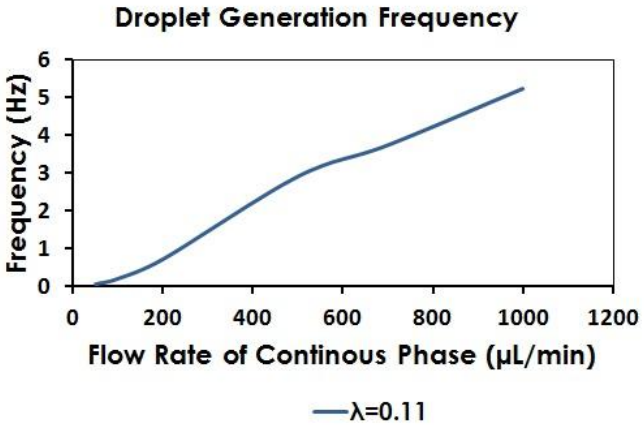
dropletex

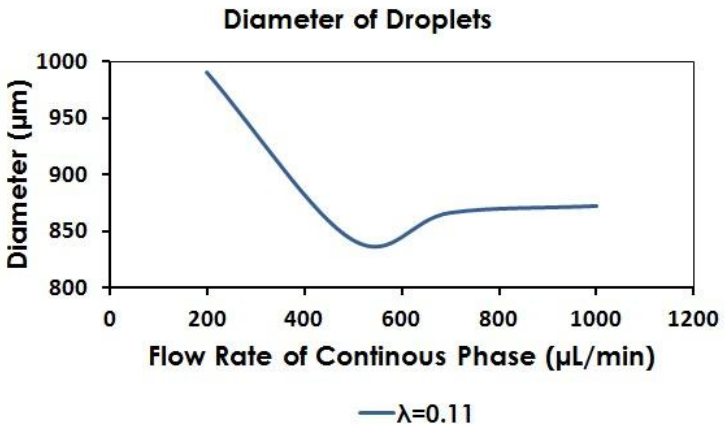
Flow Focusing Droplet Generator Chip

Product Name	Flow Focusing Droplet Generator
Catalogue Number	F04-RAW-nx F04-HPB-nx F04-HPL-nx
Dimension	25mm×75mm
Number of Inlets	2
Number of Outlets	1
Number of Devices on a Chip (options)	n=1
Device Material	PDMS
Droplet Type	w/o and o/w*
Coating Availability	Hydrophilic Hydrophobic
Maximum Pressure	3 atm
Tube Outer Diameter	1/16 in.

*w/o: water in oil, o/w: oil in water



Effect of flow rate, and flow rate ratio on the droplet size. Water in oil system. $\lambda = Q_{dispersed} / Q_{continuous}$



Effect of flow rate, and flow rate ratio on the droplet frequency. Water in oil system. $\lambda = Q_{dispersed} / Q_{continuous}$

Surface Coating:

Our droplet generators can be ordered with hydrophilic or hydrophobic surface coating upon customer request. Hydrophobic coating avoids water in oil droplets from absorption to the surface while hydrophilic coating repels the oil in water droplets from the walls. This results in higher droplet stability and monodispersity.

Surfactants:

Surfactants are commonly used in droplet microfluidics for increasing droplet stability and avoiding droplet coalescence. Choice of a surfactant is dependent on the droplet material. For example, for water in oil droplets Span 80 is commonly mixed with the oil phase at 1-4% concentration. For oil in water droplets, Tween 20, Tween 80 or SDS could be added to the aqueous phase. In our experiments, we used Span 80 in mineral oil at 2% v/v as the continuous phase and DI water as the dispersed phase for generating water in oil droplets.

Effect of flow rate on droplet diameter and droplet generation frequency:

Continuous phase flow rate (Q_c) and flow rate ratio ($\lambda=\frac{Q_d}{Q_c}$) are both important parameters in determining the droplet diameter and droplet generation frequency. Proper choice of flow rates results in generating stable and monodisperse droplets. The above figures show the average diameter and frequency vs. Q_c for various flow rate ratios. Frequency of droplet generation can be calculated using the following formula:

$$f=\frac{Q_d}{\frac{4}{3}\pi r^3}=\frac{Q_c\lambda}{\frac{4}{3}\pi r^3}$$

where f and r show the droplet generation frequency and droplet radius, respectively.

Tubing:

The ports in our droplet generators are compatible with tubes with outer diameter of 1/16 in. You do not need any fittings or connectors to connect our devices to syringes. For instructions on how to insert the tubes, please refer to the videos on our website. The tube can get connected to the syringe using BD 18G needles (Cat. no. 305196) if tube with compatible inner diameter is used.