

Protocol for Silanization of Microfluidic Chips

This protocol describes the silanization of inDrop Seq microfluidic chip shown in Figure 1. The silanization is necessary to render the surfaces of the channel network fluorophilic.

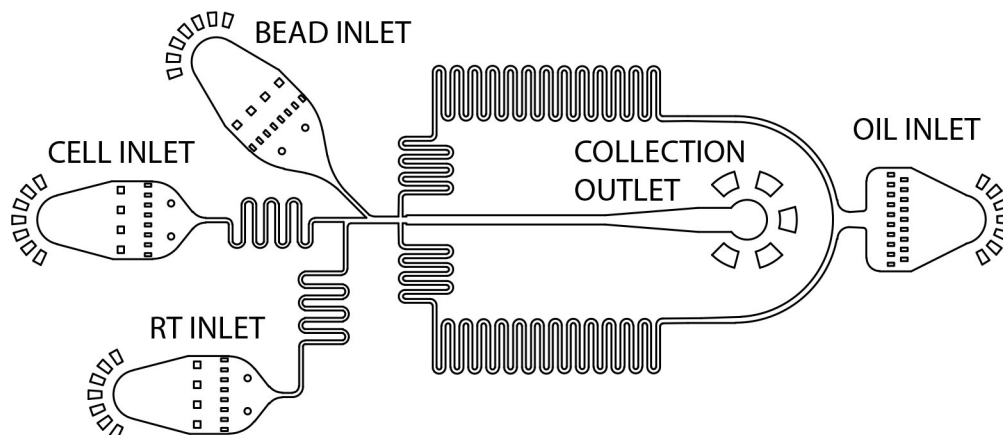


Figure 1. Schematic of an inDrop Seq encapsulation chip used for barcoding single cells

1 Materials

Supplied by 1CellBio

- HFE-7500
- Silane
- 6x 1mL syringes
- 6x Needles 27G (gauge) x 1/2"
- 6x Small filter units
- 6x 7.5-10cm long tubing (I.D: 0.38mm, O.D: 1.09mm)
- 1x 3mL syringe

Supplied by Customer

- 1000 μ L pipette tips and pipette
- 20 μ L pipette tips and pipette
- 2x 1.5mL Eppendorf tube
- Tweezers
- Nitrogen source recommended

***** SILANE IS SENSITIVE TO AIR, STORE IN SILICA GEL, HANDLE ONLY IN FUME HOOD, AND WORK RAPIDLY!

2 Procedure

2.1 Preparation of the Silane Syringe

1. Pipette 990 μ L of HFE-7500 into a 1.5mL Eppendorf tube, add 10 μ L of the silane for a 1% (v/v) solution.
2. Label a 1 mL syringe with **SILANE**.
3. Attach a 27-gauge needle to the 1mL syringe and draw up the entire silane solution into the syringe. Remove the needle and attach the filter unit.
4. Attach the 27-gauge needle to the 7.5-10cm long tubing and then attach the needle to the filter on the syringe.

 DISCARD SILANE SYRINGE AND CONTENTS AFTER 2h. DO NOT REUSE.

2.2 Preparation of HFE-7500 Syringe

1. Take a 1mL aliquot from HFE-7500 tube and dispense into a 1.5mL Eppendorf tube.
2. Label a 1mL syringe with **OIL**.
3. Attach a 27-gauge needle to the 1mL syringe and draw up the HFE-7500. Remove the needle and attach the filter unit.
4. Attach the 27-gauge needle to the 7.5-10cm long tubing and then attach the needle to the filter on the syringe.

2.3 Preparation of Air Flush Syringe

1. Attach the 27-gauge needle to the 7.5-10cm long tubing and then attach the needle to a 1mL syringe.

2.4 Silanization

1. Using the tweezers, carefully attach the tubing on the SILANE syringe to the inlet for oil (Figure 1).
2. Gently press the plunger until the channel network is completely filled and fluid appears at the other inlets and outlets.
3. Carefully attach the air flush syringe and empty the channel network by pushing air through the channel network.
4. Using tweezers, carefully attach the tubing of the OIL syringe to the inlet for oil.
5. Gently press the plunger until the channel network is completely filled and fluid appears at the other inlets and outlets.
6. Carefully attach the air flush syringe and empty the channel network by pushing air through the channel network.

7. Repeat steps 1-6 of part 2.4
8. Cover silanized chips with Scotch tape to avoid dust entering the channel network. Label these chips as silanized.

3 Notes & Tips

1. Silanize chips shortly before use; re-silanize chips if silane treatment is older than 3 days.
2. After silanization a white residue is often visible on the PDMS around the holes where silane solution exited.
3. Use a dark background (e.g. black cardboard) to visualize filling of channel network.
4. If possible, flushing the channel network with nitrogen is recommended.