABTS concentration at constant H_2O_2 concentration (0.5 mM).

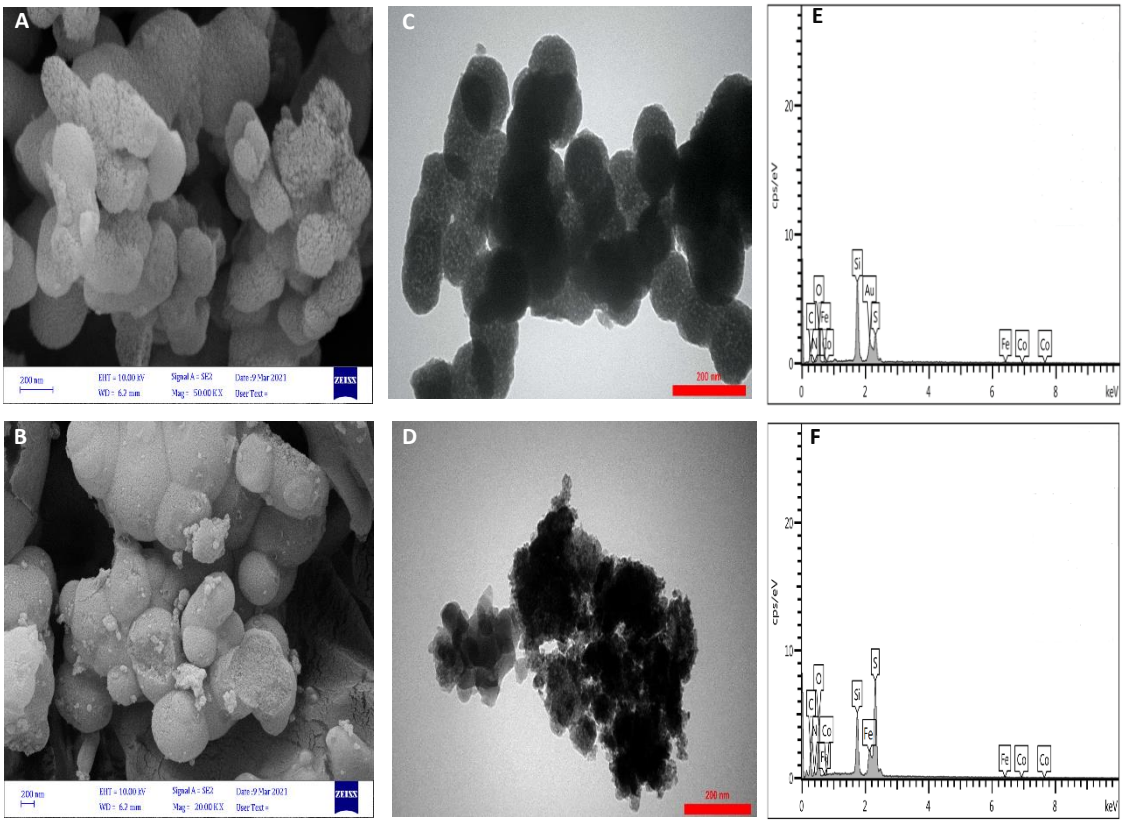

Fig. S2 TEM images of Co/Fe-MSN after incubated with Cys 500 nM

Table S1. Comparison of Si/Fe mole ratio dependent apparent Kinetic data for peroxidase-like activity.

Catalyst	k_m(mM)	V_{max}(mM.S^{-1})	k_{cat}(S^{-1})	K_{cat}/k_m($mM^{-1}.S^{-1}$)
Fe-MSN(10)	0.0719	8.5×10^{-5}	4.5×10^{-2}	6.2×10^{-1}
Fe-MSN(30)	0.0923	7×10^{-5}	2.8×10^{-2}	3×10^{-1}
Fe-MSN(50)	2.94	1.23×10^{-5}	8.6×10^{-3}	2.9×10^{-3}

Table S2. Comparative rate constants value for HRP and as-prepared catalysts.

Catalyst	$k_1(M^{-1}s^{-1})$	$K_3(M^{-1}s^{-1})$
HRP	5.37×10^{7}	3.03×10^{5}
Co/Fe-MSN (1%)	4.41×10^{3}	2.65×10^{2}
Co/Fe-MSN (3%)	2.53×10^{3}	1.13×10^{2}
Co/Fe-MSN (5%)	8.75×10^{3}	5.43×10^{2}
Fe-MSN	7.29×10^{2}	3.32×10^{1}

Table S3 Determination results of real samples with different concentrations of cys (n=6)

Samples	Added (μM)	Found (μM)	Recovery (%)	RSD(%)
1	5	4.91±0.092	98.2	1.17
	10	9.93±0.098	99.3	1.01
2	5	4.98±0.054	99.6	1.23
	10	9.91±0.078	99.1	0.88
3	5	4.93±0.064	98.6	1.42
	10	9.96±0.091	99.6	0.91

Table S4. Comparison of apparent Kinetic data of Co/Fe-MSN (1%) with or without cys for peroxidase-like activity.

Catalyst	**k_m(mM)**	**V_{max}(mM.S^{-1})**	**k_{cat}(S^{-1})**	**K_{cat}/k_m($mM^{-1}.S^{-1}$)**
Co/Fe-MSN(1%)	2.06×10^{-4}	0.0586	1.2×10^{-4}	5.3×10^{-1}
Co/Fe-MSN(1%) with 50 nM cys	1.36×10^{-1}	7.6×10^{-5}	2.8×10^{-5}	2×10^{-4}