Comparative study of hydrophobic surface treatments sold by Emulseo

OBJECT

In microfluidic experiments, coating the channel walls of the microfluidic system with a hydrophobic surface treatment is most of the time required for a successful experiment. For efficient droplet generation, the oil phase must wet the walls of the microfluidic device.
In this paper, we are evaluating and comparing the performance our Emulseo's surface treatment: Fluo-ST1 and Fluo-ST2 for their hydrophobic coating properties. All our surface treatments are easy to handle and do not require plasma preactivation. They can prevent the biological material to stick on the channel wall of a chip as well as ensure the stability of an emulsion.

PROTOCOL

For each treatment, 3 samples of COC, PMMA, PC, PDMS and glass, numbered 1 to 3, were treated as follows:

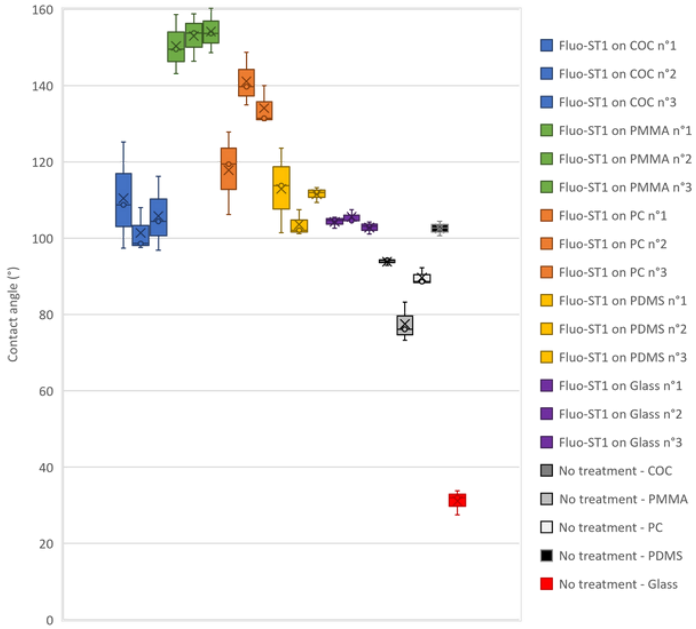
- Cover the surface with Fluo-ST
- Flush with argon
- Put the samples in an oven at 65°C overnight

The measurements were carried out according to the protocol below:

- Drop a 5µL droplet on the surface
- Take a photo and analyze the contact angles via the ImageJ software
- Carry out the measurements in triplicate for each material tested

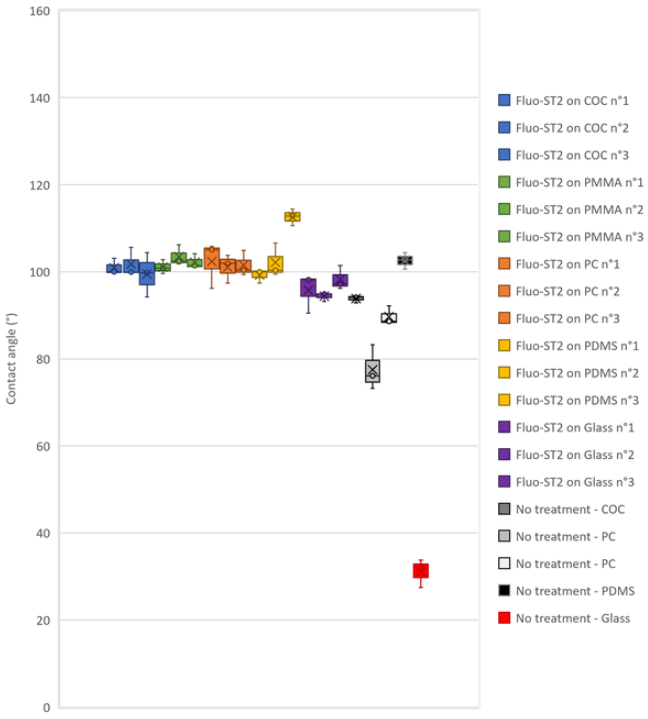
RESULTS

The following graphs (Figures 1 and 2) list the contact angle measurements determined according to the type of material and surface treatment.



The Fluo-ST1 treatment makes the glass (≈30°) hydrophobic (≈105°) and slightly increases the hydrophobicity of the PDMS.
Even if the Fluo-ST1 treatment makes COC, PMMA and PC materials very hydrophobic, a whitish layer remains on the surface after treatment which can interfere with microfluidic observations.

Figure 1. Contact angles measured by image analysis for different materials treated with Fluo-ST1. Measurements carried out in triplicate.



Fluo-ST2 makes all the materials tested (COC, PMMA, PC, PDMS, Glass) hydrophobic with a contact angle of around 100°.

Figure 2. Contact angles measured by image analysis for different materials treated with Fluo-ST2. Measurements carried out in triplicate.

CONCLUSION

Fluo-ST1 is not recommended for the hydrophobic treatment of COC, PMMA and PC surfaces. It is more recommended for the treatment of PDMS and glass.
Fluo-ST2 can be used as a hydrophobic surface treatment on all materials tested (COC, PMMA, PC, PDMS, Glass).

To learn more about surfactants and other formulation products for droplet microfluidics, please visit www.emulseo.com

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