# Fluoropolymer surfaces modification via lithographic techniques

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The ability to immobilize biomolecules onto a surface with high spatial resolution is crucial for the development of micro- and nanoscale arrays and biosensors. In addition, the chemistry and the topography of a surface can control the size and the structure of cells attached to them, thus affecting their behavior [1].

Patterning techniques using conventional lithography are excellent techniques for high-resolution, precise alignment and thus spatial control of a surface [2]. Those techniques, unfortunately, have the disadvantage of requiring harsh developers and exposure conditions as well as elevated temperatures, which often lead to denaturation of biomolecules. Nevertheless, the use of this technique as a surface modification technique using novel photosensitive materials whose biomolecule adsorption properties change upon exposure to UV light is of high interest.

In the present work, different fluorinated polymers based on two different fluorinated monomers that cleave their fluorinated moieties upon exposure to UV irradiation and subsequent thermal treatment are presented. Those polymers were synthesized and evaluated as potential materials for surface modification through optical lithography. The two monomers have on their side chain either a fluorinated phenyl group or a fluorinated carbon chain which are cleaved from the polymer in the presence of acid and heat. Consequently, by adding a photoacid generator in these materials, it is possible to change the chemistry of the surface in specific areas by UV irradiation through a mask (UV light produce acid only in the exposed areas of the films). In order to improve the film properties (e.g. the film will remain on the surface after immersion in aqueous biomolecule solutions), copolymers containing one of the monomers were synthesized. The characterization of the fluorinated homopolymers and copolymers films in terms of solubility and wettability change before and after exposure to UV radiation were investigated. The novelty of this work is the implementation of optical lithography in combination with novel fluorinated polymers for the creation of well-defined areas on a substrate in order to be used in biological applications requiring site-directed immobilization of biomolecules.

References:

1. R.S. Kane, S. Takayama, E. Ostuni, D.E. Ingber, G.M. Whitesides, Biomaterials 20 (1999) 2363-2376.

2. K. M. Midthun et al., Biomacromolecules 14 (2013) 993-1002.