Electronic Supplementary Information

ESI-1: Schematic diagram of the microfluidic device

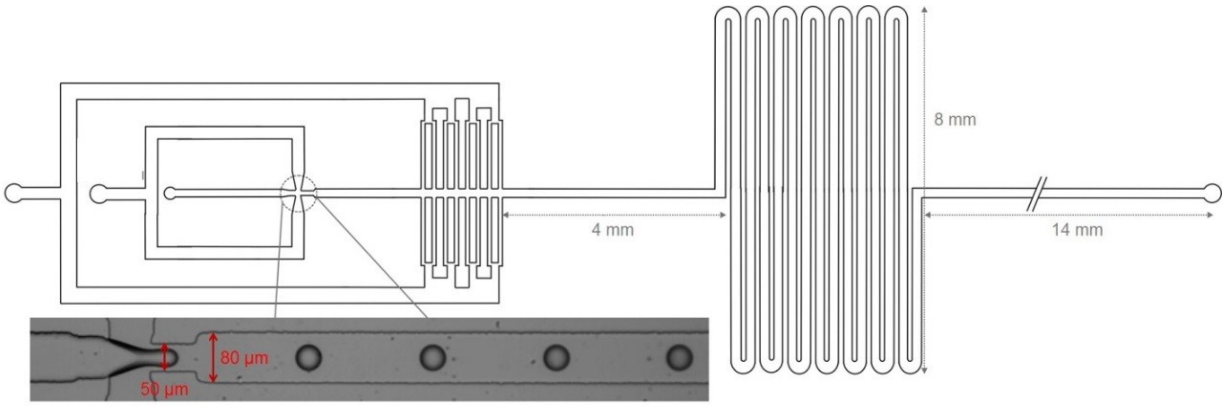

Figure SI-1: Layout of the microfluidic chip

ESI-2: Effect of the concentration of surfactant on the particle morphology

Concentration of surfactant (Abil Em 90) in the continuous phase has a non-negligible effect on the final morphology of the microparticles.

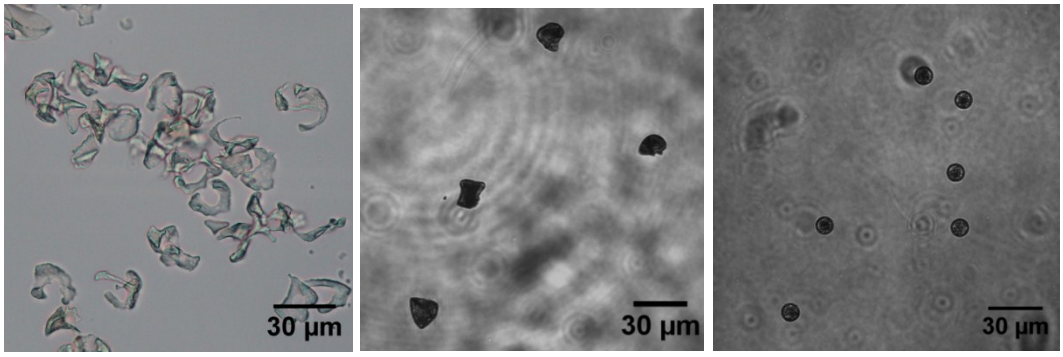

Figure SI-2: Effect of different concentration of surfactant (Abil Em 90) in the continuous phase on the final morphology of microparticles: 1%, 3% and 5% w/w respectively. Particles were prepared with the same conditions (, Q_w = 5 µl/h = 50, Q_{oil1} = 150 µl/h, Q_{oil2} = 50 µl/h, C_{Ca}^{2+} = 0.5%).

ESI-3: Chemicals used in the preparation of liposomes and iron oxide nanoparticles

The following chemicals were used: 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC, Corden Pharma LLC, Switzerland), cholesterol (Sigma), Sephadex G-50 (Sigma), tris(2-amino-2-

hydroxymethylpropane-1,3-diol) (Sigma), 5(6)-carboxyfluorescein (Sigma), chloroform (Lach-Ner), hydrochloric acid (Lach-Ner), iron (II) chloride tetrahydrate (Sigma), iron (III) chloride hexahydrate (Sigma), ammonium hydroxide (Penta). Deionized water was filtered by Aqual 25 (Aqual, Czech Republic).

ESI-4: Preparation of iron oxide nanoparticles

Hydrophilic iron oxide nanoparticles stabilized by sodium citrate were prepared by the co-precipitation method.[33] Briefly, 3.50 g of $FeCl_3 \cdot 6H_2O$ and 1.29 g of $FeCl_2 \cdot 4H_2O$ were dissolved in 70 ml of water. The solution was put into a 250 ml three-neck flask equipped with a reverse cooler, stirred for 1000 rpm and heated to 80 ºC. The solution was purged with nitrogen during the synthesis. After 10 minutes, 20 ml of NH_4OH (25% in water) was added into the solution at once. After 30 minutes of stirring, 2.0 g of sodium citrate dihydrate ($Na_3C_6H_5O_7 \cdot 2H_2O$) dissolved in 10 ml of water was added to the solution, and the temperature was increased to 95 °C under vigorous stirring. The solution was mixed for the next two hours under the nitrogen atmosphere. The cooled solution of iron oxide nanoparticles was then dialyzed for one day to remove any excess amount of ions. The nanoparticles were then filtered (450 nm Milipore filters) to remove larger aggregates. After the filtration the mean size of the particles obtained from TEM measurements was 10 nm (number weighted).

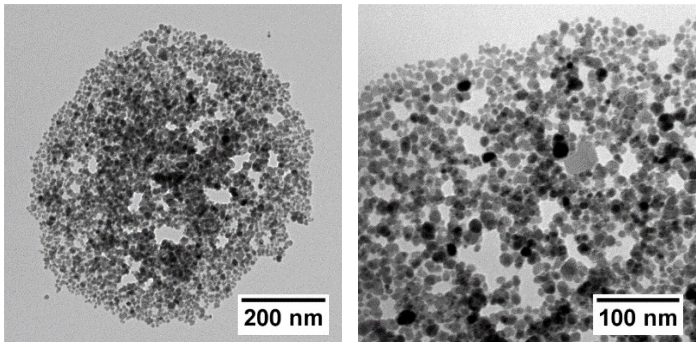

Figure SI-3: TEM images of iron oxide nanoparticles

ESI-5: Preparation of liposomes

Liposomes were prepared by the Banghamte method.[34] The amount of 10 mg of lipids (DPPC:cholesterol in 2:1 molar ratio) was dissolved in 1 ml of chloroform. The solvent was gently evaporated at 65 ºC by rotary evaporator (IKA RV10), while the pressure was progressively

decreased to 50 mbar. The lipid film formed at the bottom of the flask was dried overnight under vacuum. Afterwards, the lipid film was hydrated in 1 ml of hydration medium, heated to 65 ºC and the mixture was vortexed for 30 minutes. As the hydration medium we have used 50 mM solution of carboxyfluorescein in Tris-HCl buffer (170 mM, isotonic pH 7.4). Liposomes were then formed by extrusion method; 30 passes of extrusion (Avanti Mini-Extruder; Avanti Polar Lipids) through a 100 nm polycarbonate membrane were sufficient to obtain a narrow size distribution of liposomes (Figure 1.). The mean size of liposomes was around 115 nm (measured by dynamic light scattering, ZetaSizer Nano-ZS, Malvern Instruments, UK). The non-encapsulated carboxyfluorescein was removed by gel permeation chromatography (Sephadex G-50 as a stationary phase in Tris-HCl buffer 10 mM).

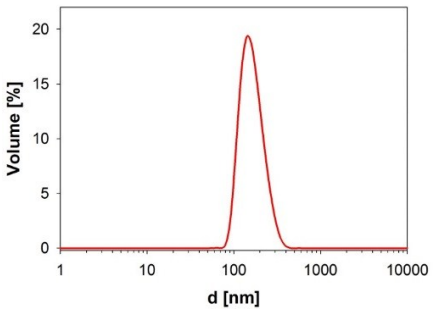

Figure SI-4: Size distribution of liposomes