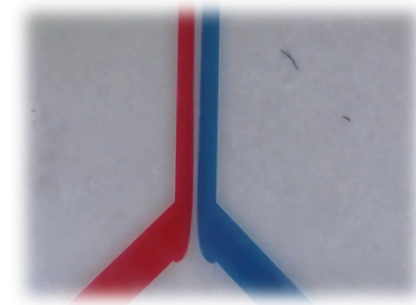# Application note Flow Focusing

How to perform an hydrodynamic flow focusing thanks to the OB1 Mk3 pressure controller.

Abstract

Hydrodynamic focusing is a powerful tool for microfluidicists that can be used for numerous applications, such as microfluidic mixing, separations, sensors, cell analysis, flow cytometry and microfabrication.

Hydrodynamic focusing occurs when fluids with different velocities are injected side by side. The most common way to perform hydrodynamic focusing is to use a 3 inlets microfluidic chips, where the core flow containing the sample of interest is sheathed by an inert fluid.

In this application note, we will detail the fluidic setup used to easily perform precise flow focusing, and we will see how to take advantage of the performances of the OB1 Mk3 flow controller to create a perfectly focused stream.
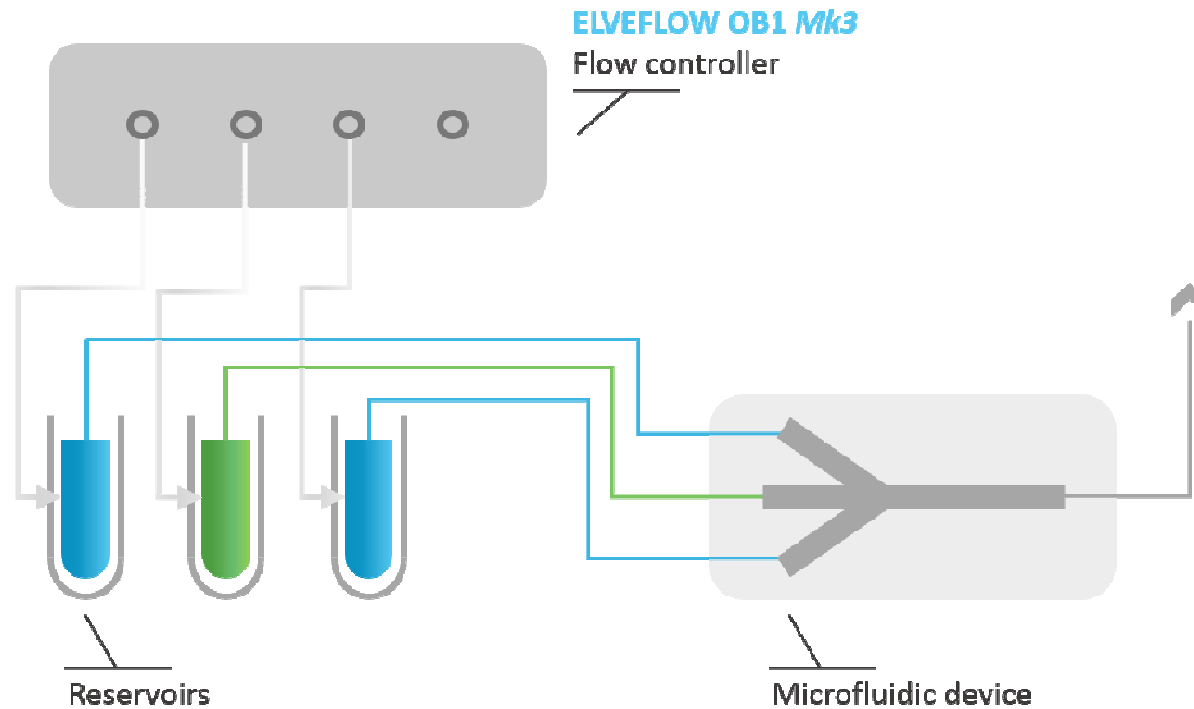
ELVEFLOW
PLUG & PLAY MICROFLUIDICS

Components list

✓ Elveflow flow controller OB1 Mk3
✓ Sample reservoirs
✓ Microfluidic device

✓ Tubing
✓ Fittings

Setup

The user-friendly Elveflow® Smart Interface software will allow you to easily perform different experiments of flow focusing. The aim of the hydrodynamic focusing is to position the elements of interest (fluid, cells, particles) at a precise spot, and so the flow control has to be reactive and stable. The OB1 Mk3 Elveflow flow controller enables to obtain unique and accurate flow focusing.

Abstract

In this first video, the pressure applied on the middle channel is gradually decreased to obtain a very narrow stream. Note that the stream obtained can be really thin and remains stable in time.
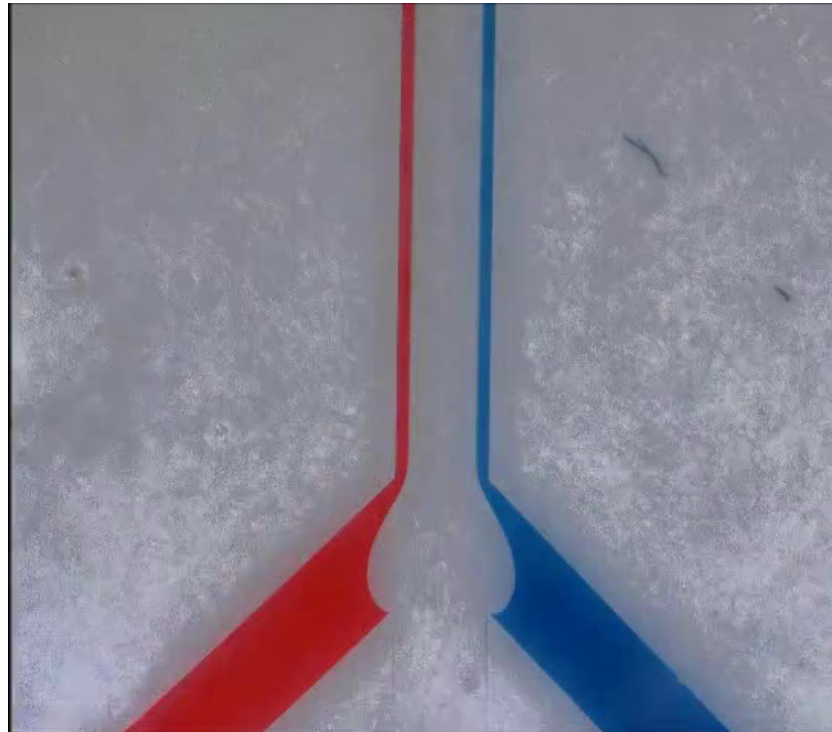
Create complex flow focusing

Create scomplex flow focusing by applying pressure patterns, such as ramps to the middle outlet of the pressure controller. The focusing can thus be quickly adjusted from a large stream to a very narrow stream positioned precisely in the microfluidic channel.
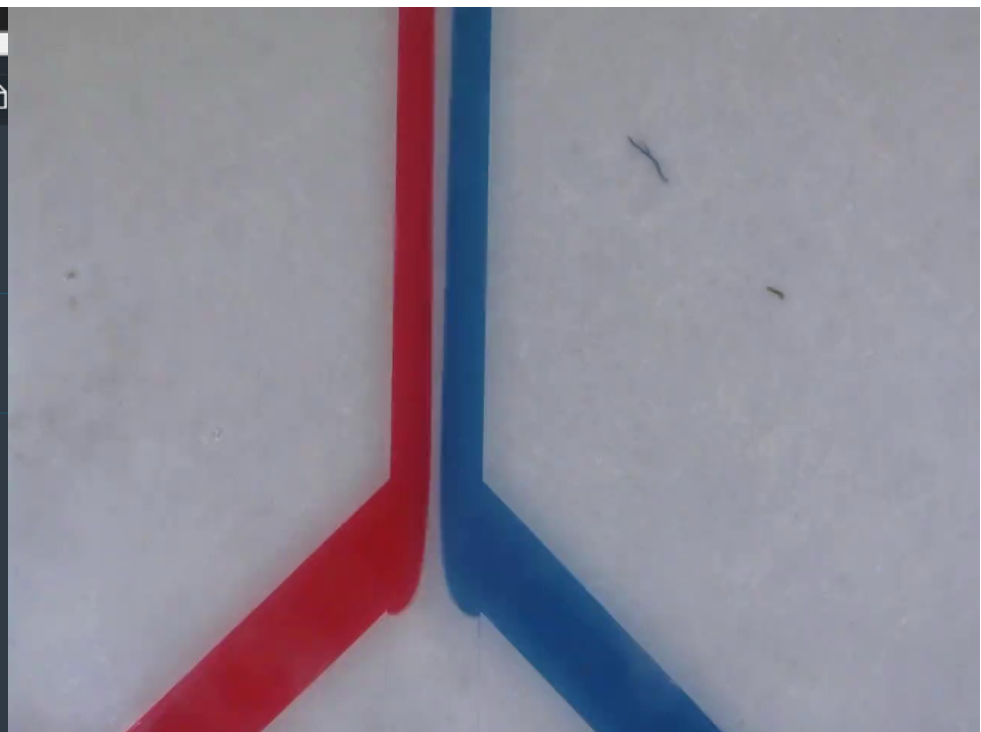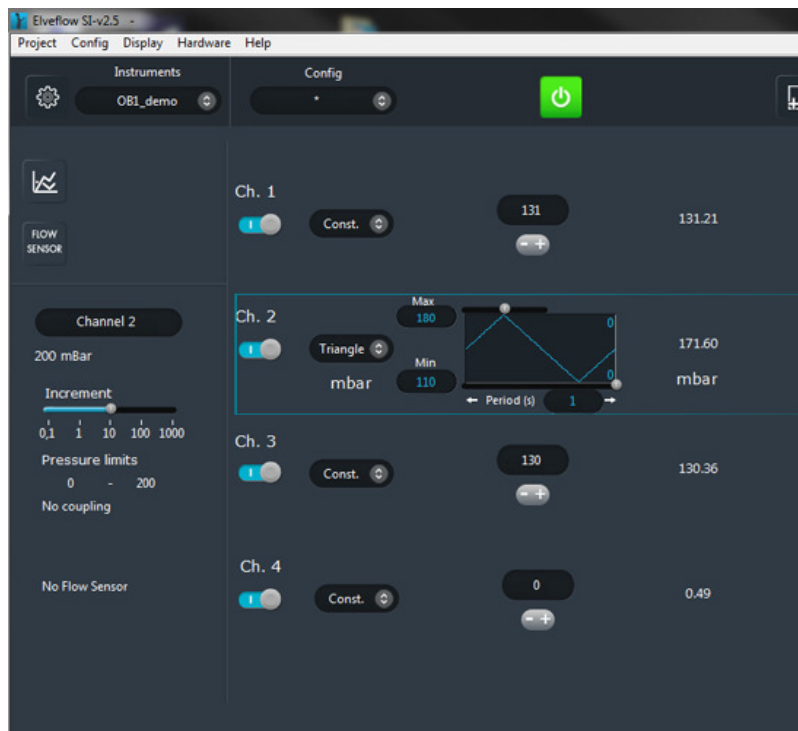
Create an oscillating middle stream

By applying ramps with a 180° shift to the two border streams, you can easily create an oscillating middle stream. The middle stream stay really stable with the same width and can be extremely thin.
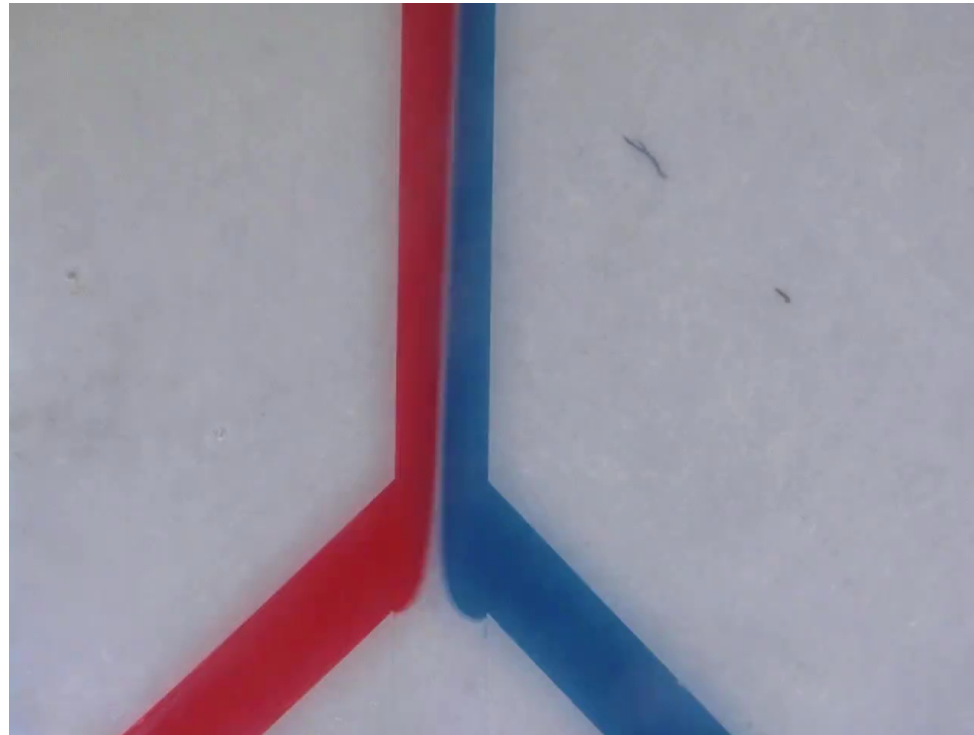
Load custom parterns

In the following example, a electrocardiogram pattern is applied on the middle stream and mimics the blood flow circulation.
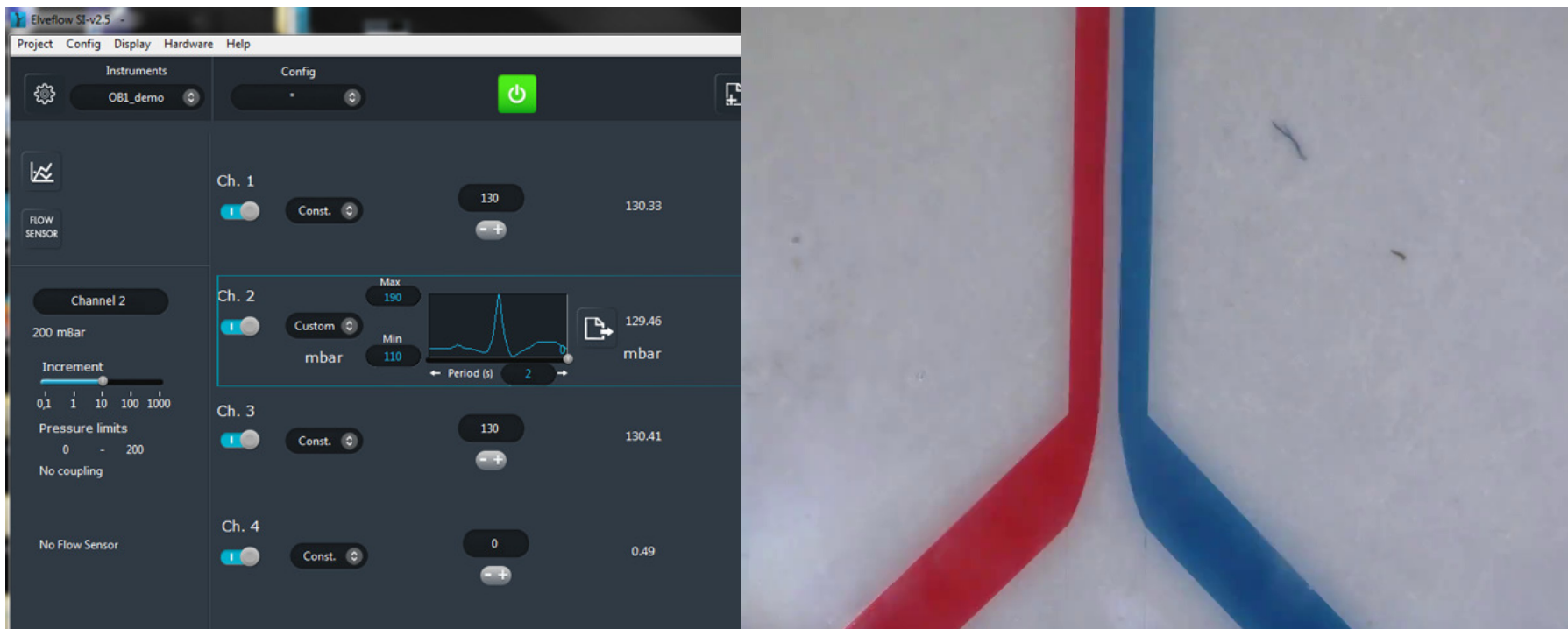
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