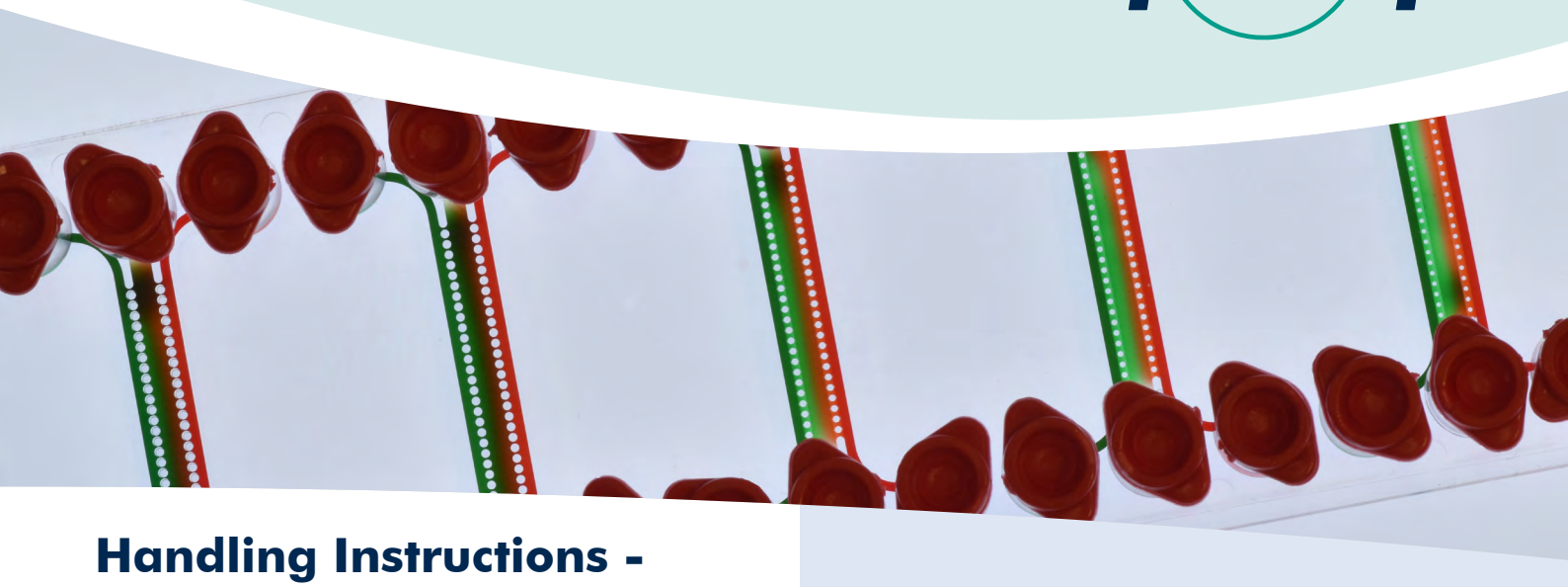
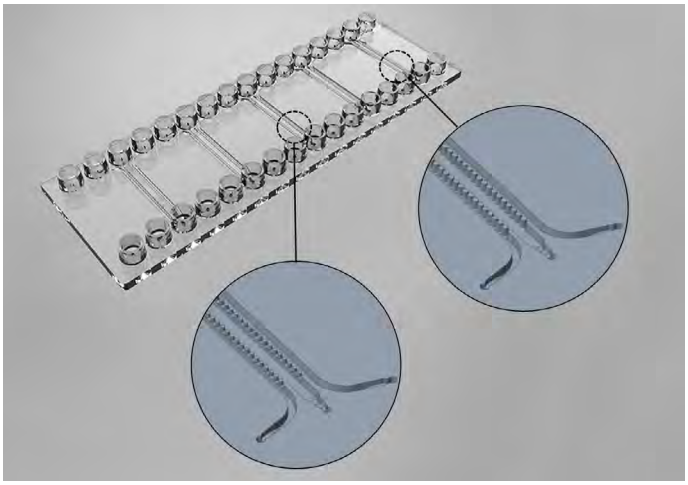
microfluidic ChipShop



Handling Instructions - Channel Interaction Chip Fluidic 983



A basic chip module for cell culture assays

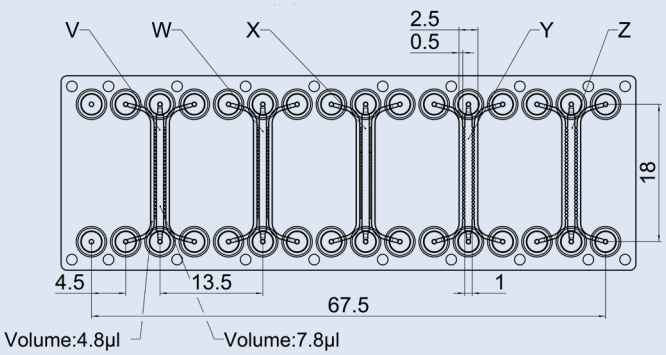
With the interaction chip family cell-cell interaction, of cells cultured in separate culture compartments, can be monitored. The channel interaction chip Fluidic 983, has been developed to study cells co-cultured in three adjacent channels, to each of which a microfluidic flow can be applied. The three channels are divided from each other by transmissive pillar barriers. On each channel interaction chip, five independant co-culture units can be found, which differ in the width of the pillar barrier.

One potential culture setting is the use of the two outer channels in perfusion mode while the inner channel can be easily filled with a cell-containing gelatinous extracellular matrix for static 3D culture conditions. Both co-culture and migratory cell assays are potential applications.

Chip description

Cell cultivation is possible in each of the five units present on one chip. Each unit consists of three adjacent cavities that are separated by each other through pillars. The central chamber has a size of 1 x 0.5 x 18 mm (w/h/l) and is with 7.8 µl the biggest chamber. The two adjacent chambers have a size of 0.5 x 0.5 x 18 mm (w/h/l) resulting in a volume of 4.8 µl.
The five units thereby only differ in the size of the pillars and thus the spacing/gap between them.

- unit V pillar gap of 250 µm
- unit W pillar gap of 225 µm
- unit X pillar gap of 200 µm
- unit Y pillar gap of 175 µm
- unit Z pillar gap of 150 µm



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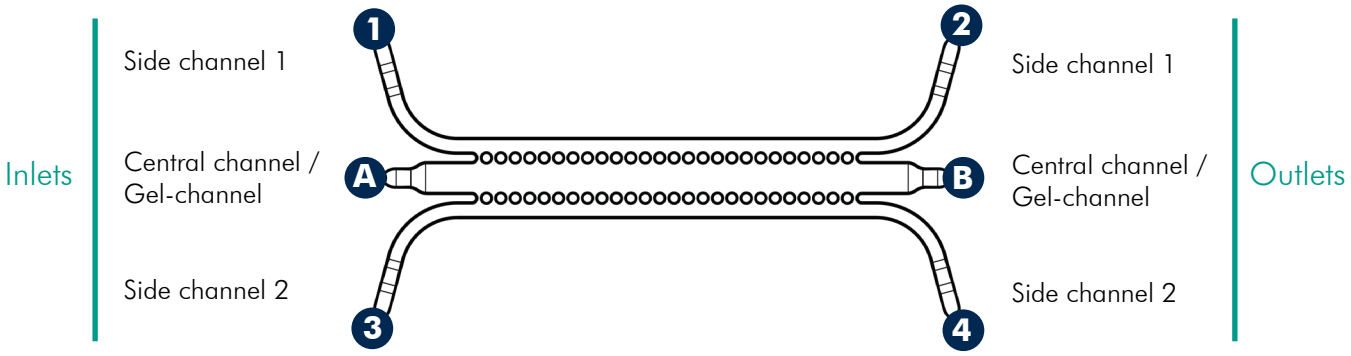
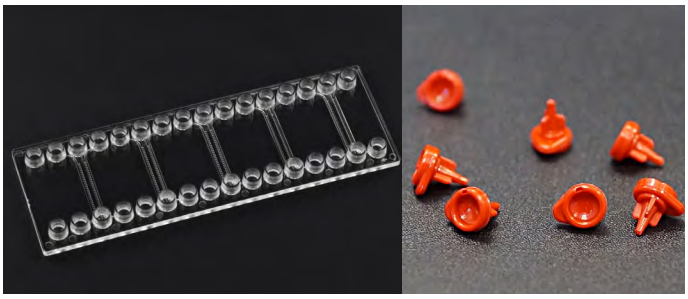
Handling instructions - a step-by-step description

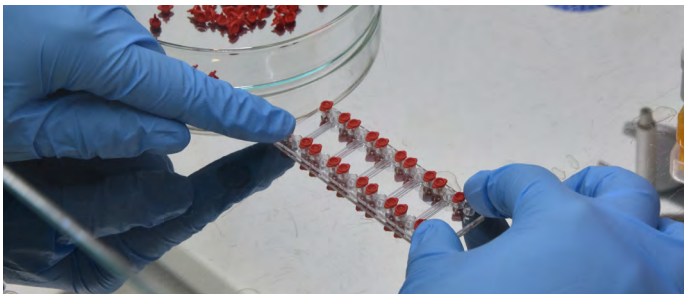


Necessary equipment

- 1 x chip Fluidic 983
- 30 x low-displacement Mini Luer plugs
- Conventional pipettes
- Extracellular matrix (ECM) hydrogel e.g. Matrigel® (make sure to follow the general handling instructions for working with gelling ECM, like cooling pipette tips, etc.)



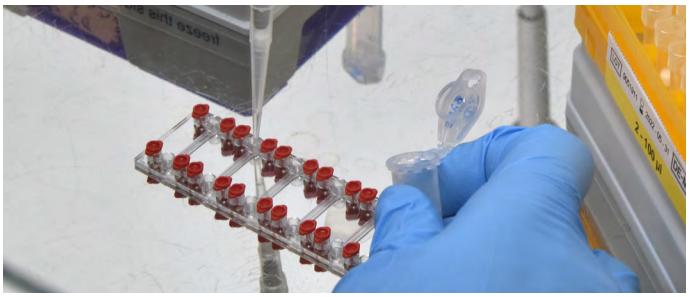
Step 1



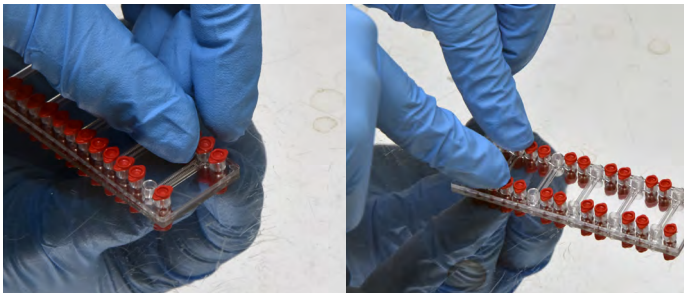
- Work in sterile conditions (sterile bench)
- Prepare 30 Mini Luer plugs and one chip
- Close in- and outlets 1-4 (side channels) in each of the units
- Leave only the central gel channel (A, B) open

Step 2

- Mix your cells with chilled, liquid ECM
- Load your pipette with 10 µl of cell containing ECM
- Place the pipette exactly in the middle of the inlet A and apply slight pressure
- Gently release the ECM to fill the chamber
- Halt dispense at first pipette stop to avoid air bubbles

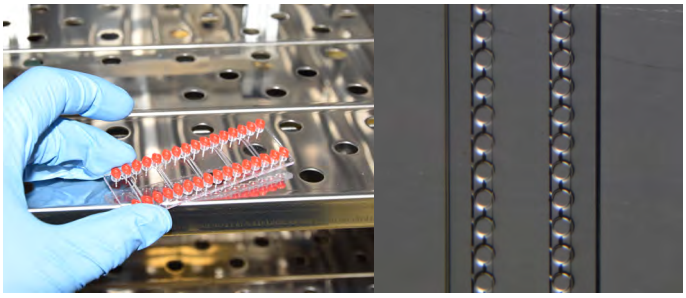


Step 3



- Fill as many units as desired
- Allow the gel to set for 1-2 min
- Place Mini Luer plugs gently and without pressure into interfaces A and B
- Use two fingers to simultaneously push down both plugs firmly

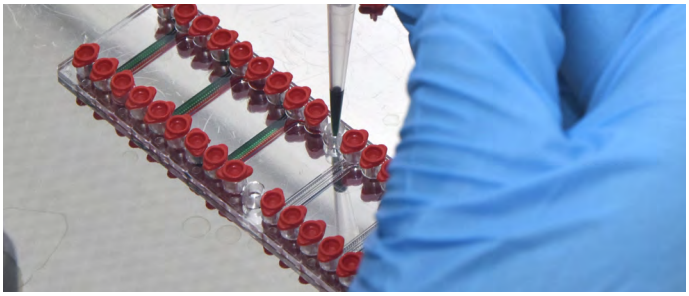
Step 4



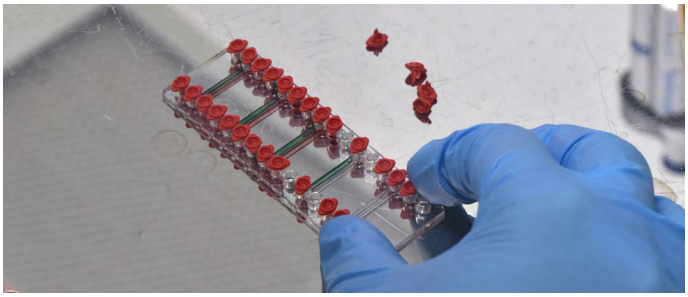
- Use a microcope to check for even filling or bubbles
- A gel line should be visible inbetween the pillars
- Let the gel polymerise for another 15 - 20 min in a cell culture incubator at 37 °C

Step 5

- To fill the first side channel remove the plugs in the interfaces 1 and 2
- Load a pipette with 10 µl of a (cell) solution of choice
- Place the pipette exactly in the middle of the inlet, apply slight pressure and release the liquid



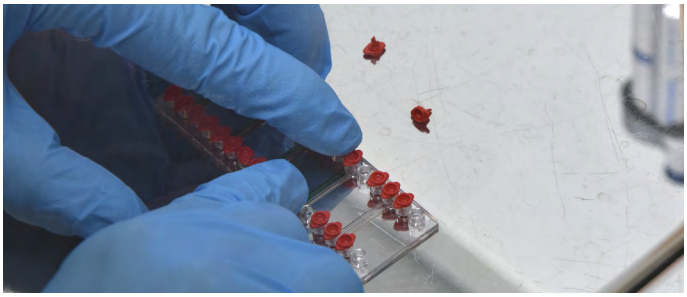
Step 6



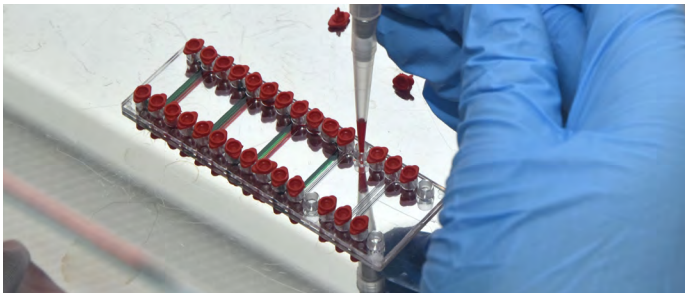
- Continue by removing the plugs from the interfaces 3 and 4 of the second side channel
- Now only the central gel channel should be closed with plugs

Step 7

- Place the Mini Luer plugs gently and without pressure into interfaces 1 and 2 of the previously filled side channel
- Use two fingers to simultaneously push down both plugs firmly



Step 8



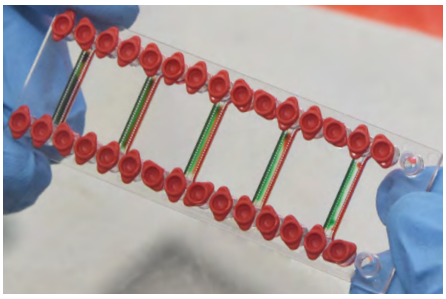
- Now start to fill the second side channel
- Load a pipette with 10 µl of a (cell) solution of choice
- Place the pipette exactly in the middle of the inlet, apply slight pressure and release the liquid
- Close this channel with plugs
- Place the chip into the incubator for cell attachment in side channels

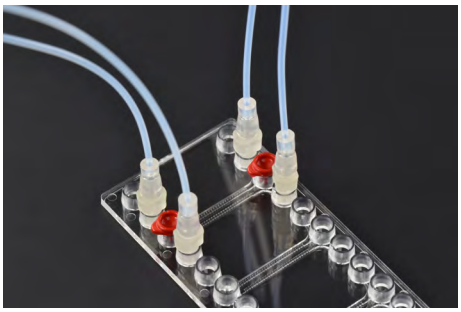
Continue with your microfluidic experiment

Handling Instructions Fluidic 983

Microfluidic use-case settings

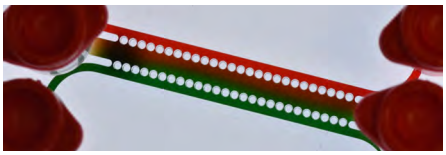
Once prepared, the channel interaction chip can be used in different use-case settings. Fluidic operation via syringe- or pressure pumps is enabled by our Mini Luer connectors, linked via a short piece of soft silicone tubing, to a second harder PTFE tube guiding to the pump.
Furthermore, tanks can be used (different volumes available) that allow to power the chip passively by gravity-/diffusion-driven flow or actively by liquid actuation through mechanical piston or pneumatic pressure. Active operation can be carried out in suction-mode by applying negative pressure at the outlets (connected to tubing) or in push-mode by applying positive pressure to the tanks via interfaces in their lid.

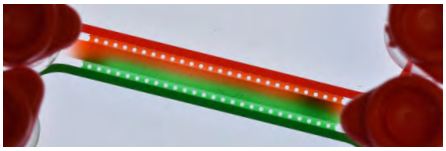




Channel interaction chip with Mini Luer connectors in the in- and outlets of the side channels, linked to PTFE tubing

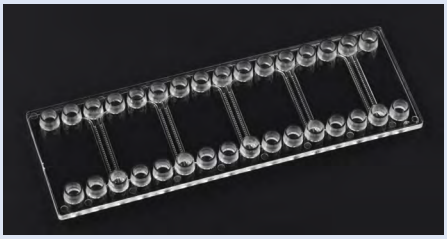
Channel interaction chip with 500 µl sampling vessels (Fluidic 639) and Mini Luer connectors linked to PTFE tubing



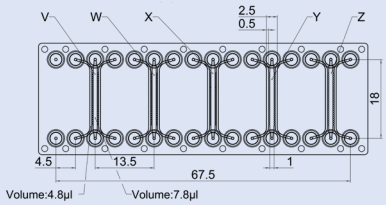


Off-the-shelf available - channel interaction chip Fluidic 983

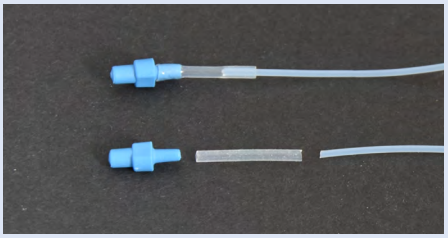
The channel interaction chip Fluidic 983 is off the shelf available in 3 different thermoplastic polymers which are Topas (COC), Polystyrene (PS) or Zeonor (COP).



Channel interaction chip Fluidic 983 with Mini Luer interfaces



Detailed schematic drawing of pillar distances of Fluidic 983



Assembly of Mini Luer fluid connector, silicone sleeve and PTFE tubing

Product Code for Fluidic 983	Description	Material	Lid Thickness [µm]	Surface Treatment
10001345	Channel interaction chip	Topas	140	-
10001347	Channel interaction chip	PS	125	-
10001349	Channel interaction chip	Zeonor	188	-
10001346	Channel interaction chip	Topas	140	hydrophilized
10001348	Channel interaction chip	PS	125	hydrophilized
10001350	Channel interaction chip	Zeonor	188	hydrophilized

Product Code	Description of Accessories	Material	Quantity
10000116	Male Mini Luer fluid connector	TPE - opaque	10 pcs / pack
10000280	Male Mini Luer plugs – Low volume displacement	PP - Red	10 pcs / pack
10000031	Silicone tube, ID: 0.76 mm, OD: 1.65 mm	Silicone	1 m
10000032	Micro tubes, PTFE, ID: 0.5 mm, OD:1.0 mm	PTFE	1 m

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