micromachines

Supplementary Material: Micromotors of MnO_2 for the Recovery of Microplastics

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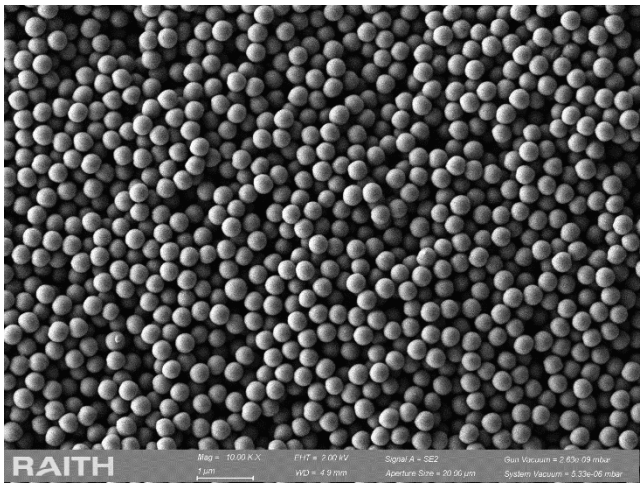
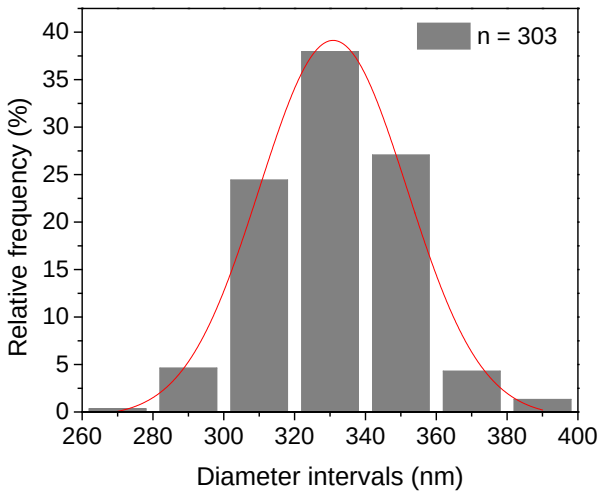


(**a**)



(**b**)

Figure S1. FSEM images of the PS particles (**a**), and their size distribution (**b**).

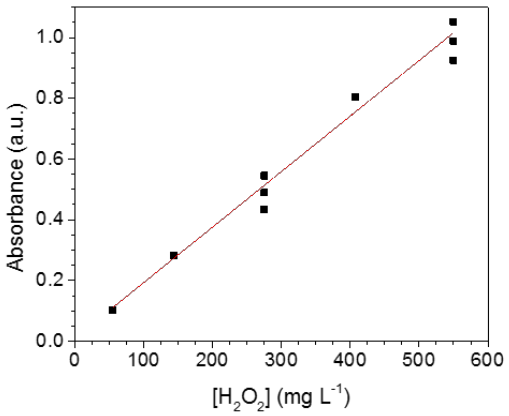


Figure S2. Simple regression and linear fit for Absorbance vs. [H_2O_2].

Table S1. Coefficients and Analysis of Variance for I vs. [H_2O_2].

Parameter	*Least Squares Estimate*	*Standard Error*	*T Statistic*	*P-Value*
Slope	0.00185488	0.000033572	55.2508	0.0000

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
Model	5.85499	1	5.85499	3052.65	0.0000
Residual	0.0268521	14	0.001918		
Total	5.88184	15			

Table S2. Analysis of Variance for %[H_2O_2] remaining in solution vs. %[H_2O_2]$_o$.

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	27709.4	2	13854.7	39.43	0.0000
Within groups	8432.77	24	351.366		
Total (Corr.)	36142.2	26			

Table S3. Analysis of Variance for TOC/TOC$_o$ vs. [PS].

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A:PS (mg L^{-1})	0.002951	2	0.0014755	0.16	0.8520
B:[H_2O_2]$_o$ (% in wt.)	0.0903406	2	0.0451703	4.95	0.0194
INTERACTIONS					
AB	0.0543381	4	0.0135845	1.49	0.2474
RESIDUAL	0.16432	18	0.00912891		
TOTAL (CORRECTED)	0.31195	26			

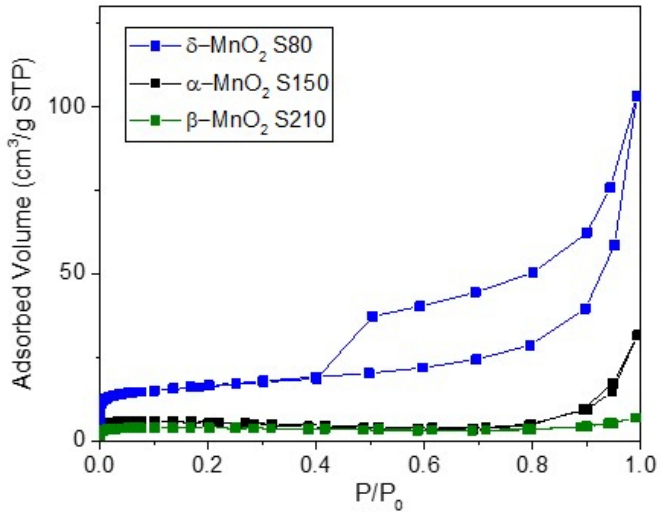


Figure S3. Nitrogen adsorption-desoption isotherms of the three MnO_2 synthesized samples.

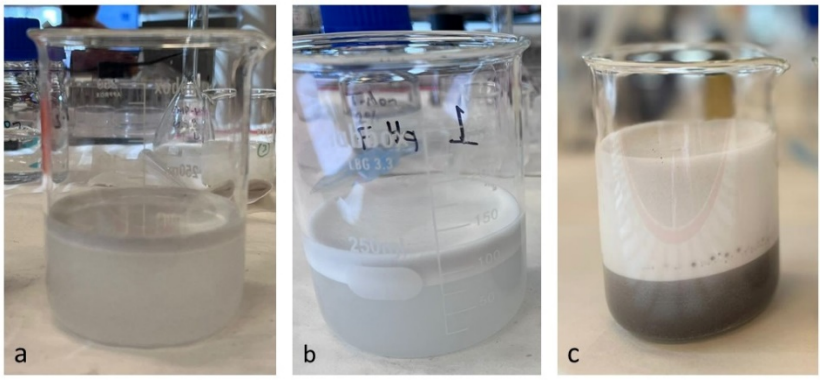
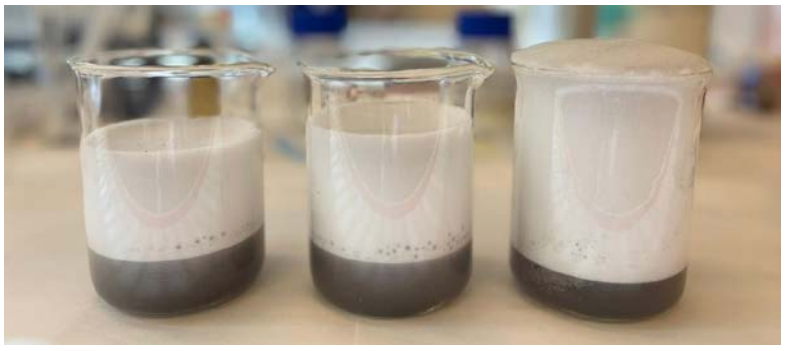


Figure S4. Effect of pH on the amount of foam formed after 5 minutes reaction time, with 0.2 g L^{-1} MnO_2, 20 mg L^{-1} MP, 1.6% H_2O_2 and 0.01% Triton-X. (**a**) pH 3, (**b**) pH 7, and (**c**) pH 9.



(**a**) (**b**) (**c**)

Figure S5. Effect of H_2O_2 concentration on the foam formation 5 min after the reaction started. 0.2 g L^{-1} MnO_2, 20 mg L^{-1} MP, pH 9 and 0.01% Triton-X. (a) 1.6% H_2O_2, (b) 3% H_2O_2 and (c) 6% H_2O_2.