CLAIMS

1. A method of providing a hydrophobic coating on a microfluidic chip that promotes the discrete flow of at least one liquid comprising:

applying the hydrophobic coating onto an outlet region of the microfluidic chip, wherein the hydrophobic coating promotes discrete flow of the liquid with respect to the outlet region of the microfluidic chip;

wherein the outlet region comprises at least one channel and the hydrophobic coating is applied away from an end of the outlet region such that the hydrophobic coating does not contact any interior of the at least one channel.

2. The method of claim 1, wherein the hydrophobic coating is a temporary coating selected from the group consisting of a wax, a nanoparticle, a non-covalently bound molecule, and a combination thereof.

3. The method of claim 1, wherein the hydrophobic coating is a semi-permanent coating selected from the group consisting of organofunctional alkoxysilane molecule, another covalently bound molecule, and a combination thereof.

4. The method of claim 1, wherein the hydrophobic coating is a permanent coating comprising a micron sized pillar.

5. The method of claim 1, wherein the hydrophobic coating is biocompatible with a cell.

6. The method of claim 1, wherein the hydrophobic coating comprises a fluoropolymer.

7. The method of claim 6, wherein the fluoropolymer comprises perfluorotributylamine and poly-1,1,2,4,4,5,5,6,7,7-decafluoro-3-oxa-1,6-heptadiene.

8. The method of claim 7, wherein the fluoropolymer comprises about 85-99% of perfluorotributylamine and about 1-15% of poly-1,1,2,4,4,5,5,6,7,7-decafluoro-3-oxa-1,6-heptadiene.

9. The method of claim 1, further comprising:

heating the microfluidic chip; and

cooling the microfluidic chip.

10. The method of claim 9, wherein the heating the microfluidic chip further comprises heating at 55°C and then at 205°C.

11. The method of claim 10, wherein the heating at 55°C and then at 205°C further comprises stepwise heating at about 55°C, then at about 105°C, then at about 155°C, and then at about 205°C.

12. The method of claim 11, wherein the heating at about 105°C is for about an hour, the heating at about 105°C is for about 20min, the heating at about 155°C is for about 20min, and the heating at about 205°C is for at least about 20min.

13. The method of claim 1, further comprising:

clearing the interior or an open end of the at least one channel from any undesired blockage by the hydrophobic coating with a projection.

14. A microfluidic chip that provides discrete flow of at least one liquid comprising:

a hydrophobic coating applied to an outlet region of the microfluidic chip, wherein the outlet region comprises at least one channel and the hydrophobic coating is disposed away from an end of the outlet region such that the hydrophobic coating does not contact any interior of the at least one channel.

15. The microfluidic chip of claim 14, wherein the hydrophobic coating comprises a fluoropolymer.

16. The microfluidic chip of claim 15, wherein the fluoropolymer comprises perfluorotributylamine and poly-1,1,2,4,4,5,5,6,7,7-decafluoro-3-oxa-1,6-heptadiene.

17. The microfluidic chip of claim 14, wherein the fluoropolymer comprises about 85-99% of perfluorotributylamine and about 1-15% of poly-1,1,2,4,4,5,5,6,7,7-decafluoro-3-oxa-1,6-heptadiene.