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Supplementary Material

Continuous flow *in situ* shear stress induced encapsulation of curcumin within spheroidal bovine serum albumin-based nanoparticles

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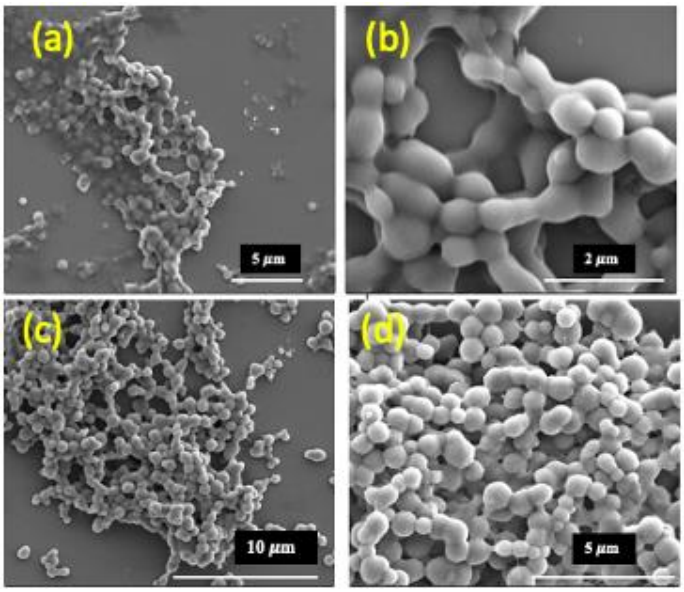

Figure S1. BNPs fabricated in a standard VFD housing a borosilicate glass tube, I.D. 17.5 mm, O.D. 20 mm, length 19.4 cm. Volume combinations for BSA (1 mg/mL) and ethanol, 1 mL and 1.5 mL, respectively; 1 mL of the combined solution was quickly transferred to the VFD tube which was then spun at 6k rpm for 30 min at (a,b) 65ºC, and (c,d) 80ºC, under the confined mode of operation of the device.

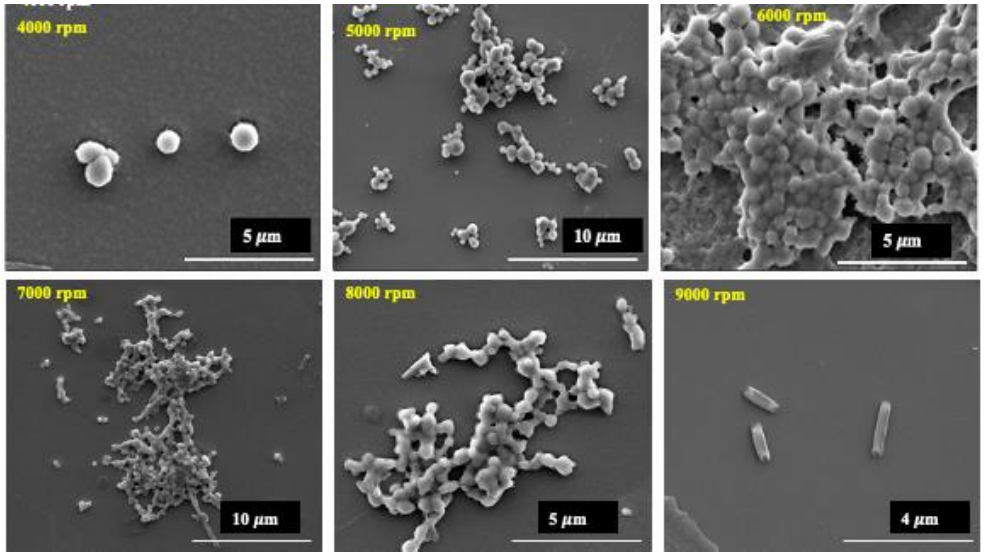

Figure S2. BNPs fabricated in a standard VFD as for Fig. S1. Optimization of the fabrication of BNPs under continuous flow mode. A syringe pump delivered a mixture of 5 mL BSA at 1 mg/mL and 7.5 mL ethanol, with the reaction operating at 80ºC and the flow rate 0.5 mL/min. After that, the as prepared samples were left at 80ºC for another 1 h, then centrifuged (1200 × g) for 2 min, washed 3 times with deionized water and centrifuged (1200 × g) for 1 min. Optimizations were conducted by varying the rotational speeds, 4k, 5k, 6k, 7k, 8k and 9k rpm.

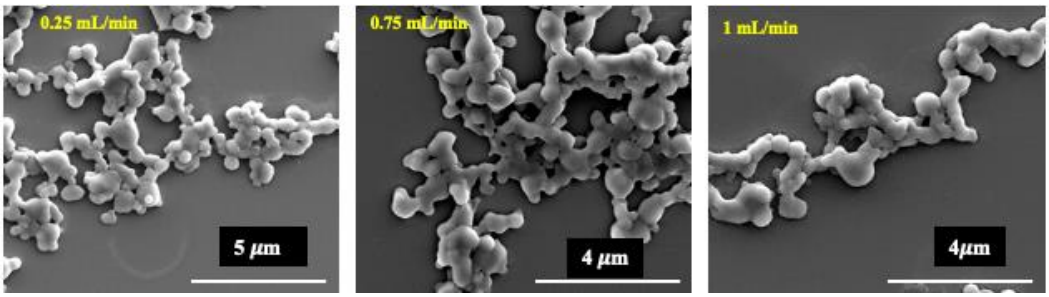

Figure S3. BNPs fabricated in a standard VFD as for Fig. S1. Optimization of the fabrication of BNPs was under continuous flow mode. A syringe pump was used to deliver a mixture of 5 mL BSA (1 mg/mL) and 7.5 mL ethanol with the VFD tube spinning at 5k rpm at 80ºC. After that, the as prepared samples were left at 80ºC for another 1 h, then centrifuged (1200 × g) for 2 min, washed 3 times with deionized water and centrifuged (1200 × g) for 1 min. Optimizations were conducted by varying the flow rate between 0.25, 0.75 and 1 mL/min.

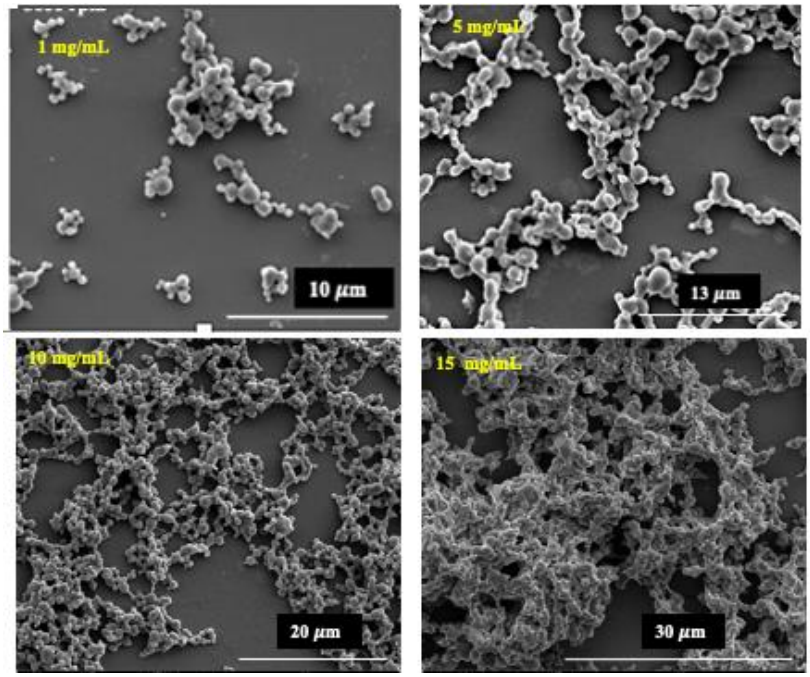

Figure S4. BNPs fabricated in a standard VFD as for Fig. S1. Optimization of the fabrication of BNPs was under continuous flow mode. A syringe pump delivered a mixture of varying concentrations of 5 mL BSA (at 1, 5, 10 or 15 mg/mL) and 7.5 mL ethanol with the VFD tube spinning at 5k rpm at 80 ℃ and the flow rate 0.5 mL/min. After that the as prepared samples were left at 80ºC for another 1 h, then centrifuged (1200 × g) for 2 min, washed 3 times with deionized water and centrifuged (1200 × g) for 1 min.

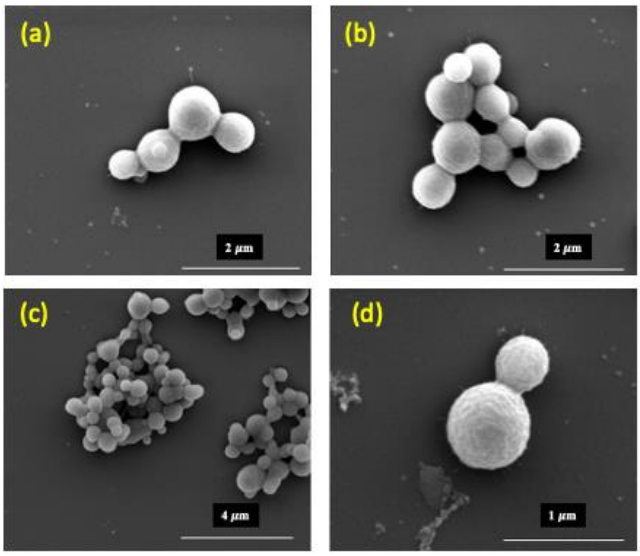

Figure S5. Stability of BNPs. (a,b) BNPs left in the air for a week. (c,d) BNPs left in solution for a week. Samples were drop casted on a silicon wafer for SEM and all processing was in the absence of glutaraldehyde.

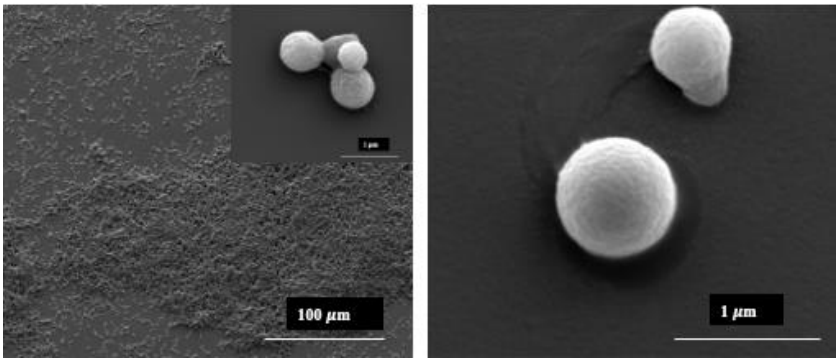

Figure S6. BNPs fabricated in a standard VFD as for Fig. S1. Optimization of the fabrication of BNPs was under continuous flow mode. A syringe pump was used to deliver a mixture of 5 mL BSA (at 10 mg/mL), 10 mL ethanol and 5 mg curcumin with the VFD tube spinning at 5k rpm at 80ºC and the flow rate 0.5 mL/min. After that the as-prepared samples were left at 80ºC for 5 min, and then centrifuged (1200 × g) for 2 min, washed 3 times and centrifuged (1200 × g) for 1 min.

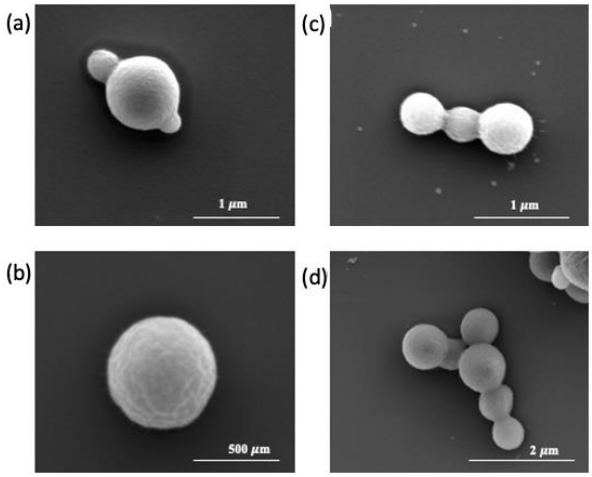

Figure S8. Stability of BNPs. (a) BNPs left in the air for a week. (c) BNPs left in solution for a week. (b) BNPs@Curcumin left in the air for a week. (d) BNPs@Curcumin left in solution for a week (all processing was conducted in the absence of glutaraldehyde crosslinking).

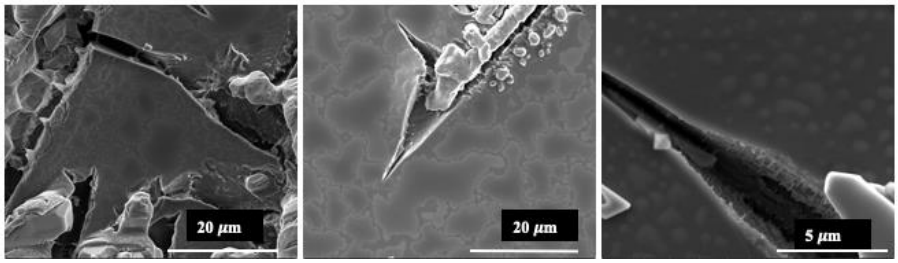

Figure S9. BNPs fabricated in a standard VFD as for Fig. S1. 10 mL BSA at 10 mg/mL was spun at 5k rpm, 80 ℃ and a flow rate 0.5 mL/min. There after the solution was kept at 80^{o}C for 1h then centrifuged for 2 min, washed 3 times and centrifuged for 1 min.

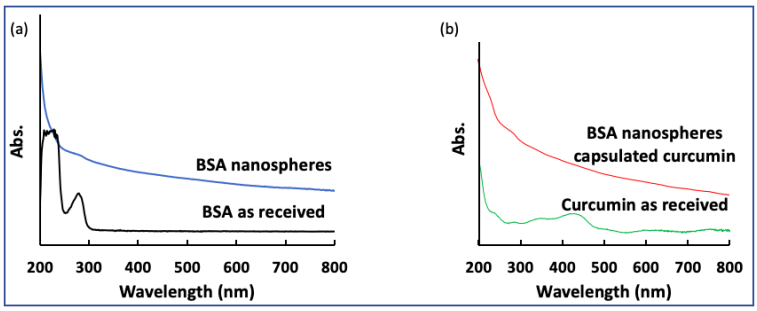

Figure S10. UV-Vis spectra of BNPs, BNPs@Curcumin, BSA, and curcumin, dispersed in water.