USE OF PHOTOLABILE OLIGONUCLEOTIDES IN THE FABRICATION OF PATTERNED SURFACES

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There is a large interest in the use of the self-assembly properties of biomolecules for electronic or biological or sensing applications. Among the biomolecules, oligonucleotides have been captured a large part of this interest[1,3]. This is due to the existence of a robust method for the preparation of oligonucleotides that allows the production of these compounds carrying reactive groups needed to anchor these molecules to surfaces.

Recently it has been shown that is possible to modify a specific region of a surface introducing chemical functionality to direct the adsorption of particulate species[4]. As example self-assembled monolayers (SAMs) carrying 4-nitrophenoxy head-groups can be converted to 4-aminophenoxy groups by electron-beam and X-ray irradiation[5]. Selective deposition of citrate-passivated gold nanoparticles (NPs) to the chemically patterned surfaces can subsequently be achieved due to the affinity of negatively charged gold NPs to protonated amino groups at the surface.

In the present communication we study the use of oligonucleotides carrying photolabile groups in their sequence as a new kind of biological resist to form patterns on surfaces. To this end, a method for the fabrication of patterned surfaces using hairpin oligonucleotides carrying photolabile groups is described. A photolabile group has been introduced at the loop of an intramolecular oligonucleotide hairpin. The photolabile oligonucleotide was immobilized on glass and SiO_2 surfaces. Photolysis results on the formation of areas carrying single-stranded DNA sequences that direct the deposition of the complementary sequence at the photolyzed sites.

References

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