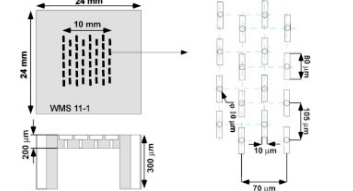**Table S1**. Commercial microfluidic devices used to generate emulsion droplets.
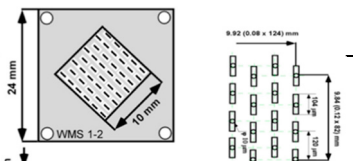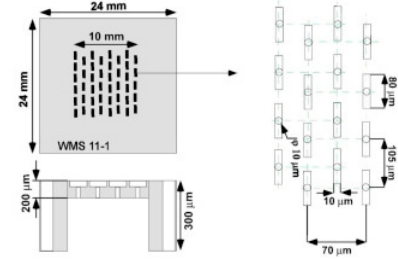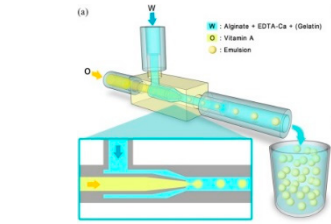
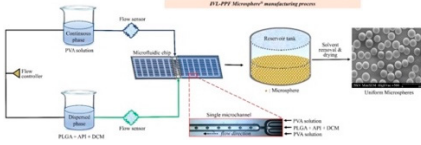| Company	Brand	Material	Characteristics	Applications	References
Dolomite	Telos ® 2 regent Telos ® 1 reagent 3D flow focusing SC	Glass microfluidic device	-The device consists of 7 parallel junctions that can be combined with others 10. -Hydrophilic, hydrophobic, and fluorophilic coating options. -Available at 100 or 50 µm.	Designed for emulsion generation, foam generation, micro-particle synthesis and high throughput experimentation (for example, analysis of cells).	[1]
	Telos ® micromixer Chip		-The device consists of 7 independent micromixer channels on the chip (with 5 mixing stages each). -Hydrophilic and hydrophobic coating options. -Available at 30 or 50 µm.	Designed to create nano and micro particles and emulsions.	
	µEncapsulator 2 Reagent Droplet Chip		-Chip size 11.25mm x 15mm x 2mm. -Hydrophilic and fluorophilic coating surface options. -Junction of 100 µm scale.	Designed for rapid generation of double emulsion droplets (an aqueous core, surrounded by an oil shell)	
	µEncapsulator Sample Reservoir Chip		-Smooth channel with 100 µL storage volume. -Easy to clean and clear device. -Hydrophilic coating surface.	Designed for single emulsion droplet generation.	
	Large Droplet Junction Chip	Glass and quartz device	-Chip offers both a T- and X-junction. -Simple and easy to use. -High droplet production (12,000 per second). -Hydrophilic, hydrophilic and, fluorophilic coating options.	Designed for droplet emulsion generation.	
	Small Droplet Junction Chip		-Chip offers a flow focusing junction geometry with 14 x 17 µm cross-section at the junction.	Designed for generating small droplets in the size range of 5-30 µm,	

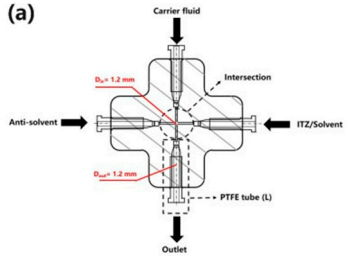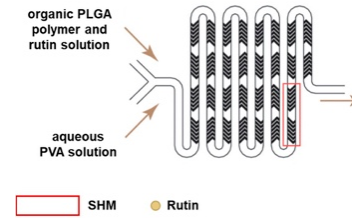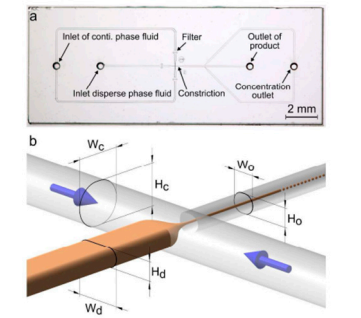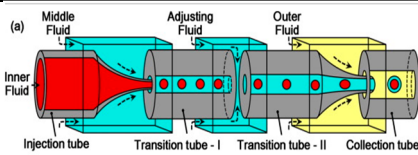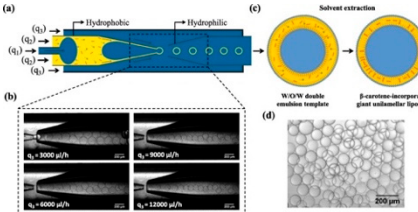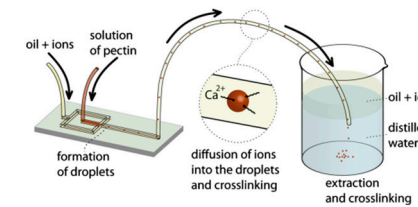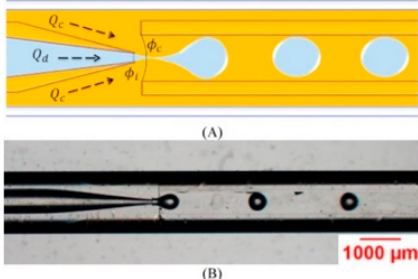|					
			-High droplet production (12,000 per second). -Hydrophilic, hydrophilic and, fluorophilic coating options.	improving control over the targeting and release of active compounds.	
	T-Junction Chip		-Extremely smooth channel surface. - Excellent chemical compatibility. -Hydrophilic, hydrophilic and, fluorophilic coating options.	Designed for a range of applications, including mixing fluids, microreactions and droplet formation.	
	6-Junction Droplet Chip	Glass device	-The device consists of 6 separate flow-focusing junctions. -Excellent chemical compatibility. -Hydrophilic, hydrophilic and, fluorophilic coating options.	Designed for the parallel generation of 20 μm - 60 μm oil-in-water droplets.	
Microfluidic ChipShop	Fluidic 162	Topas® COC (Cyclic olefin copolymer) or Polycarbonate PC	-One channel device. -Lid thickness 140 or 170 μm without surface treatment.	Designed for droplet generation on chip.	[2]
	Fluidic 537		-The flow-focusing device consists of 4 identical droplet generation units with a 38 μm nozzle size.		
	Fluidic 912		-The flow-focusing device consists of 8 identical droplet generation units with a channel dimension of 80 μm at the droplet formation region.		
	Fluidic 536		-The device consists of double-cross geometry with 37 μm nozzle size and 3 droplet generator units.	Designed for W/W/O double emulsion generation, allowing cell and particle encapsulation.	
	Fluidic 488		-The device consists of a combination of multiple T-junctions. -Storage module for capturing droplets. -Double cross nozzle type (74 μm).	Designed for generating single or multiple emulsions and storage.	

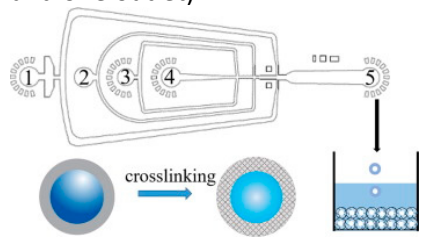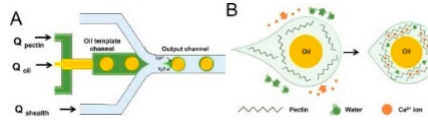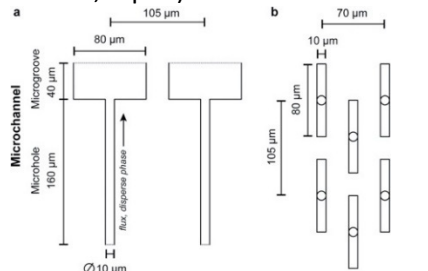|					
	Fluidic 285		-The multi-channel device presents various channels with different nozzle (50; 70; 80; 100 μm). -The main channel, as well as the entrance channel, vary in diameter, enabling a large set of experiments.	Designed for generating droplets with different volumes.	
	Fluidic 1196	Glass microfluidic device	-Several parallel microchannels in one unit. -Lid thickness of 250 μm -Channel dimensions 20 μm	Designed for droplet generation on chip.	

Table S2. Technological approaches and properties of the delivery systems based on food-grade emulsions assembled by microfluidic techniques.
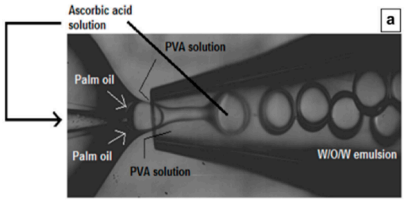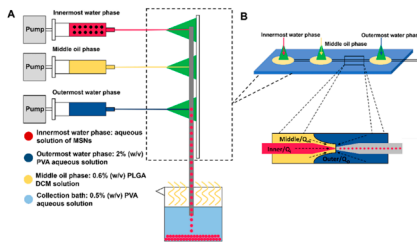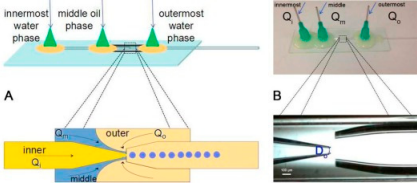
Emulsion type-Delivery system	Aqueous phase	Oil phase	Process conditions	Bioactive	Delivery system characterization	Microfluidic device type	Reference
O/W- Emulsion	Modified lecithin (ML), whey protein isolate (WPI), or Tween 20 (0.05-3 wt%)	Medium chain triacylglycerol oil	Q_d= 0.1-10 mL/h Q_c= 100-500 mL/h	Fucoxanthin extract (0-4 wt%)	Size= 30.3 ± 0.2 μm (ML), 32.3 ± 0.1 μm (WPI) and 29.0 ± 0.8 μm (Tween 20) DI= 0.5 EE= 100%(ML) 90.7% (WPI) 50.4% (Tween 20)	Silicon 24 × 24 mm^2 microchannels array chip (Model: WMS 11–1; EP. Tech Co., Ltd., Hitachi, Japan)	[3]
	Tween 20 (1% w/w), sodium salt of colic acid (Na-cholate), decaglycerol monolaurate, polyglyceryl-5-		J_d= 10-300 L/m.h	Quercetin (0.1-0.6 mg/mL)	Size= 28-29 μm DI < 0.21 EE= 80 % (4 ºC) and 70 % (25 ºC)	Silicon 24 × 24 mm^2 microchannels array chip (Model WMS 1-2; EP. Tech Co., Ltd., Hitachi, Japan)	[4]

	laurate (Sunsoft A-12E), or bovine serum albumin (BSA) (1% w/w)						
	Decaglycerol monolaurate (ML-750) or Tween 20 (1% w/w)		Q_d= 1-14 mL/h	β-sitosterol (0.5-4.0% w/w) and γ-oryzanol (0.5-4.0% w/w)	Size= 26-28 µm DI < 0.20 EE over 80 %	Silicon 24 × 24 mm^2 microchannels array chip (Model: WMS 11–1; EP. Tech Co., Ltd., Hitachi, Japan)	[5]
	Sodium dodecyl sulfate (SDS), decaglycerol monolaurate (ML-750), decaglycerol monooleate (MO-7S), sodium casinate (Na-Cs), and modified lecithin (ML) (1% w/w)		Q_d= 0.25-5 mL/h	AstaReal® (AR, astaxanthin purity 20%), Zanthin® (ZA, astaxanthin purity 10%), and Astaxanthin >97% (Sigma-Aldrich) (1-5% w/w)	Size= 35-37 µm DI < 0.25 EE over 98 %		[5]
O/W-Microgel	Sodium alginate (1 wt%), gelatin (5 wt%), and EDTA-Ca (2 wt%)	Tert-butyl hydroquinone (TBHQ)	Q_d= 1-2 mL/h Q_c= 10-20 mL/h	Vitamin A (weight ratio 4:1 vitamin A/TBHQ)	Size= 246 µm DI= 0.96% EE= not specified CR= 75% over 2h	Photosensitive resin microfluidic device made using microscale 3D printing equipment 	[6]
	Poly (vinyl alcohol) (PVA) (0.25% w/v)	PLGA 7525A dissolved in dichloromethane (DCM)	-	Finasteride (28 mg, monthly doses)	Size around 30 µm DI= 23-28% EE= not specified CR= an initial burst, a moderate release, and then a plateau.	IVL-PPF Microsphere® microfluidic device 	[7]
		PLGA 5050A (PURASORB® PDLG 5002A),	P_d= 1,100 mbar		Size= 40 µm (PLGA 7502A or 5002A) and		[7]

		PLGA 7525A (PURASORB® PDLG 7502A), and PLA02A (PURASORB® PDL 02A) dissolved in dichloromethane (DCM)	P_c= 2,200 mbar		around 30 µm (PLGA/PLA02A) DI= 0.28 and 0.16 EE > 96.5%		
O/W-Nanoparticle	D1: acetone or methanol D2: deionized water	3M fluorinated™ Fluid (FC-40)	Q_c= 10 to 250 µL/min. Q_d= fixed at 50 µL/min.	Itraconazole (ITZ) nanoparticles (1 mg/mL)	Size= the volume was calculated and range from 1 to 6 µL. EE= encapsulation was confirmed by the increase of particle size.	316 stainless steel metal T-junction devices	[8]
	Poly (vinyl alcohol) (PVA; 1% w/v) solution	PLGA (13.4 mg/mL) in acetonitrile (ACN)	Total flow rate: 2-12 mL/min Flow rate ratio= 2:1 to 10:1, aqueous:oil phases	Rutin (10 mg/mL)	Size= 123.4 nm DI= 0.16 ± 0.005 EE= 34 ± 2%	NanoAssemblr® Benchtop Device	[9]
	Water	Tween 20 dissolved in ethyl acetate	P_c= 4.20 bar P_d= 3.81 bar For the smallest particle size	Fenofibrate (0.5 %wt)	Size < 1 µm DI= not specified	Glass microfluidic device	[10]
O/W/O-	*Middle phase:* an aqueous solution	*Outer phase:* soybean oil,	Q_i= 2.2 µL/h.	Thyme essential oil and lavender	Size= 182-342 µm DI= 2.4-2.8%	Glass microfluidic device	[11]

Core-shell microcapsule	containing CaCl$_2$ (100 × 10^{-3} M), disodium-EDTA (100 × 10^{-3} M) and sodium alginate (2.0%; pH 7.0)	acetic acid (5% w/v) and PGPR (5.0% w/v) *Inner phase:* soybean oil, benzyl benzoate (1:1), and PGPR (2.0% w/v)	Q$_m$= 5.0 µL/h. Q$_o$= 68.1 µL/h	essential oil (33.33% v/v)	EE= not specified		
W/O/W- Giant liposome	*Outer phase:* poly (vinyl alcohol) (PVA; 10 % w/v) *Inner phase:* PVA (1% w/v) and dextran (9% w/v)	*Middle phase:* soybean lecithin (0.5% w/v) in the following organic solvent mixtures (1:1.8 v/v): chloroform/hexane; ethyl acetate/hexane or ethyl acetate/pentane.	Q$_i$= 1000 µl/h Q$_m$= 1000 µl/h Q$_o$= 3,000-12,000 µl/h.	β-carotene (0.125% w/v)	Size= 100-180 µm DI= 3-6 % EE= not specified	Glass microfluidic device	[12]
W/O-Microgel	Pectin solution (0.5 and 1% w/w)	Acetic acid and CaCO$_3$ in rapeseed oil	Q$_d$= 1 mL/h Q$_c$= 9 mL/h	Silver and gold nanoparticles (5.5 nm; 1.5 mg/mL)	The microgel was able to encapsulate nanoparticles	Polycarbonate (PC) microfluidic device	[13]
	Gellan gum (0.10–0.30% w/w) and *Jabuticaba* extract (diluted in 0.025 M potassium chloride pH 1 and 0.4 M sodium acetate pH 4.5)	PGPR (4% w/w) and calcium acetate (1% w/w) added to the soybean oil	Q$_d$= 2-30 mL/h Q$_c$= 150-250 mL/h	*Jabuticaba* extract (10-30% v/v)	Size= 185-342 µm DI= 0.016 and 0.086	Glass microfluidic device	[14]

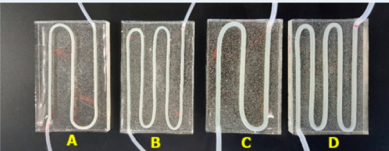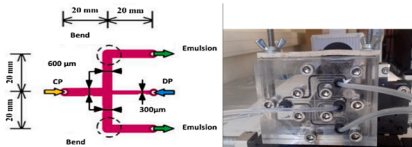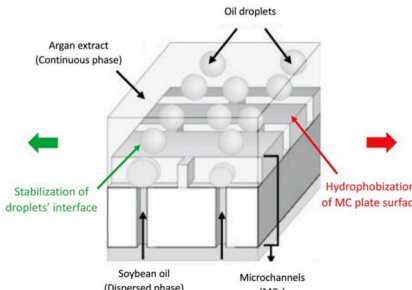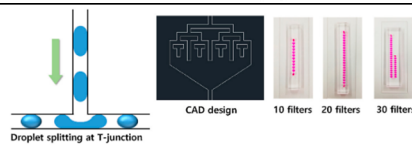|							
	1: Dextran or protein aqueous solutions 2: Alginate solution (2% wt%) containing $CaCO_3$ (200 mM). poly(ethyleneimine) (PEI; 0.3 wt%) or chitosan (1% v/v in acetic acid) coating	3: Mineral oil with Span 80 (3 wt%), used as oil phase A 4: Mineral oil with Span 80 and acetic acid (0.2% v/v) used as oil phase B	Q_1= 15 µL/min Q_2= 0.5 µL/min Q_3= 10 µL/min Q_4= 14 µL/min	Ovalbumin	Size around 100 µm DI= not specified EE= 88% (PEI coating) and 80% (chitosan coating)	Polydimethylsiloxane (PDMS) microfluidic device (four inlets and one outlet) 	[15]
	Alginate (2% w/v) and recombinant proteins in water *Collection bath:* chitosan (0.5%) and $CaCl_2$ (0.1%)	Span 80 in mineral oil	Q_d= 10 µl/h Q_c= 50 µl/h	eGFP+AvrA nanoparticles (2% w/v)	Size= 339 ± 52 µm DI= 0.352 ± 0.153 EE= not specified CR= 70 % of the encapsulated was released after 240 min	Polydimethylsiloxane (PDMS) microfluidic device	[16]
	Pectin (1 wt%) Sheath flow: $CaCl_2$ solution (1 wt%)	Mineral oil solution containing quercetin nanoparticles and retinyl palmitate, and Tween 80 (1 wt%)	Q_d= 0.5 µL/min Q_c= 4.0 µL/min Q_{sheath}= 30 µL/min	Quercetin nanoparticles (0.02 wt%) and retinyl palmitate (0.2 wt%)	Size around 67.3-93.1 µm DI= not specified EE= not specified, encapsulation confirmed by fluorescence	Polydimethylsiloxane (PDMS) microfluidic device 	[17]
W/O/W-Emulsion	*Inner phase:* phosphate buffer solution (100 mmol/L) containing betanin and D-glucose (1% w/w) *Outer phase:* Tween 20 in water	*Middle phase:* soybean oil and tetraglycerin monolaurate condensed ricinoleic acid ester (CR-310)	J_d= 5-100 L/m.h	E162, (mixture of beetroot extract and maltodextrin; 0.4% w/w betanin, TCI/ABCr), betanin, and spray dried beetroot juice) (0.1-1.0% w/w)	Size < 50 µm DI < 0.26 ± 0.01	Silicon 24 × 24 mm² microchannels array chip (Model: WMS 11–1; EP. Tech Co., Ltd., Hitachi, Japan) 	[18]
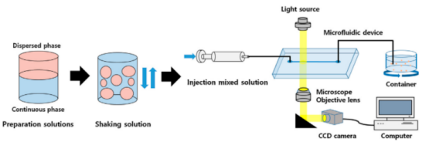
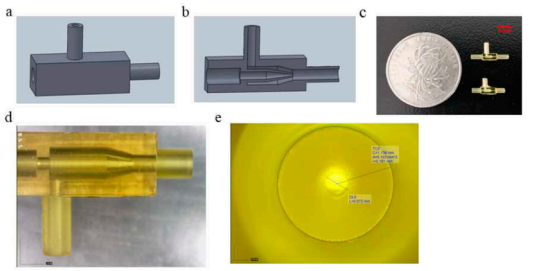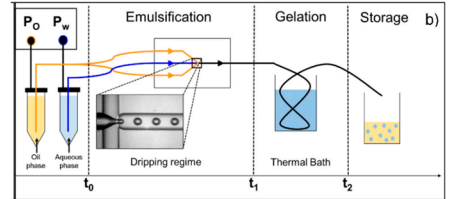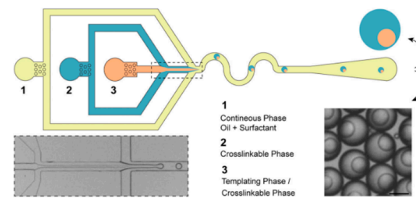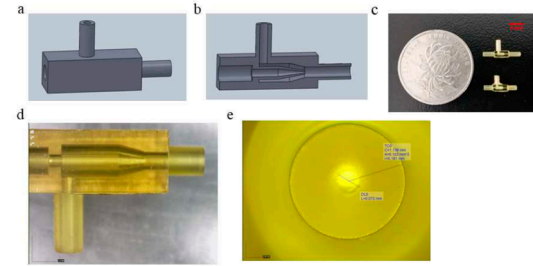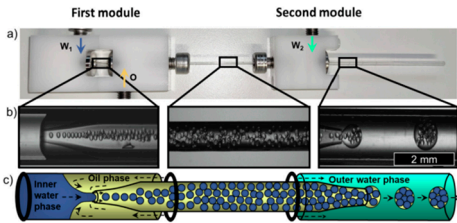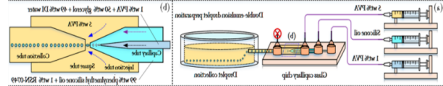|							
W/O/W- Solid lipid microparticle	*Outer phase:* water and polyvinyl alcohol (PVA; 10% (w/v) *Inner phase:* Ascorbic acid solution with or without $CaCl_2$, and chitosan.	*Middle phase:* palm fat oil	Q_i= 3,000 and 1,000 μL/h. Q_m= 2,500 and 3,000 μL/h. Q_o= 14,000 and 12,000 μL/h	Ascorbic acid (3-20% w/w)	Size= 195- 342 μm DI= 73-95 % EE= 73-95 % CR decreased around 50% after 30 days	Glass microfluidic device	[19]
W/O/W- Microcapsule	*Outer phase:* aqueous solution and PVA *Inner phase:* aqueous mesoporous silica nanoparticles (MSN) + Rhodamine B (RB) solution	*Middle phase:* PLGA oil	Q_i= 1 mL/h. Q_m= 2 mL/h. Q_o= 4 mL/h	Mesopouros silica nanoparticles (MSN; 40% w/v) + Rhodamine B (RB; 10-500 mg/L)	Size= 119 nm (MSN) and 56 μm (PLGA-MSN) DI= 4.91% EE around 88% for PLGA-MSN and 95% for PLGA CR around 96% after 120 days for PLGA-MSN and 97% after 120 days for PLGA	Polymethyl methacrylate (PMMA) microfluidic device	[20]
	Outer phase: Poly (vinyl alcohol) (PVA) aqueous solution (2 wt%) *Inner phase:* Poly (vinyl alcohol) (PVA) aqueous solution	*Middle phase:* PLGA (0.6 wt%) in dichloromethane)	Q_i= 1000 μL/min Q_m= 2000 μL/min Q_o= 4000 μL/h	2-[[(4-phenoxyphenyl) sulfonyl]methyl]-thiirane (SB-3CT; 0.5 mg/mL)	Size= 35-65 μm DI= 3% EE= 99%	Glass microfluidic device	[21]
	Middle phase: poly (N-isopropyl acry-lamide) (PNIPAM)	*Inner phase:* soybean oil solution added with camptothecin (0.4 mg/mL)	Q_o= 1600-2400 μL/min Q_m= 130-210 μL/min Q_i= 20-100 μL/min	Doxorubicin hydrochloride and camptothecin (2 mg/mL)	Size= 600-1000 μm DI= not specified EE= not specified CR= burst process	Glass microfluidic device	[22]
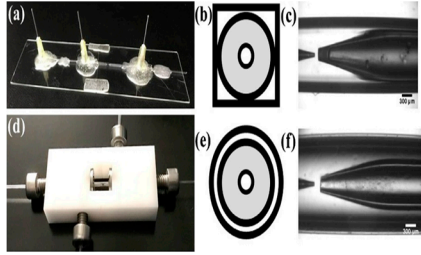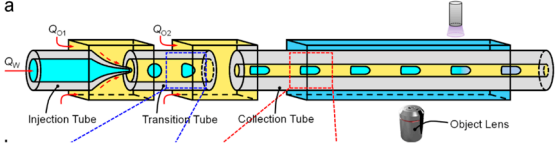
		Outer phase: soybean oil and PGPR					
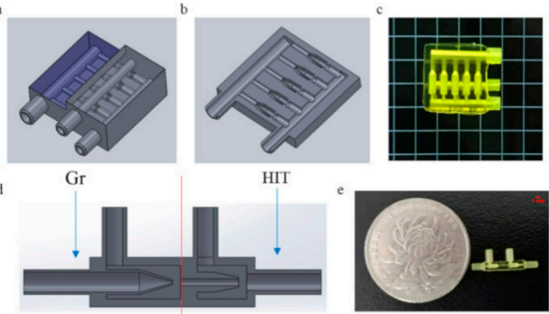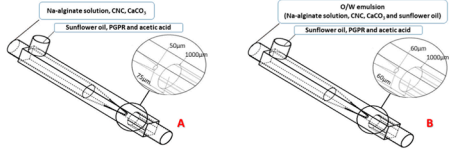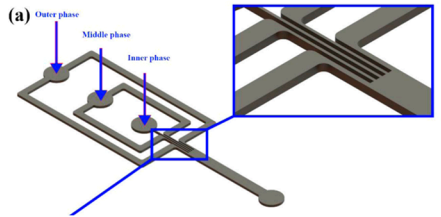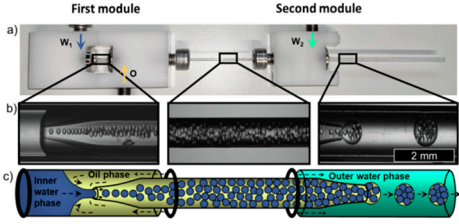
*Q_c: continuous phase flow rate; Q_d: disperse phase flow rate; Q_i: inner phase flow rate; Q_m: middle phase flow rate; Q_o: outer phase flow rate; J_d: disperse phase flux; P_d: disperse phase pressure; P_c: continuous phase pressure; Tween 20: polyoxyethylene (20) sorbitan monolaurate; EDTA-Ca: ethylenediaminetetraacetic acid calcium disodium salt hydrate; PGPR: polirricinoleato de poliglicerol; CaCl₂: calcium chloride; CaCO₃: calcium carbonate; PLGA: poly-lactic-co-glycolic acid; DI: dispersity index; EE: encapsulation efficiency; CR: compound release.

Table S3. Trends in droplet-based microfluidics approaches for fabricating delivery systems based on emulsions.

Emulsion type	Continuous phase	Disperse phase	Surfactant	Microfluidic device type	Process conditions	Microfluidic device design	Reference
O/W emulsion	Aqueous surfactant solution	Palm oil	Span 20	Combination of ultrasound and silicon/epoxy microchannel	Q_d and Q_c= 4 mL/min		[23]
	Xanthan gum or poloxamer in water	Sunflower oil	Tween 80 or Precirol™	Microsystem at High Throughput (MHT)	Q_d= 20.8-95.2 mL/min Q_c= 500 mL/min.		[24]
	Argan by-products extract	Soybean oil	Tween 80	Silicon	Q_d= 2 mL/h		[25]
	Mineral oil and glutaraldehyde (5 %wt)	Chitosan (2 %wt) in hydrochloric acid (1 %wt)	Span 80 (3 %wt)	PDMS microfluidic device	Q_d and Q_c = 100 to 500 µL/h		[26]

	Silicon oil and surfactant	Deionized water	Span 80 (1% w/v)	Photosensitive resin Gr			[27]
	Water and PEG 2000	Sunflower oil	Tween 20	Glass microfluidic device	Q_d and Q_c= 20 to 280 µL/min	-	[28]
W/O emulsion	Sunflower oil and surfactant	Whey protein isolated (WPI)	PGPR	Glass microfluidic device	Pressure ranged from 0-200 mbar for both phases		[29]
	Fluorocarbon oil (HFE 7500) and surfactant	PPGDA:Dextran (20% w/w) Dextran and PPGDA:PPGA (1:3 in 300 µL of ethanol)	Fluorosurfactant 008 (2% w/w)	PDMS microfluidic device	Q_d= 60 µL/h for PPGDA and 30 µL/h for dextran		[30]
	Deionized water and surfactant	Mixture of mineral oil and heptane (50:50).	PVA (2% w/w).	Photosensitive resin Gr	Q_d and Q_c= 100 to 500 µL/h		[27]

W/O/W emulsion	*Outer phase:* glycerol (5% w/v)	*Inner phase:* glycerol (50% w/v) in water *Middle phase*: middle chain triglyceride (MCT)	PGPR in MCT	Glass microfluidic device	Q_i= 1-5 mL/h Q_m= 4-14 mL/h Q_o= 50-400 mL/h		[31]
	Outer phase: glycerol (25% w/w) in distilled water	*Inner phase:* Na-alginate (1.5 %wt) *Middle phase*: silicon oil	Span 80 (0.25% w/w) in middle phase. PVA (5% w/w) in outer phase	PDMS microfluidic device	Q_i = 50 µL/h. Q_m= 500 µL/h Q_o=: 20000 - 100000 µL/h		[32]
	Outer phase: aqueous surfactant solution	*Middle phase:* phenylmethyl silicone oil and silicone resin RSN-0749 *Inner phase:* glycerol, PVA, and water	PVA (5 wt%) in outer and inner phases.	Glass microfluidic device	Q_i= 150 mL/h Q_m= 150-1750 mL/h Q_o= 1 mL/h		[33]
	Outer phase: glycerol (40 wt%) and surfactant	*Inner phase:* glycerol (5 %wt) and surfactant *Middle phase:* XIA-METERÒ RSN-0749 resin in Dow Corning ® 200 fluid (2 wt%)	Hydrophilic: PVA Lipophilic: XIAMETER® RSN-074	Glass microfluidic device			[34]
O/W/O emulsion	*Outer phase 1 and 2:* oil solution containing PGPR (4% w/v)	*Inner phase:* poly(ethylene glycol) diacrylate (PEGDA; 50 %wt), 2-Hydroxy-methylpropiophenone (HMPP; 5 %wt), and surfactant	Pluronic ® F 127	Glass microfluidic device	Q_i= 100-900 µL/h Q_{o1}= 300 and 200 µL/h Q_{o2}= 500-800 µL/h		[35]

Outer phase: dimethicone	*Inner phase:* silicone oil. *Middle phase:* surfactant	PVA (2 % w/w) in the middle phase	Photosensitive resin Gr and HIT	Q_i= Q_m= 2 mL/h Q_c= 5 mL/h		[27]
Outer phase: sunflower oil and glacial acetic acid (0.1% w/w)	O/W emulsion prepared by ultrasound: Na-alginate (1% (w/w)) and CaCO$_3$ (0.1825 g/g of Na-alginate), cellulose nanocrystal and sunflower oil	PGPR (4 wt%)	Glass microfluidic device	Q_c= 3000 - 15000 µL/h. Q_d= 600-3000 µL/h		[36]
Outer phase: silicone oil	*Inner phase:* silicone oil. *Middle phase:* glycerol (25% (w/w))	Span 80 (0.25% w/w) in the inner phase. PVA (10 % w/w) and in the middle phase. Span 80 (2.5% w/w) in the outer phase	PDMS microfluidic device	Q_i= 50 µL/h. Q_m= 500 µL/h Q_o= 20,000 - 100,000 µL/h		[32]
Outer phase: orange oil	*Inner phase:* middle chain triglyceride (MCT). *Middle phase:* PVA (1% w/v) in water	PVA in water and PGPR in MCT	Glass microfluidic device	Q_o=50-400 mL/h Q_m= 4-14 mL/h Q_i=1-5 mL/h		[31]

* PVA: polyvinyl alcohol; PGPR: polyglycerol polyricinoleate; Span 20: sorbitan monooleate; PDMS: polydimethylsiloxane.

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