Supplementary Material

Catalytic enrichment of plasma with hydroxyl radicals in aqueous phase at room temperature

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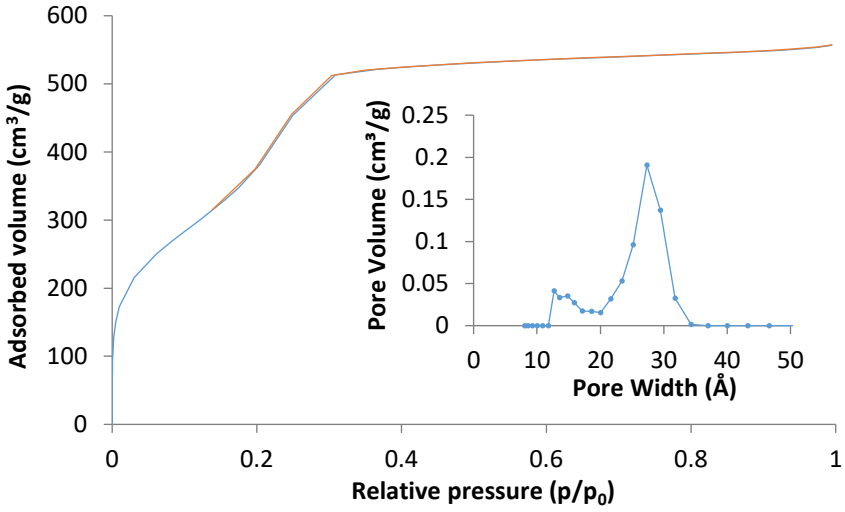


Figure S1: Nitrogen adsorption/desorption isotherms at 77 K of the synthesized MCM-48 material and (inset) DFT pore size distribution obtained from N_2 physisorption (adsorption)

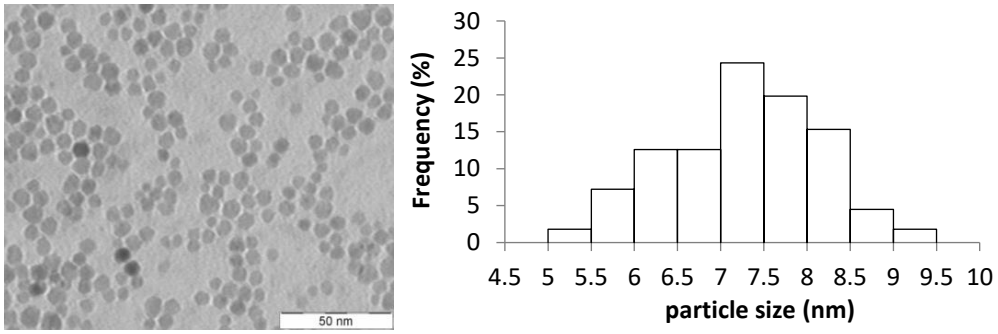


Figure S2: TEM image and size distribution of hydrophobic Fe_3O_4(o) nanoparticles

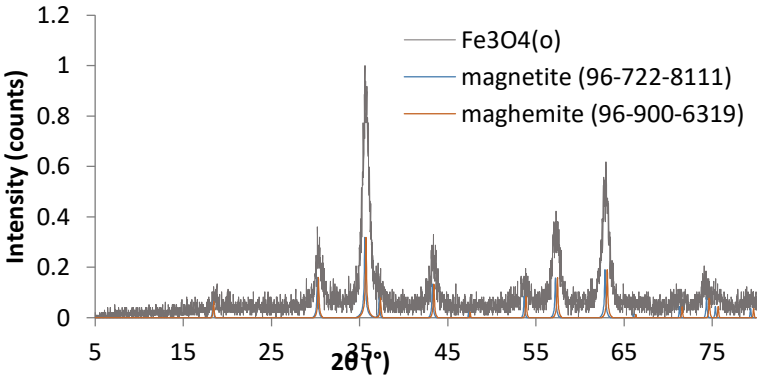


Figure S3: XRD diffractogram of hydrophobic Fe_3O_4(o) nanoparticles

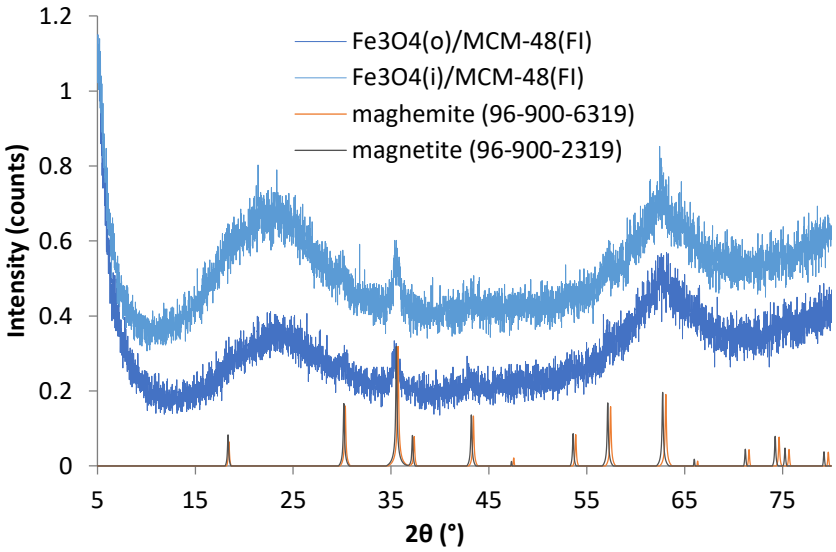


Figure S4: XRD patterns of the Fe_3O_4(o)/MCM-48(FI) and Fe_3O_4(i)/MCM-48(FI) catalysts prepared by ferrofluids impregnation (Bump at 63-64° due to the instrument) and reference data for maghemite and magnetite phases

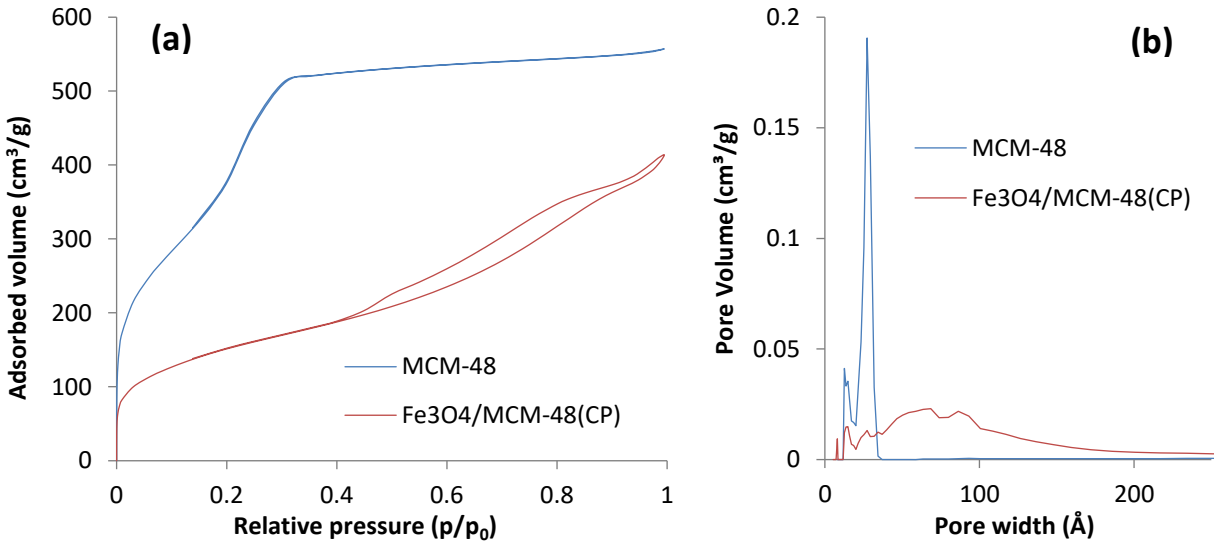


Figure S5: (a) Nitrogen physisorption isotherms at 77 K of the synthesized MCM-48 and the Fe_3O_4/MCM-48(CP) catalyst and (b) DFT pore size distribution obtained from N_2 physisorption (adsorption). Specific surface area: MCM-48 = 1440 m^2/g, Fe_3O_4/MCM-48(copre) = 555 m^2/g

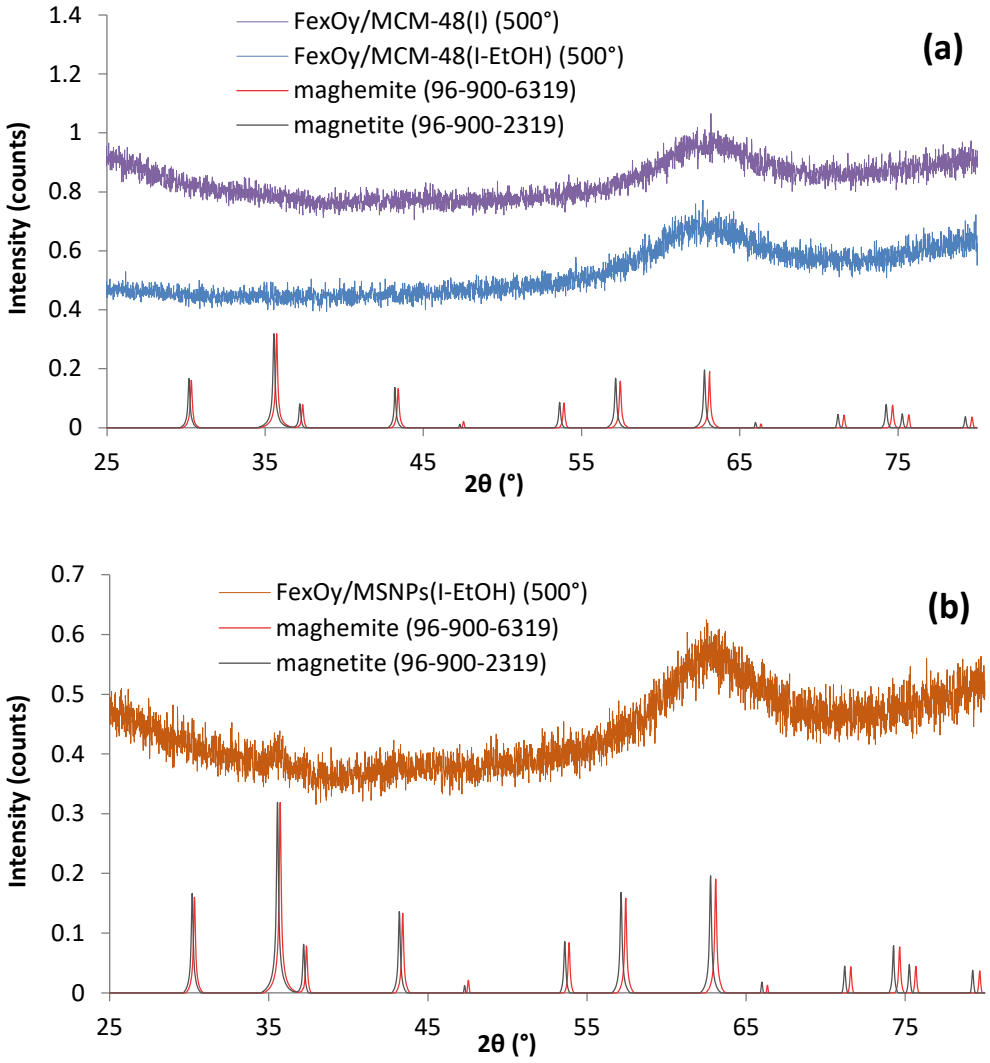


Figure S6: XRD patterns of (a) the Fe_xO_y/MCM-48(I) and Fe_xO_y/MCM-48(I-EtOH) catalysts and (b) the Fe_xO_y/MNPs(I-EtOH) catalyst obtained by dry impregnation and activated at 500 °C (Bump at 63-64° due to the instrument) and reference data for maghemite and magnetite phases

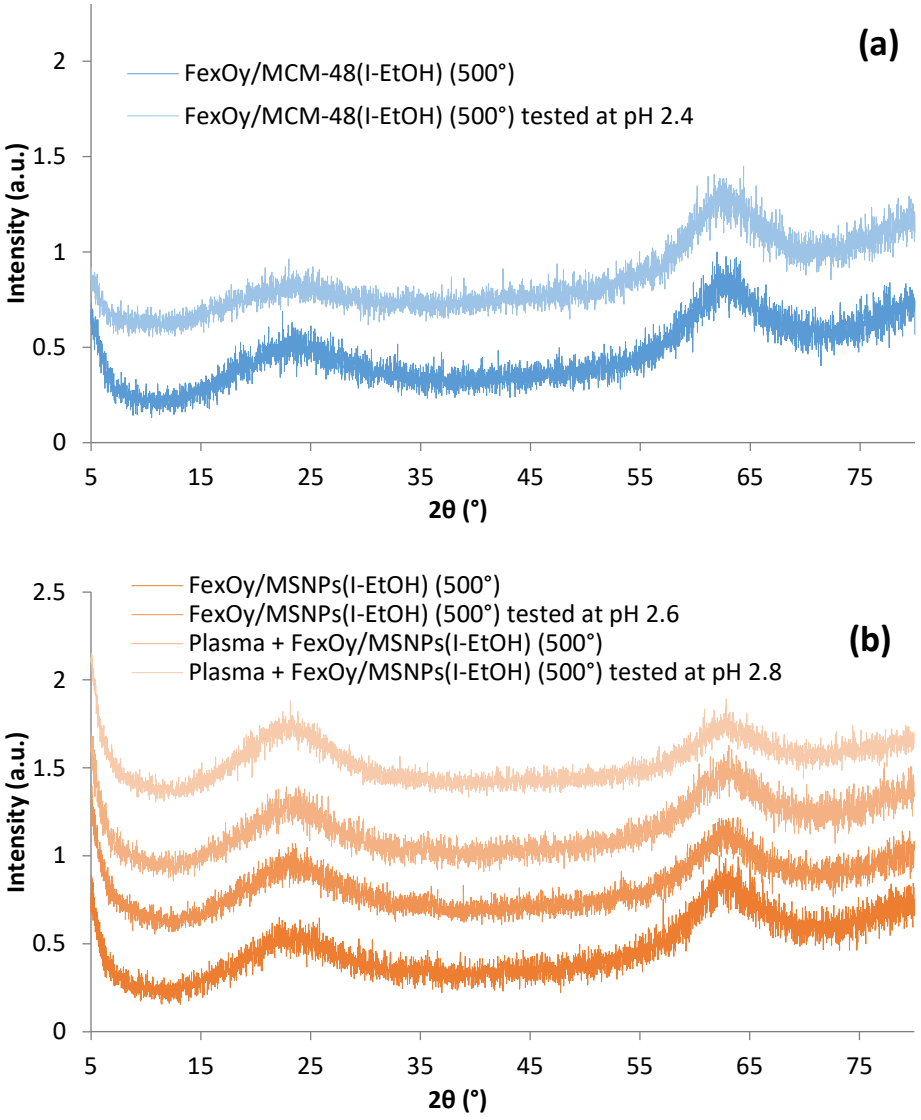


Figure S7: XRD patterns of (a) Fe_xO_y/MCM-48(I-EtOH) and (b) Fe_xO_y/MNPs(I-EtOH) catalysts after catalytic tests in milliQ water and acidic solution

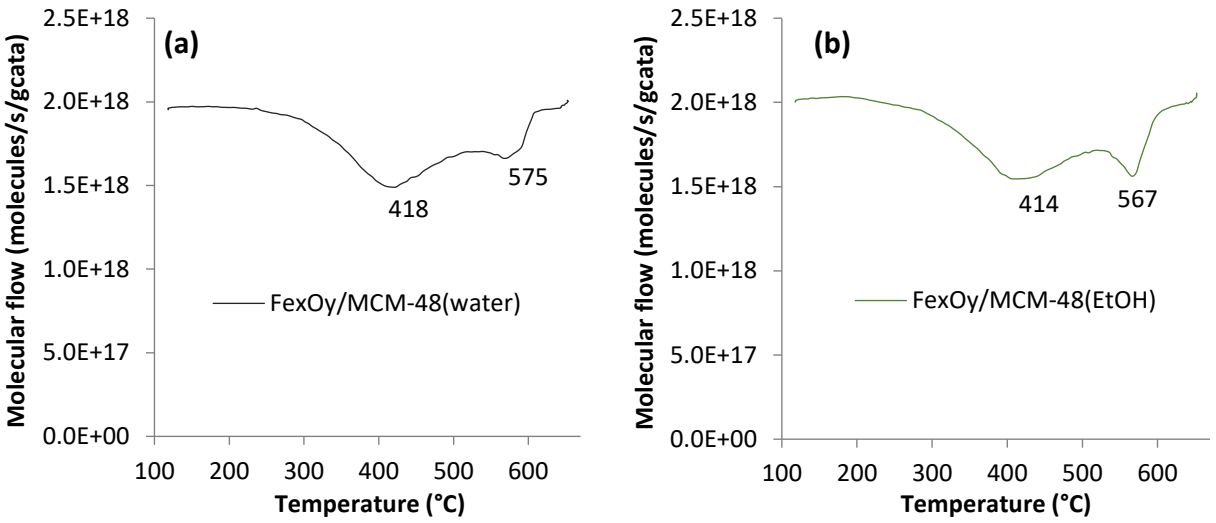


Figure S8: Temperature Programmed Reduction (TPR) profile of the catalyst Fe_xO_y/MCM-48(I) obtained by dry impregnation (a) in aqueous solution and (b) in ethanolic solution

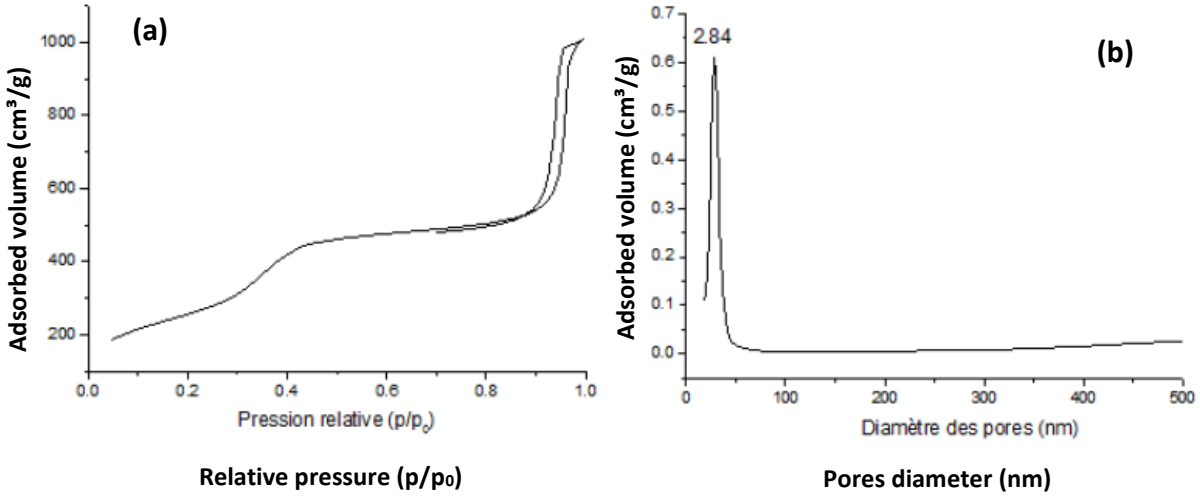


Figure S9: (a) Nitrogen adsorption/desorption isotherms at 77 K of the synthesized MSNPs material and (b) pore size distribution (desorption)

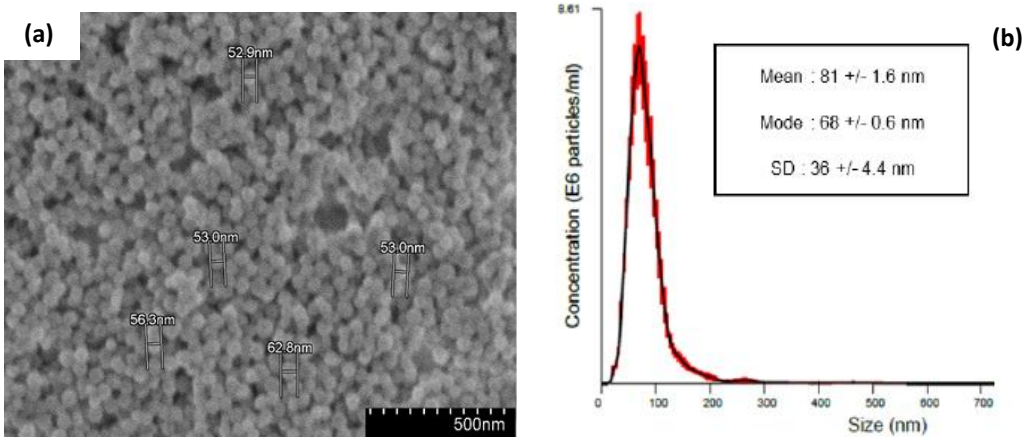


Figure S2: (A) SEM image of the MSNPs and (B) hydrodynamic diameter of MSNPs particles in milliQ water by NTA (a no significant peak is observed at 250 nm, possibly resulting from an impurity in the analyzed solution)

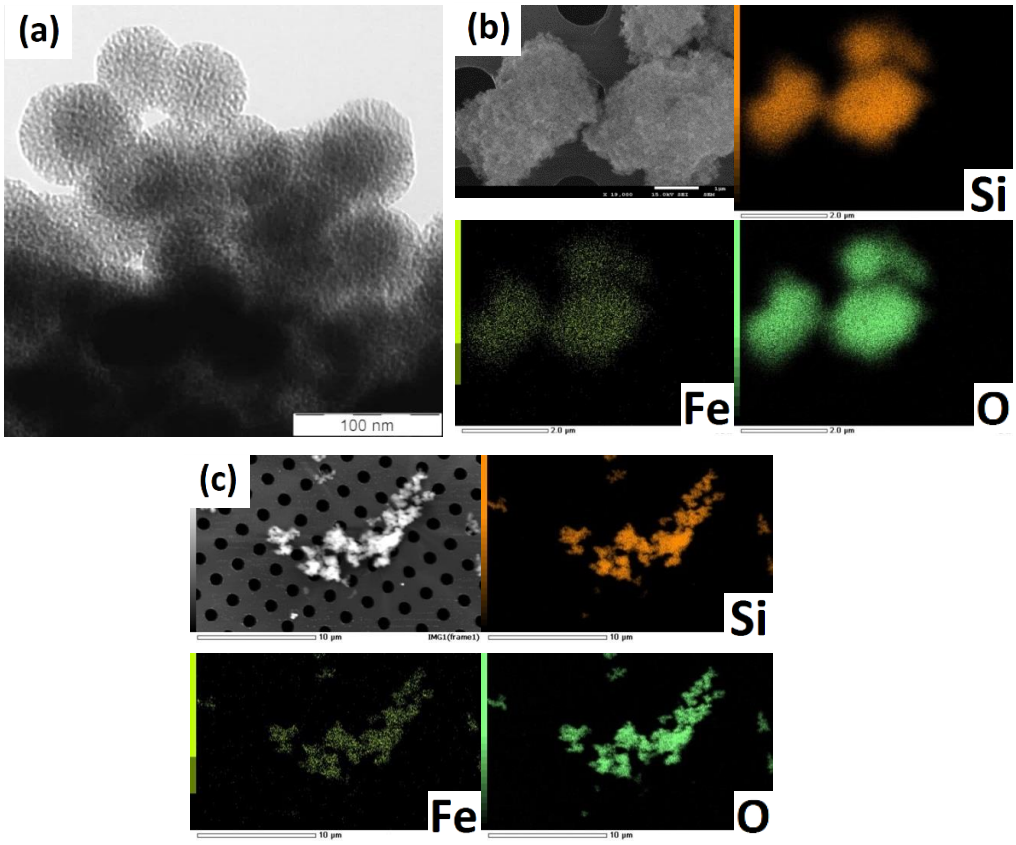


Figure S3: (a) TEM image and (b) SEM-EDX mapping of Si, Fe, O components in Fe_xO_y/MSNPs(I-EtOH) sample and (c) in Fe_xO_y/MCM-48(I-EtOH) sample

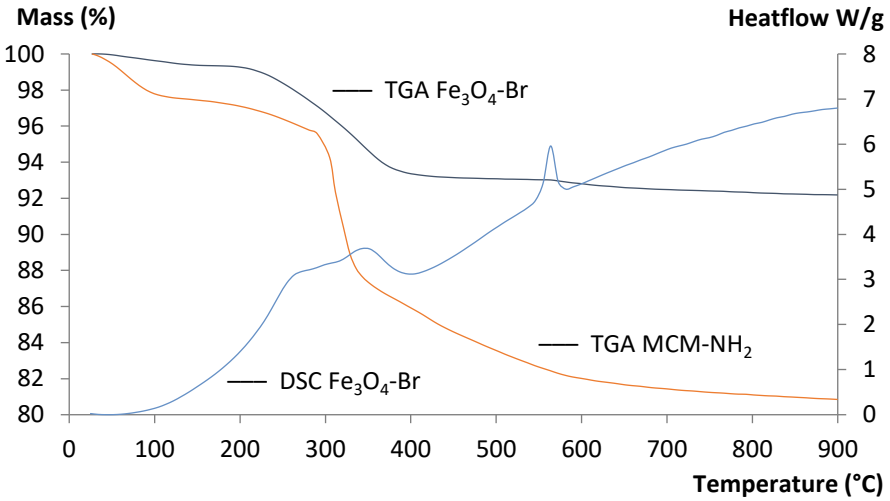


Figure S4: TGA in air and DSC characterization of the surface modified Fe_3O_4-Br NPs and surface modified MCM-48 samples

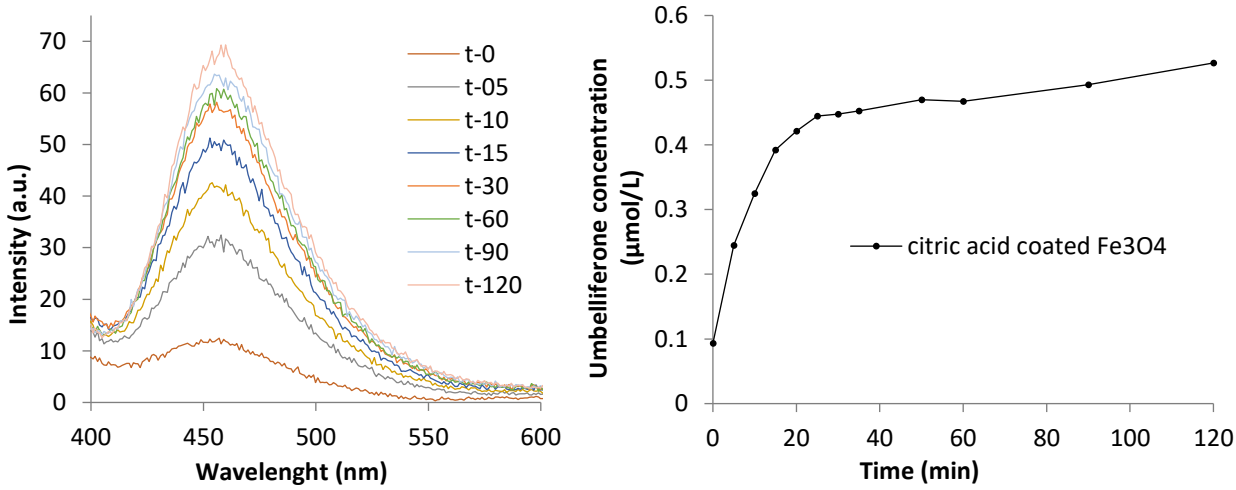
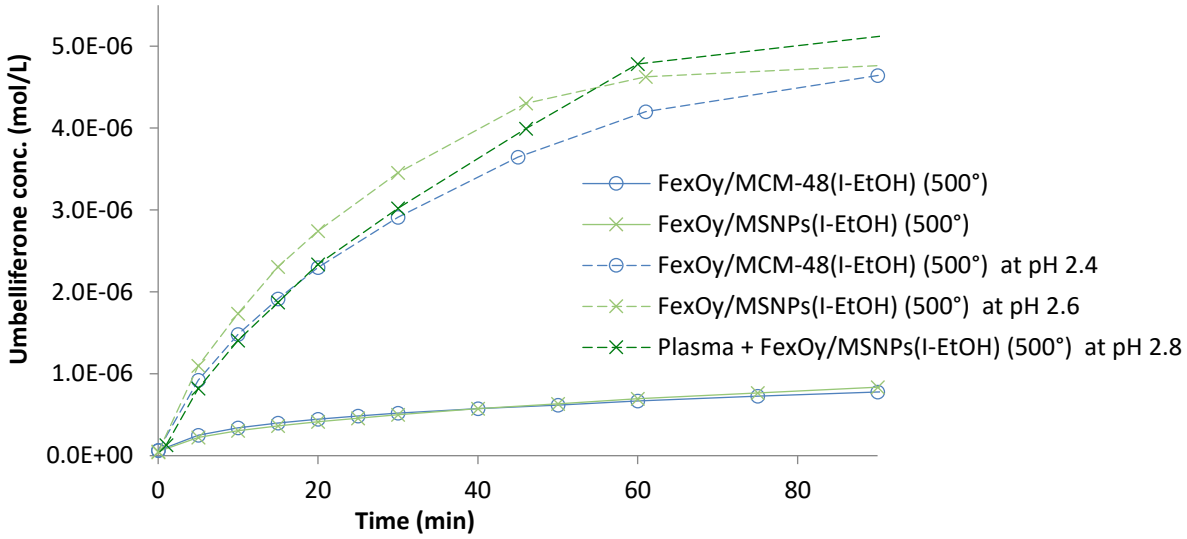


Figure S5: Fluorescence intensity at various reaction times for the catalytic production of HO• radicals with the hydrophilic Fe_3O_4(i) nanoparticles (unsupported)



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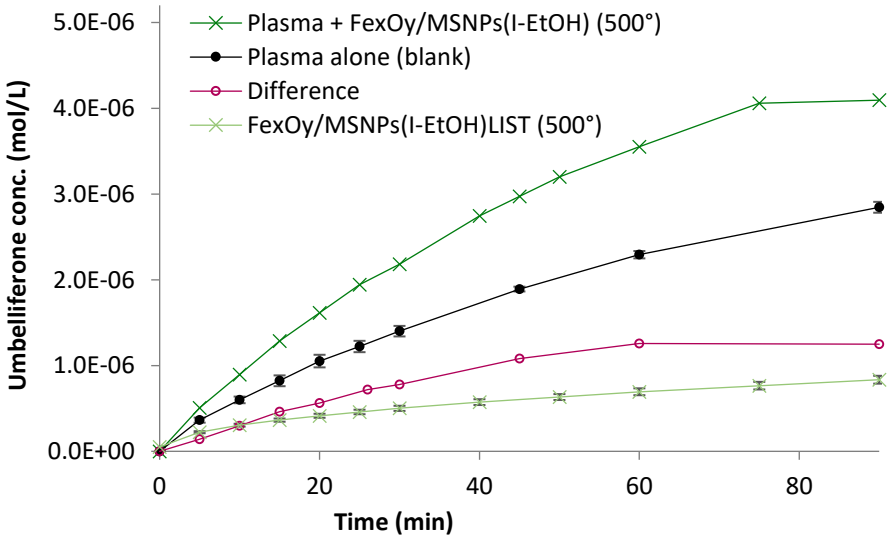

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Table S3: Iron leaching values during catalytic tests, measured by ICP analysis of the solutions

Catalysts	Without Plasma		With Plasma irradiation	
	Iron leaching	% tot iron	Iron leaching	% tot iron
Fe_xO_y/MCM-48(EtOH)	10 ppb	>0.1 %	8.79 ppm	15 %
Fe_xO_y/MSNPs	50 ppb	0.2 %	6.19 ppm	11 %
Fe_xO_y/MCM-48(EtOH) at pH 2.4	3.29 ppm	13.2 %	n.d.	n.d.
Fe_xO_y/MSNPs at pH 2.6	5.74 ppm	23.0 %	44.66 ppm	78 %

Table S4: XPS results (at.%) for the Fe_xO_y/MCM-48(I-EtOH) and Fe_xO_y/MNPs(I-EtOH) catalysts after catalytic test in milliQ water or acidic solution

	Fe_xO_y/MCM-48(I-EtOH) after test	Fe_xO_y/MCM-48(I-EtOH) after test at pH 2.4	Fe_xO_y/MSNPs (I-EtOH) after test	Fe_xO_y/MSNPs (I-EtOH) after test at pH 2.6	Plasma + Fe_xO_y/MSNPs (I-EtOH) after test	Plasma + Fe_xO_y/MSNPs (I-EtOH) after test at pH 2.8
O 1s	68.91	68.72	67.25	66.66	67.33	67.85
Si 2p	26.86	27.92	29.88	31.20	24.86	26.65
O/Si	2.57	2.46	2.25	2.14	2.71	2.55
Fe 2p3	0.54	0.32	0.38	0.26	0.38	0.18
Fe/Si	0.02	0.01	0.01	0.01	0.02	0.01
C 1s	3.68	3.04	2.49	1.88	7.42	5.32