Microfluidic Chip Production

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1 Works for me Share This protocol is published without a DOI.

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ABSTRACT

Protocol for producing microfluidic chips used in HyDrop experiment.

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Microfluidic Chip Preparation

1 **Microfluidic device fabrication**

Guide to making microfluidic devices for bead production. The same method is used for the droplet encapsulation chips.

1.1 Check if bubbles are gone, pour into PMMA holder on wafer or PU mold. Pour leftover PDMS mix into a cell culture plate to create a PDMS mat. Bake in over for 4 hours (or at the shortest 2 hours) @ 80 °C

1.2 Remove PDMS slab from mold and tape over features to prevent dust accumulation
Puncture slabs with 1 mm biopsy needles and PDMS mat to prevent tip blunting
A quality of life tip: when you puncture the slabs, do so at a slight angle so that the tube that you will connect through that hole will face slightly outward, away from the centre of the tip. This ensure that the tube will not block your microscope's light source.

1.3 Put glass slide into 50 mL falcon and add 1 mL of acetone.
Shake well
Wipe glass plate dry with dust-free cloth

1.4 Put glass plate with rough yellow edge on top on the glass plasmabonder plate
Put chip with features facing up on the glass plasmabonder plate
Put plasmabonder vacuum valve in the metering position
Vacuum glass + PDMS chip in plasma bonder until the pressure is stable under 1 mmHg

Put plasma on HIGH for 30 seconds
Turn off plasma bonder and take out the plate
Slowly press PDMS slab on glass plate. Press down well using flat object.
Check for delamination

1.5 Flow 10 uL of silane in HFE (2%) through the channels
Wet all channels quickly
Blow out all oil in channels using the air gun. Any residual HFE will evaporate and leave a concentrated mess on the surface of the chip.

1.6 Bake 4h @ 100 °C and store the finished chips with tape covering the inlets.