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

Supporting information

Heat-triggered Drug Release Systems based on Mesoporous Silica Nanoparticles and Phase-change Molecules as Gatekeepers

Ji Liu, Christophe Detrembleur, Marie-Claire De Pauw-Gillet, Stéphane Mornet, Luce Vander Elst, Sophie Laurent, Christine Jérôme* and Etienne Duguet*

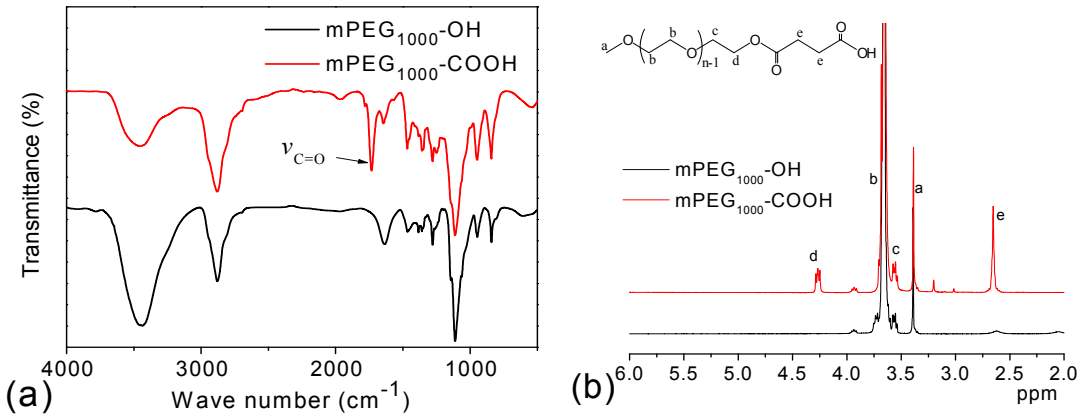

Figure S1. FT-IR spectrum (a) and ^{1}H NMR spectrum (b) of $mPEG_{1000}$-OH and $mPEG_{1000}$-COOH

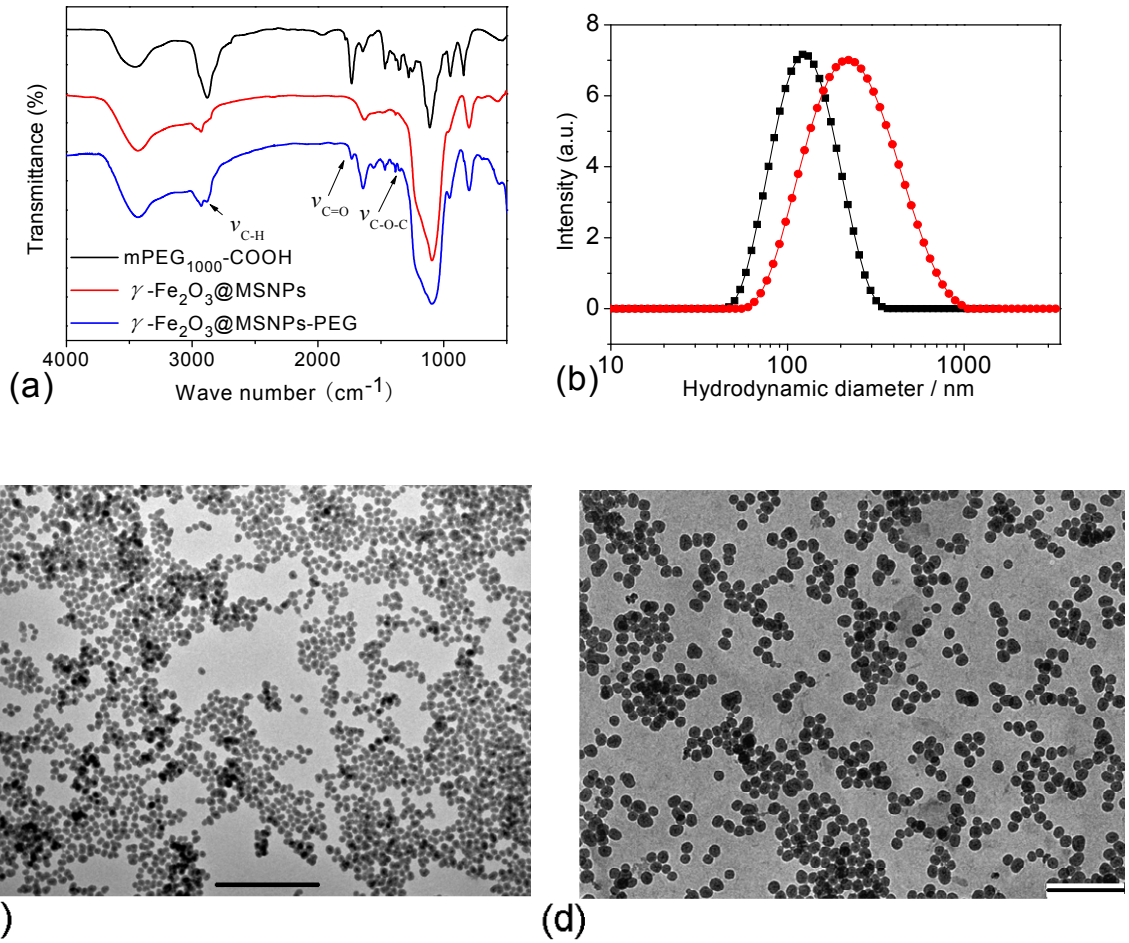

Figure S2. FTIR spectrum of the γ-Fe_2O_3@MSNPs before and after PEGylation (a); size distribution diagrams of the γ-Fe_2O_3@MSNPs before (black) and after (red) PEGylation from DLS analyses (b); and TEM image of the γ-Fe_2O_3@MSNPs with lower magnification (c, scale bar: 1000 nm) and (d, scale bar: 500 nm).

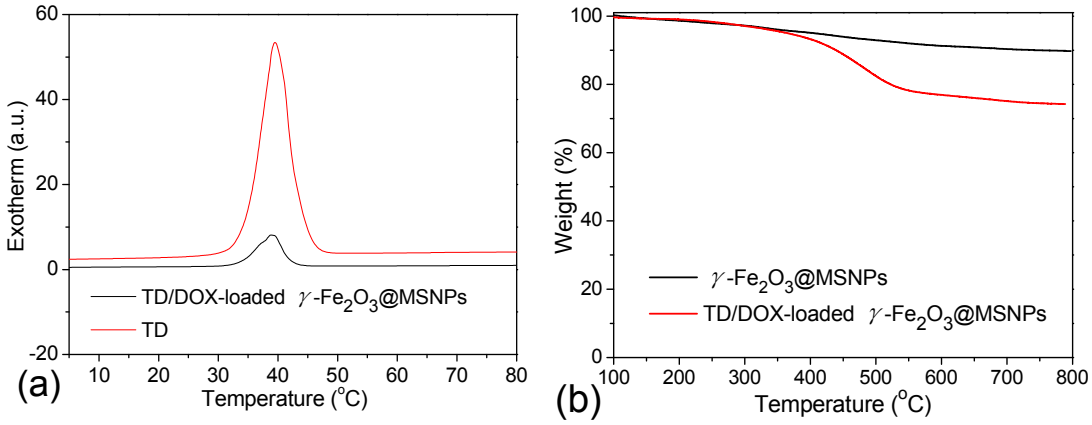

Figure S3. DSC (a) and TGA (b) curves of the TD/DOX-loaded γ-Fe_2O_3@MSNPs

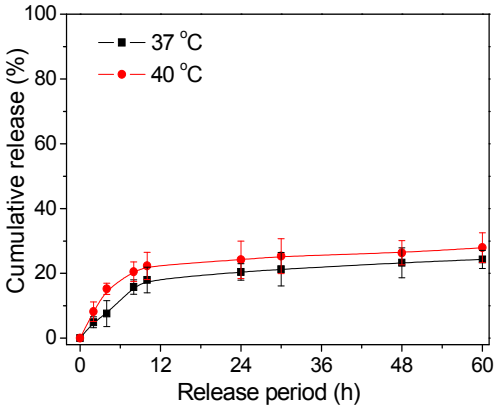

Figure S4. Release profiles of DOX from the DOX-loaded γ-Fe_2O_3@MSNPs (without TD as gatekeepers, *DLC* and *DLE* of *ca*. 11.6 *wt.* % and 25.1 %) at different temperatures. The cumulative release was presented as mean value ± standard deviation (n = 3), and the solid lines just serve to guide the eyes.

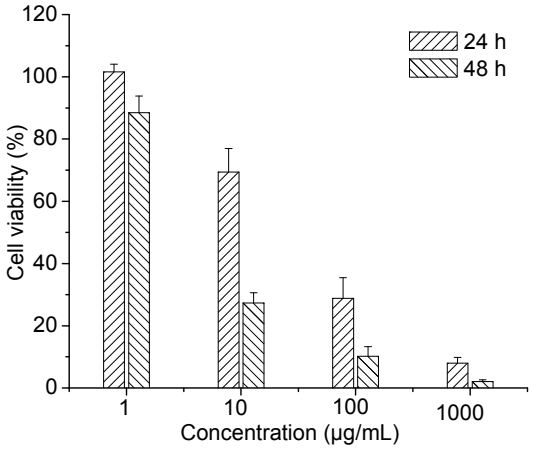

Figure S5. Cytotoxicity profiles of the γ-Fe_2O_3@MSNPs before CTAB extraction against the melanoma MEL-5 cell lines via the MTS assay, with different incubation concentrations for different periods at 37 ºC. Untreated cells were taken as a control (100% viability), and percentage cell viabilities were all expressed relative to the control. Results were all presented as mean value ± standard deviation (n = 5).

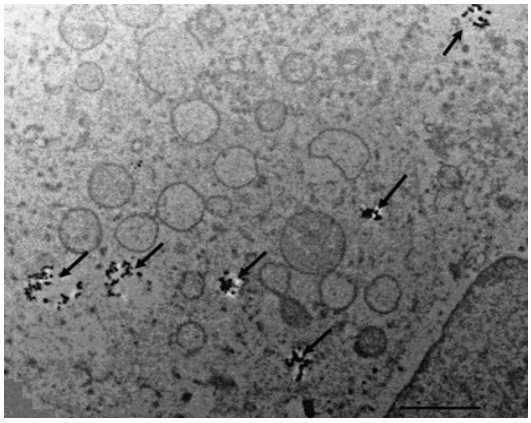

Figure S6. Representative TEM image of the treated MEL-5 cells after 12-h incubation with γ-Fe_2O_3@MSNPs (100 μg/mL) at 37 ºC (scale bar: 2 μm). Small dots marked with arrows refer to the internalized γ-Fe_2O_3@MSNPs.

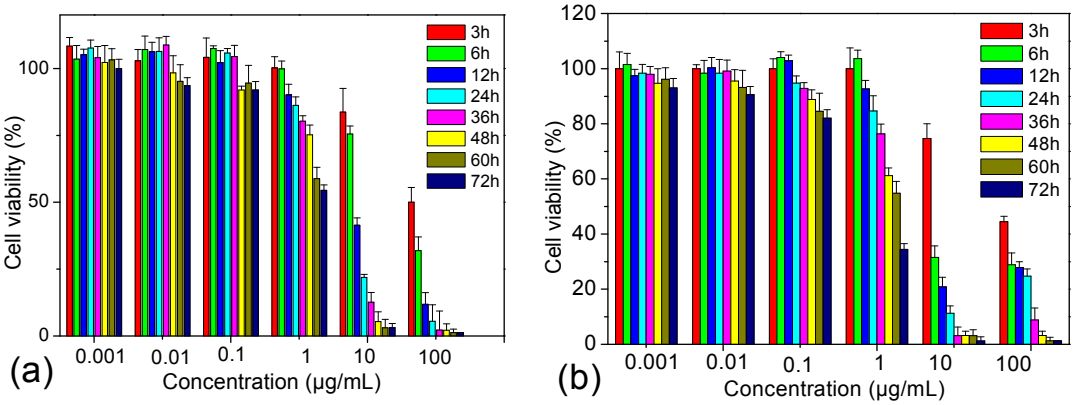

Figure S7. Cytotoxicity profiles of DOX with different concentrations against the MEL-5 cell line determined via the MTS assay at 37 ºC (a) and 40 ºC (b), respectively. Percentage viabilities of the treated MEL-5 cells were expressed relative to the untreated cells, which were taken as a control (100% viability), results are all presented as mean value ± standard deviation (n = 5).

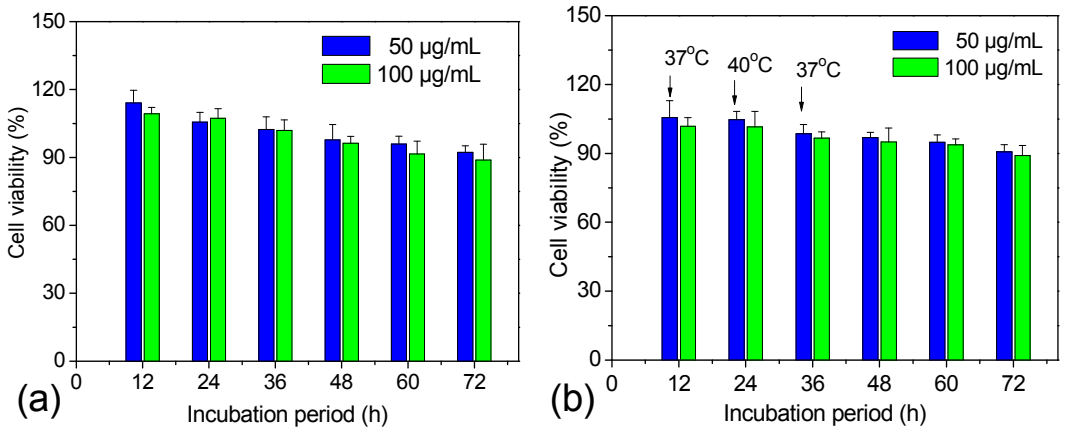

Figure S8. Cytotoxicity profiles of the TD-loaded γ-Fe_2O_3@MSNPs (without DOX uploaded) against the MEL-5 cell line at 40 ºC (a) or 37/40 ºC heating off/on cycles (b). Percentage cell viabilities of the treated MEL-5 cells were expressed relative to the untreated cells, which were taken as a control (100% viability), results are all presented as mean value ± standard deviation (n = 5).

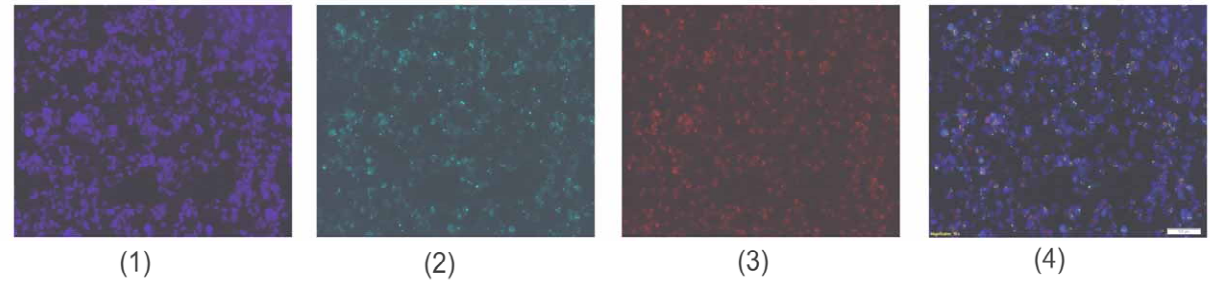

Figure S9. CLSM images of the MEL-5 cells after 24-h incubation with the FITC-labelled DOX-loaded γ-Fe_2O_3@MSNPs (100 μg/mL, without TD as gatekeepers) at 37 °C: (1) nuclei stained with DAPI (blue), (2) FITC (green), (3) DOX (red), (4) merged image of (1), (2) and (3).

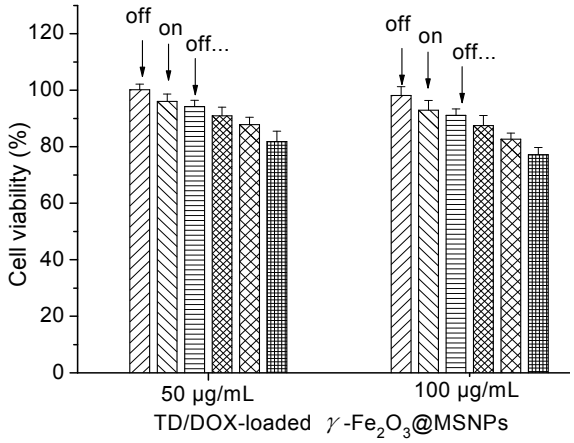

Figure S10. Cytotoxicity profiles of the TD/DOX-loaded γ-Fe_2O_3@MSNPs against MEL-5 cells under multiple heating off (37ºC)/on (40ºC) cycles with a time interval of 12 h; percentage cell viabilities of the treated MEL-5 cells were expressed relative to the untreated cells (control, 100% viability), and all results were presented as mean value ± standard deviation (n = 5).