Supplementary information

Performance of a helical insert in commercial tubing as a passive micromixer to produce nanoparticles by an emulsification approach

Lucia Abengochea\textsuperscript{a,b}, Santiago Pina-Artal\textsuperscript{a,b}, Victor Gonzalez\textsuperscript{c} and Victor Sebastian*\textsuperscript{a,b,d,e}

\textsuperscript{a}Instituto de Nanociencia y Materiales de Aragón (INMA), CSIC-Universidad de Zaragoza, Zaragoza 50009, Spain.
\textsuperscript{b}Department of Chemical and Environmental Engineering Universidad de Zaragoza Campus Rio Ebro, 50018 Zaragoza, Spain.
\textsuperscript{c}Exella, Gran Via Corts Catalanes, 583,08011, Barcelona, Spain
\textsuperscript{d}Laboratorio de Microscopías Avanzadas, Universidad de Zaragoza, 50018 Zaragoza, Spain
\textsuperscript{e}Networking Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), 28029 Madrid, Spain.

\textbf{Figure S1.} A) Conversion of DMP over the total volume flow rate (mL/min) without insert for tubings of ID 0.02", 0.03" and 0.04". B) Comparison of DMP conversion for the different tubings without inserts versus the residence times (ms).

\textbf{Figure S2.} Representative SEM images of polymeric NPs synthesized by O/W emulsification, with a 0.04"(id) insert in the system (A,B,C) and without an insert (D,E,F), at different flow ratios: A,D) \( Q_O/Q_A = 1/3 \), \( Q_O = 12 \) ml/min, \( Q_A = 36 \) ml/min. B,E) \( Q_O/Q_A = 1/6 \), \( Q_O = 6.85 \) ml/min, \( Q_A = 41.14 \) ml/min. C,F) \( Q_O/Q_A = 1/10 \), \( Q_O = 4.36 \) ml/min, \( Q_A = 46.63 \) ml/min. \( Q_T \) was maintained 48 ml/min across all conditions.
Figure S3. Dynamic light scattering particle size histograms of PLGA/Eudragit NPs synthesized by o/w emulsification with and without an insert in a 0.04" tubing (referred to as ID 0.04"+insert and ID 0.04", respectively), under different Q_T: 40ml/min (A), 50ml/min (B), 60ml/min (C), 70ml/min (D) and 80ml/min (E). In all conditions, the Q_o/Q_a ratio is 1/12. Data are plotted according to a number-weighted distribution fitted to lognormal.