Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Manganese Dioxide Nanosheet-Containing Reactors as Antioxidant Support for Neuroblastoma Cells

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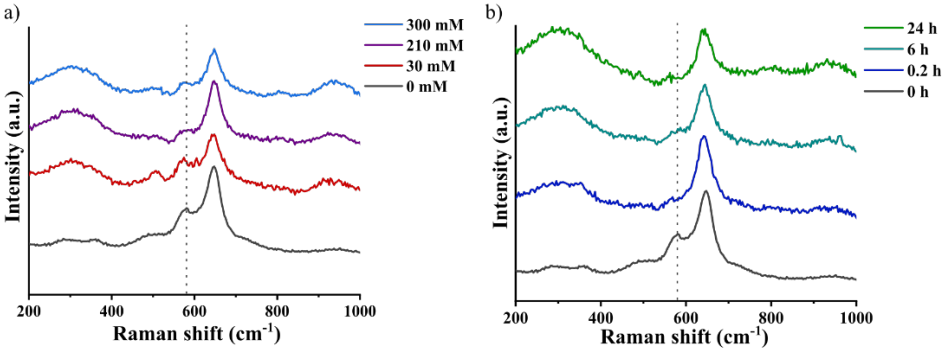

Figure S1. Stability of MnO_2-NS exposed to H_2O_2. Raman spectra of MnO_2-NS were exposed to a) increasing concentrations of H_2O_2 (30, 210 and 300 mM) for 10 min and b) 0.3 mM H_2O_2 for different times (10 min, 6 h and 24 h). It can be observed a general depletion of the band centered at 578 cm^{-1} (dotted line) and the shoulder at lower wavenumbers, likely due to the transition from MnO_2 to other phases. The grey spectra correspond to the pristine sample.

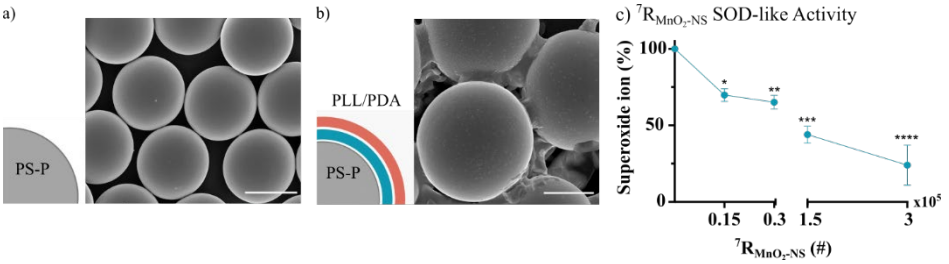

Figure S2. Representative SEM images of 7 µm PS particles (a) and PS particles coated with PLL and DPA (b). Scale bars are 3 µm. c) Concentration dependent SOD-like activity of $^7R_{MnO2\text{-}NS}$. All percentages are normalized to control situation without nanoparticles or any other SOD-like activity that is considered to be 100% of the $O_2^{\cdot -}$. Each percentage corresponds to the amount of $O_2^{\cdot -}$ remaining in the solution after 20 min of reaction, when in presence of indicated concentration of $^7R_{MnO2\text{-}NS}$ (n=3-10).

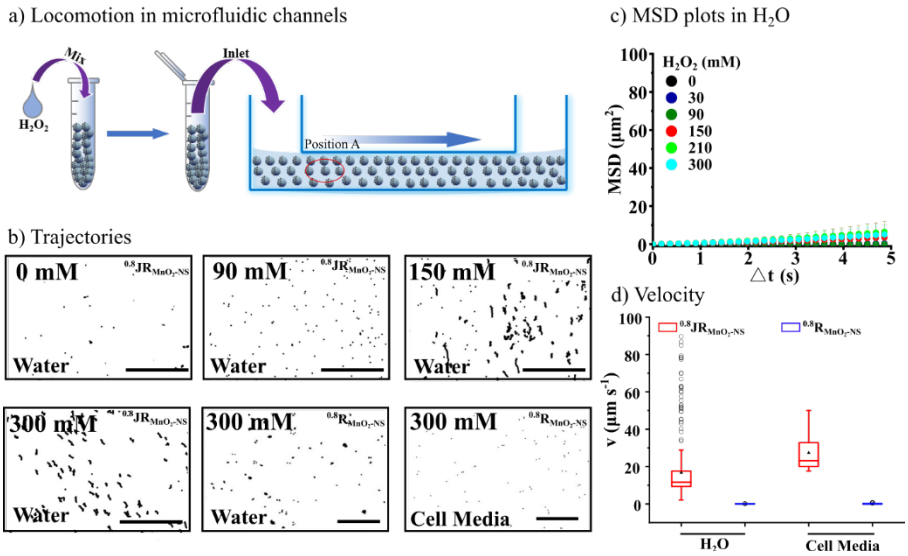

Figure S3. a) Cartoon of the experimental locomotion set-up in microfluidic channels. Trajectories (b, scale bar 100 µm) of $^{0.8}R_{MnO_2\text{-}NS}$ and $^{0.8}JR_{MnO_2\text{-}NS}$ in water and cell media as well as the MSD plots (c) of $^{0.8}JR_{MnO_2\text{-}NS}$ in water. d) Whisker plots of $^{0.8}R_{MnO_2\text{-}NS}$ and $^{0.8}JR_{MnO_2\text{-}NS}$ using 300 mM H_2O_2 as fuel in water and cell media.

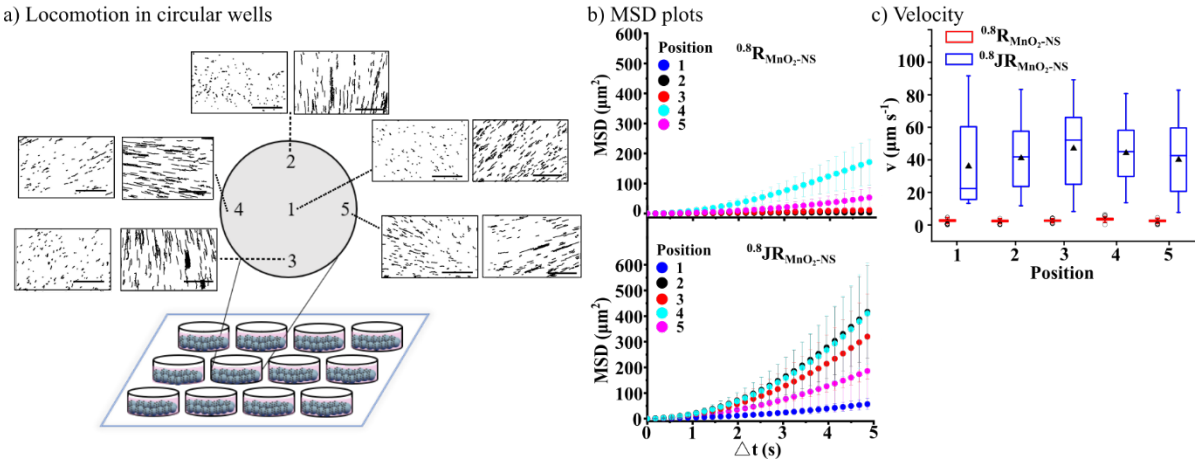

Figure S4. a) Cartoon of the locomotion set-up in circular wells, and the experimental trajectories of $^{0.8}R_{MnO_2\text{-}NS}$ (left) and $^{0.8}JR_{MnO_2\text{-}NS}$ (right) using 300 mM H_2O_2 as fuel in cell media (scale bar 100 μm). b) MSD plots of $^{0.8}R_{MnO_2\text{-}NS}$ and $^{0.8}JR_{MnO_2\text{-}NS}$ in cell media in the circular wells at different positions. c) Whisker plots of $^{0.8}R_{MnO_2\text{-}NS}$ and $^{0.8}JR_{MnO_2\text{-}NS}$ depending on the different positions in cell media-filled circular wells.

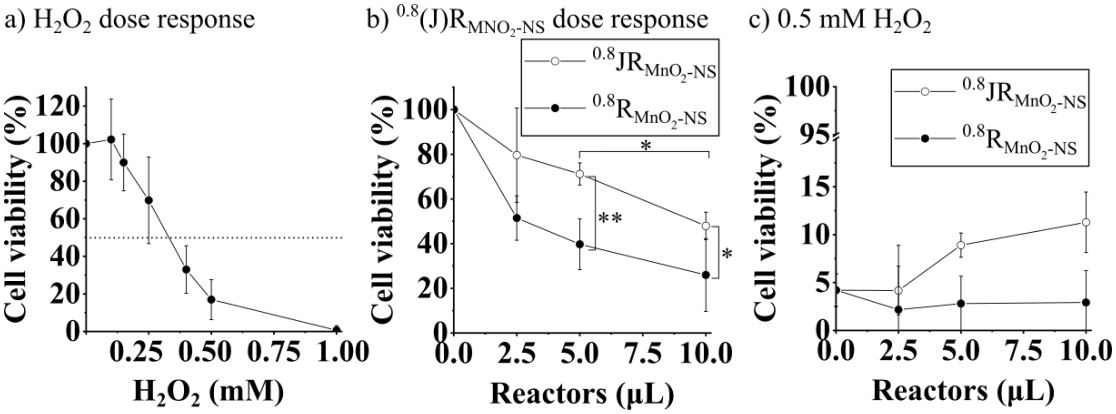

Figure S5. a) Dose response curve showing cell viability of neuroblastoma cells when exposed to increasing amounts of H_2O_2 for 24 h. Data was normalized to untreated cells. (n = 3) b) Viability of cells exposed to 2.5, 5 or 10 μL $^{0.8}R_{MnO_2\text{-}NS}$ or $^{0.8}JR_{MnO_2\text{-}NS}$ for 24 h. The data was normalized to untreated cells. (n = 3) c) Viability of cells exposed to $^{0.8}R_{MnO_2\text{-}N}$ or $^{0.8}JR_{MnO_2\text{-}NS}$ and 0.5 mM H_2O_2 for 24 h. The data was normalized to untreated cells. (n = 3, *p<0.05, **p<0.01; one-way ANOVA with Sidák's multiple comparison test)

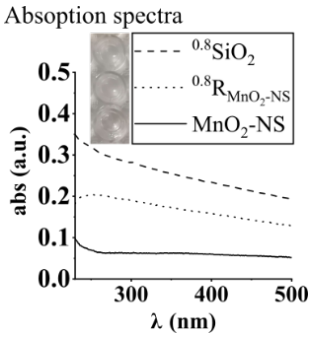

Figure S6. Absorption spectra of $^{0.8}R_{MnO_2\text{-}NS}$ compared to SiO_2 particles and MnO_2-NS.

a) Uptake

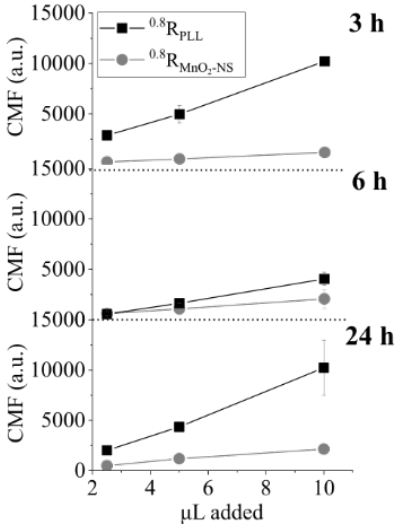

Figure S7. Cell mean fluorescence (CMF) of SH-SY5Y cells incubated for 3, 6 and 24 h exposed to fluorescently labelled $^{0.8}R_{PLL}$ or $^{0.8}R_{MnO2\text{-}NS}$ (n=3).