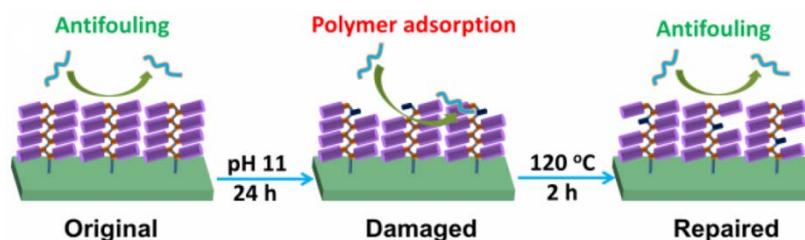


<b>Group</b>	: Responsive Supramolecular Polymers
<b>Project</b>	: <b>Self-healing antifouling fluorinated polymer brushes</b>
<b>Supervisors</b>	: Annemieke van Dam, Maarten Smulders and Han Zuilhof

## Introduction

Fouling is a significant problem for the transport or printing of organic materials through small holes, as is happening in inkjet printing, high-resolution 3D printing, and various processing industries. The deposition of organic materials at the inside of e.g. print heads leads to extra cleaning steps and greatly reduces its lifetime and the quality of printing. Initial results indicate that fluorinated polymer brushes can withstand such fouling to a very high degree.<sup>1</sup> In addition, they provide the potential for self-repair via chain rearrangements at slightly elevated temperatures.<sup>2</sup> In this project, a range of fluorinated polymer brushes will be investigated on their antifouling and self-healing abilities.

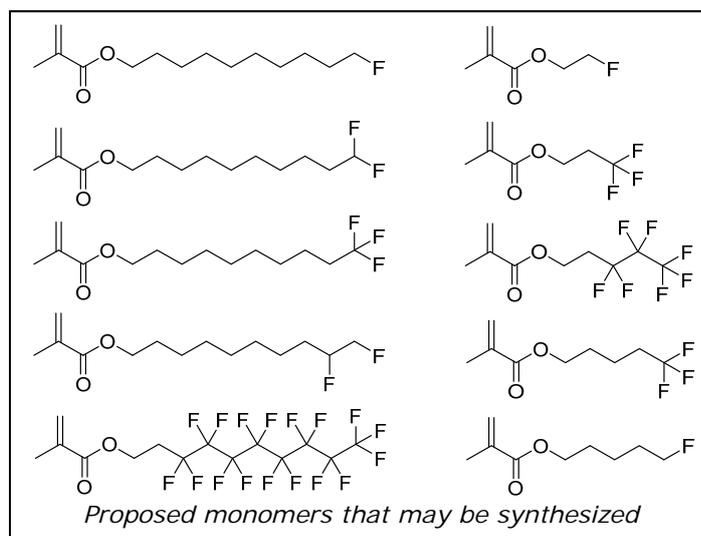


*The self-healing property of an antifouling polymer brush is demonstrated by submission in a pH 11 solution and heating.*

## Topics to be studied

As this project is in its early stages, there are many options for thesis topics. Depending on the wishes of the student, one or more of these topics can be included:

- Synthesis of monomers
- Growth of polymers and copolymers onto a silica surface
- Testing the antifouling ability of one or more coatings with a selection of fouling solutions.
- Testing the self-healing ability of one or more coatings with a variety of damaging procedures.



## Techniques to be used

- General organic synthesis techniques such as reaction set-up, TLC, column chromatography and NMR.
- Surface modification techniques such as plasma cleaning, fluoride etching, grafting, ATRP.
- Surface characterisation techniques such as water contact angle measurements, Ellipsometry, XPS, XRD, AFM and IRRAS.

## References

- (1) Wang, Z.; Zuilhof, H. *Langmuir* **2016**, 32 (26), 6571–6581.
- (2) Wang, Z.; Zuilhof, H. *J. Mater. Chem. A* **2016**, 4 (7), 2408–2412.

## More information

Annemieke van Dam, room Helix 8056, tel. 0317-482374, e-mail: [annemieke.vandam@wur.nl](mailto:annemieke.vandam@wur.nl)  
 Maarten Smulders, room Helix 8057, tel. 0317-480435, email: [maarten.smulders@wur.nl](mailto:maarten.smulders@wur.nl)  
 Han Zuilhof, room Helix 7031, tel. 0317-482367, e-mail: [han.zuilhof@wur.nl](mailto:han.zuilhof@wur.nl)