Group : Responsive Polymers
Project : **Introducing Responsivity to Antifouling Polymer Brush 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).
The aim of this project is to synthesize polymer brush coatings on modified steel surfaces that possess stimuli-responsive or self-healing features. This multifunctional nature of polymer brush coatings will be obtained by various copolymerization reactions of well-defined monomers using surface-initiated atom transfer radical polymerization (SI-ATRP) (Figure 2).

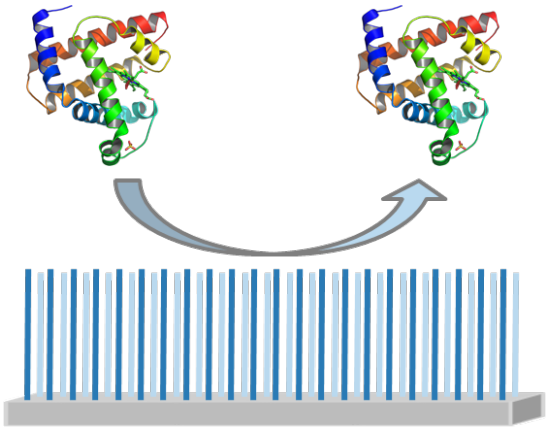

Figure 1 Schematic representation of an antifouling polymer brush coating.

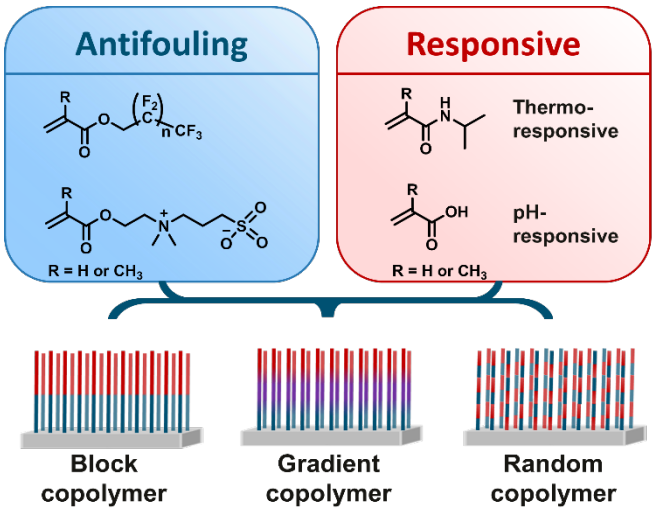

Figure 2 Examples of suitable monomers for the synthesis of antifouling, responsive copolymer brushes of block, gradient or random architecture.

Topics to be studied

This project was only recently started and, as a result, several possible research directions for BSc and MSc thesis projects are available, including:

- Characterization and functionalization of modified steel surfaces.
- Synthesis of monomers.
- Synthesis of copolymer brushes via graft copolymerization reactions.
- Analysis of polymer brush antifouling properties.
- Analysis of polymer brush self-healing properties.

Techniques to be used

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

More information

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