SUPPORTING INFORMATION

Continuous Synthesis of Elastomeric Macroporous Microbeads

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S1-Flow-Focusing Microreactor

Figure S1 shows the schematic of the off-the-shelf fittings, capillaries, and fluidic connections utilized for constructing the coaxial flow-focusing microreactor.

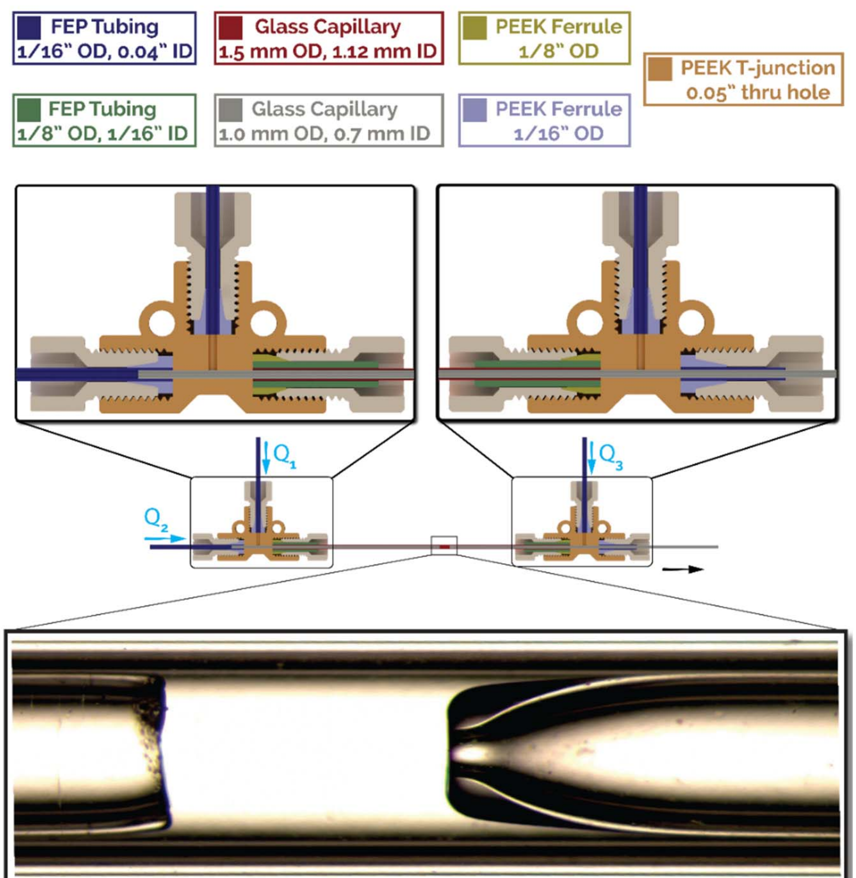

Figure S1. The capillary-based flow focusing microreactor constructed using off-the-shelf components. The bottom inset shows a bright-field image of the coaxial inner capillaries inserted inside the outer capillary.

Inlet-side T-junction (Left) connections listed clockwise from the left:

Polymer/crosslinker inlet line: 1 mm OD × 0.75 mm ID × 4 cm long inner glass capillary inserted into 1/16'' OD 0.04'' ID FEP tubing and threaded through the long axis of the T-junction.

Solvent/catalyst inlet line: 1/16'' OD FEP tubing connected to the perpendicular inlet of the T-junction.

Outlet of first T-junction: 1.5 mm OD × 1.12 mm ID × 6 cm long outer glass capillary with 1/8'' OD x 1/16'' ID Tygon sleeve fastened coaxially around inner capillary as it protrudes from the outlet of the T-junction.

Outlet side T-junction (Right) connections listed clockwise from the left:

Inlet of second T-junction: Other end of 1.5 mm OD × 1.12 mm ID x 6 cm long outer glass capillary with another 1/8'' OD × 1/16'' ID Tygon sleeve to fasten to the long axis of the outlet T-junction.

Continuous phase inlet line: 1/16'' OD FEP tubing connected to the perpendicular inlet of the T-junction.

Reactor outlet: 1 mm OD × 0.75 mm ID × 10 cm long flamed-tip glass capillary with 1/16'' OD 0.04'' ID FEP sleeve fastened such that the two inner capillaries are separated by ~ 1.5 mm.

S2-Non-Porous Microbeads (Control)

Figure S2 shows the high degree of monodispersity obtained for the crosslinked non-porous PHMS microbeads (3:1 PHMS:hexadiene ratio) synthesized using the capillary-based microfluidic platform described in the paper.

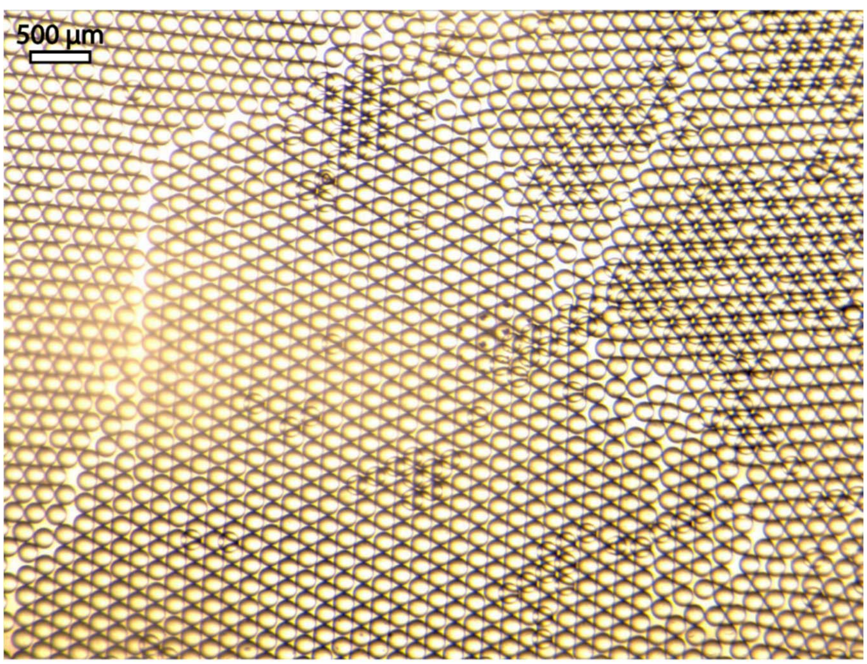

Figure S2. Bright-field monolayer image of the PHMS microbeads synthesized using the developed 3D flow-focusing microreactor with PHMS:hexadiene ratio of 3:1.

S3-Silica-Loaded PHMS Microbeads

Figure S3 shows the high degree of monodispersity obtained for the (crosslinked) silica-loaded PHMS microbeads (5 µm silica microspheres, 5:1 PHMS:hexadiene ratio) synthesized using the capillary-based microfluidic platform described in the paper.

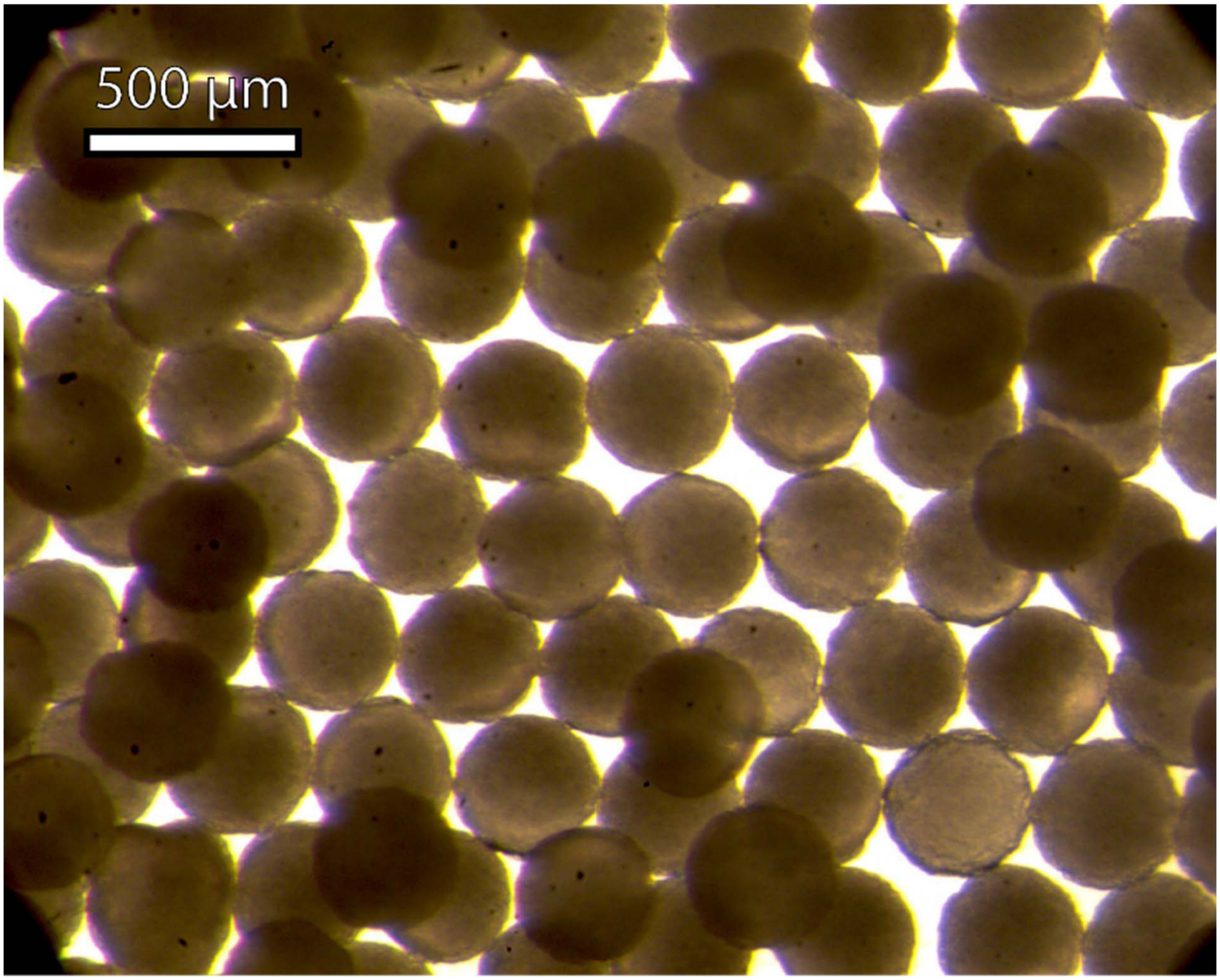

Figure S3. Bright-field monolayer image of the silica-loaded PHMS microbeads synthesized using the developed 3D flow-focusing microreactor with 5µm silica microspheres and PHMS:hexadiene ratio of 5:1.

S4-Example Rheometer Compression Data

Figure S4 shows an example of data obtained for a non-porous PHMS microbead (control) from the compression test using the rheometer in parallel plate configuration.

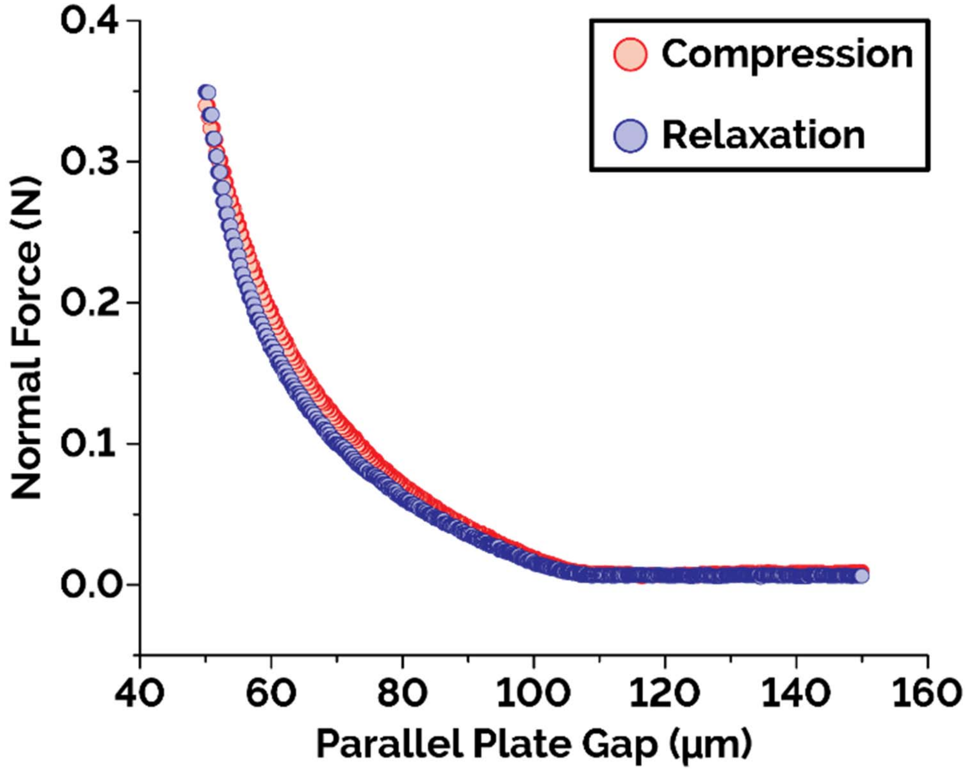

Figure S4. Measured normal force *vs.* the parallel plate gap for an in-flow synthesized dense PHMS microbead with PHMS:hexadiene ratio of 3:1. The overlay of the compression/relaxation curves demonstrate the elasticity of the PHMS microbeads without hysteresis.

Supplementary Videos:

Video M-1 The droplet production videos of the flow-focusing microreactor for a porogen-free control and a silica-loaded test using a high-speed camera. Porogen-free flow parameters: Q_1 = 10 µL/min, Q_2 = 5 µL/min, and Q_3 = 200 µL/min with 5:1 PHMS:hexadiene ratio. Silica-loaded flow parameters: Q_1 = 10 µL/min, Q_2 = 10 µL/min, and Q_3 = 200 µL/min with 5:1 PHMS:hexadiene ratio and 10 µm silica microspheres.

Video M-2 Reconstructed MicroCT volume renderings of multiple microbeads and single microbead sweep cut for the silica-loaded and macroporous PHMS microbeads. Microbeads were produced using Q_1 = 10 µL/min, Q_2 = 10 µL/min, and Q_3 = 300 µL/min with 5:1 PHMS:hexadiene ratio and 5 µm silica microspheres.