
Group : Dynamic Polymers
Project : **Development of Smart, Antifouling Polymer Coatings**
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Introduction

Surface fouling is a well-known problem in various applications, such as membranes, biomedical devices and marine structures. Antifouling coatings prevent such undesired deposition and have been studied extensively in the past years (Figure 1.1).

The aim of this project is to develop antifouling polymer brush coatings that possess stimuli-responsive –also known as *smart*– features. This allows the properties of the film to be altered through a change in the environmental conditions, such as temperature, ionic concentration or pH. Such *smart* coatings are of huge interest for, for example, future applications in biosensor or membrane technologies.

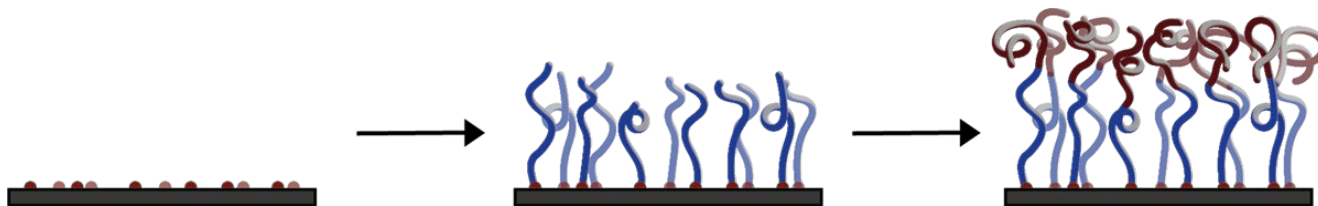


Figure 1 Schematic representation for surface-initiated polymerisation for a block copolymer brush structure.

Topics to be studied

Development of such polymer coatings consists of multiple steps. Each of these steps, or a combination, can constitute the main focus of the research project. The goal of the project will be jointly decided by the student and project supervisors. The individual steps primarily entail:

- Synthesis of monomers;
- Synthesis of copolymer brushes *via* graft or solution copolymerisation reactions;
- Characterisation and functionalisation of modified surfaces.

Techniques to be used

- General organic synthesis techniques such as reaction set-up, TLC, column chromatography, IR-spectroscopy and NMR.
- Polymerisation techniques such as RAFT and ATRP.
- Surface modification techniques including plasma cleaning, surface-initiated polymerisations and self-assembled monolayers.
- Surface characterisation techniques such as water contact angle measurements, ellipsometry, XPS, XRD, AFM and IRRAS.

More information

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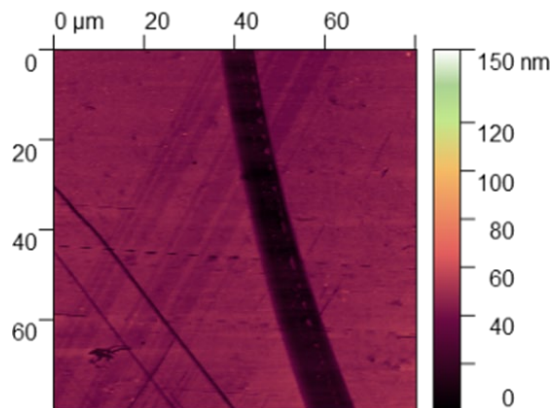


Figure 2 AFM-image of a polymer brush scratched with a scalpel to determine the brush height.