Standard Operating Procedure:
Surface Functionalization of Microfluidic Channels with
(Perfluorinated silane (Heptadecafluoro-1,1,2,2-tetrahydrodecyl) trichlorosilane

(HEPTADEXFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRICHLOROSILANE (C₈H₄Cl₃F₁₃Si)

C₈H₄Cl₃F₁₃Si reacts with water to make hydrogen chloride. Do not inhale.
Handle only in fume hood.

Date of last revision to SOP: 18 July 2014

1. Perfluorinated silane (Heptadecafluoro-1,1,2,2-tetrahydrodecyl) trichlorosilane
2. Novoc HFE7500
   
   Perfluorinated silane Safety Data Sheet
   HFE7500 Safety Data Sheet

3. Approval Required
   Users must receive training on the process before working independently

4. Personal Protective Equipment
   
   - Protective eyewear such as approved safety glasses, goggles required.
   
   - Lab coat required.
   
   - Rubber, neoprene, or nitrile gloves required.

5. Engineering/Ventilation Controls
   
   - Only use in fume hood. Use on the open bench is prohibited. The silane reacts with water or water vapor to produce HCl gas.

6. Chemical Handling, Storage, Cleanup and Disposal Requirements
   
   - Conditions to avoid: Combustible; avoid contact with heat, sparks or open flame.
   
   - Incompatibility: Reacts with water and moisture in air, liberating hydrogen chloride. Avoid contact with alcohols, acids, and oxidizers.
   
   
   - The vial must be stored in a completely sealed container. Visually examine for leak before opening the outer container.
   
   - In case of spill: Cover spill with absorbent material. Transfer to a suitable container for disposal. Report to EH&S for assistance.
   
   - Disposal must be done through EH&S. No chemical wastes can go into the sewer system, trash or be allowed to freely evaporate.
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(Perfluorinated silane (Heptadecafluoro-1,1,2,2-tetrahydrodecyl trichlorosilane)

Adapted from Harvard University Protocol supplied by Lloyd Ung
15 July 2014

** This protocol involves a dangerous chemical, refer to the SOP and MSDS prior to handling it **
*Do not perform this protocol if you have not been trained by an authorized user*

This protocol is intended for liquid phase deposition of a silane on the channel walls of a PDMS microfluidic device. The chemical “Heptadecafluoro-1,1,2,2-tetrahydrodecyl trichlorosilane” will be referred to as silane for the purposes of this protocol.

*The silane reacts with water vapor in air to create hazardous vapor. Do not handle outside the fume hood. *

1. Punch and bond the device, following the protocol for PDMS-glass chips.
2. Dilute perfluorinated silane (Heptadecafluoro-1,1,2,2-tetrahydrodecyl trichlorosilane) 1:1000 (V/V) in Novec HFE7500 to a final volume of ~1mL in a glass vial.
3. Connect a blunt syringe needle and tubing to the syringe, and aspirate the solution into the syringe.
4. Prime the tubing, holding the tubing outlet above the glass vial, which now serves a waste container.
5. Connect the syringe to the oil inlet of the first device which is being treated.
6. Connect tubing to the outlet of the device, making sure that the tubing drains into the waste container. Plug any extra junctions with dead-end tubing.
7. Press the solution through the device, watching to make sure it fills the droplet making junction completely.
8. Repeat steps 5 through 7 for each device on the chip.
9. Incubate the silane solution in the channels for 20 minutes in the fume hood.
10. Rinse all the devices using pure HFE7500, following the same procedure as in steps 5 through 7.
11. Clean the top of the device with wipes. Seal any contaminated wipes into a plastic bag, labeled as hazardous waste.
12. Dispose of any liquid collected into the waste container labeled as halogenated hazardous waste.
13. (Optional) Bake the device for 4 hours at 65C to remove any residual solvent.