Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information for:

Continuous flow generation of magnetoliposomes in a low-cost portable microfluidic platform

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Fig. S1: 6-inlet microfluidic chip

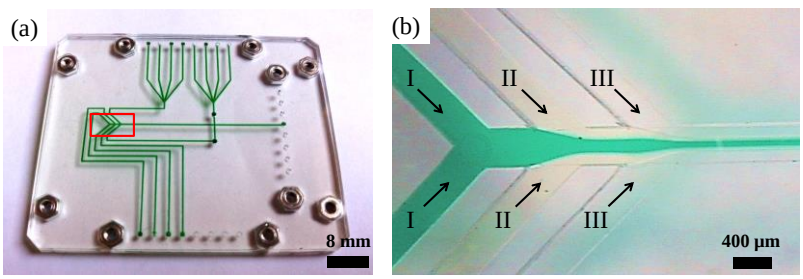

Fig. S1 (a) Photograph of the 6-inlet microfluidic chip configuration loaded with green food dye. (b) Microphotograph of the area highlighted inside the red square in Fig. S1a. The system is running green food dye (I), yellow food dye (II) and water (III).

Methods and Results of Fig. S1

The chip consists of three bonded layers made from 1 mm thick optical quality poly-methylmetacrylate (PMMA) sheets (Clarex, Japan) following the same fabrication procedure used for the 10-inlet microfluidic chip. The channels width and depth were 400 µm and 150 µm respectively.

In order to visualize the hydrodynamic focusing flow, food dyes and water were injected in the following the configuration shown in Fig. S1b.

Fig S2: 10-inlet microfluidic chip

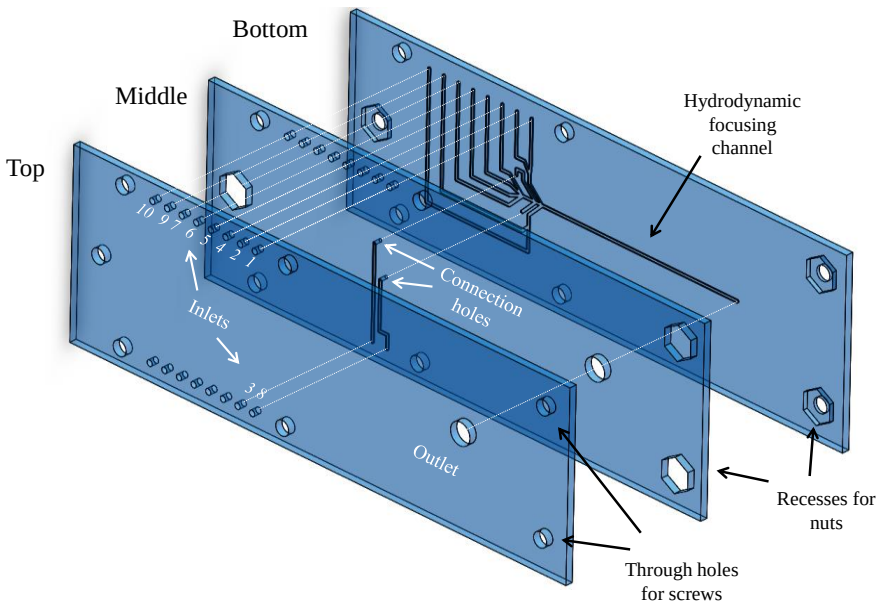

Fig. S2 Exploded view of the three layers of the microfluidic chip used for liposomes and magnetoliposomes generation.

Methods and Results of Fig. S2

400 µm and 1000 µm diameter end mills and a 400 µm diameter drill (all from Kyocera Microtools, Costa Mesa, CA) were used for fabrication of the microchannels and features of the chip. From Fig. S2 it can be seen that the microfluidic channels connecting to inlets 3 and 8 are fabricated in a different layer (middle) than the rest of the channels (bottom), and then connected to the main microfluidic network *via* through holes. More information about fabrication of microchannels using computer numerical control micro end milling in plastics can be found in the work done by M.Y. Ali.[S1]

Fig S3: Mixing effect along the hydrodynamic focusing channel

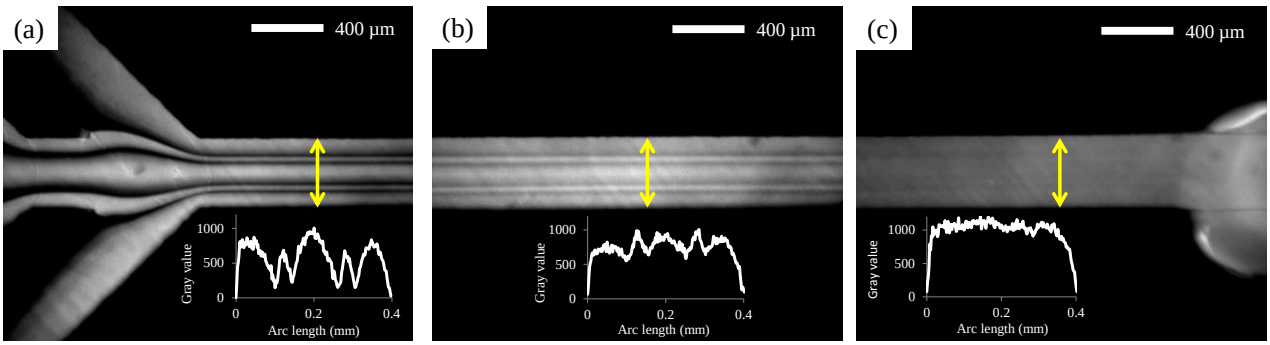

Fig. S3 Fluorescence micrographs of the focusing microfluidic channel running a fluorescein in PBS solution and ethanol 90% at different positions: (a) the final merging point of the phases, (b) in between the final merging point and the outlet (approximately 15mm) and (c) the end of the microfluidic channel (the outlet can be seen on the right). The yellow double arrows indicate where each corresponding plot over line was made.

Methods and Results of Fig. S3

To evaluate the mixing effect in the hydrodynamic focusing channel a 1.5 mM solution of fluorescein in phosphate buffer saline (PBS) and ethanol 90% (Sigma-Aldrich, St. Louis, MO) were injected in the channels (all inputs at 25 µl/min) following the same configuration as described on the main paper. Micrographs of the focusing channel (Fig. S3) were taken at different positions under a fluorescence microscope setup with a digital CCD camera (QIClick; Qimaging, Canada) and analyzed in ImageJ. In order to compare the different concentration distribution profiles at each position the pixel intensity, or gray value, over a line (yellow double arrows in Fig. S3) was plotted and are shown in Fig. S3. In Fig. S3c we can observe that mixing is almost complete, which agrees well with the results predicted by the simulation shown in Fig. 2c ("outlet" curve).

Fig. S4: Intensity distribution of magnetoliposomes sizes obtained by the microfluidic method

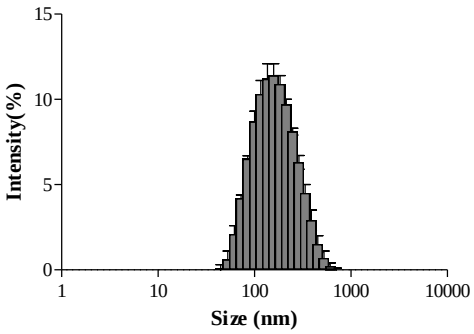

Fig. S4. DLS intensity distribution of magnetoliposomes sizes obtained by the microfluidic hydrodynamic focusing method.

References

S1 M.Y. Ali, *Int. J. Mech. Mat. Eng.*, 2009, **4**, 93-97.