Biomolecules immobilization as a models of nanobiosensors

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Immobilization of biomolecules or organic molecules on a biocompatible surface such as gold or silicon is a process that has been received much attention, specially in the search for nanobiosensors[1]. In this context, the main objective of our research project consists in to give biological or chemical properties to a surface in order to make them capable of actuate as a sensor or a tag in a biosystem.

The immovilization approach is based in the formation of a self assembled monolayer (SAM) and the posterior linkage to the functional (bio)molecule through a covalent bond. Different monolayers have been studied in order to find the optimal conditions for the SAM formation on both silicon and gold surfaces. Different nanotechniques were used to characterize the functionalized surface, such as contact angle, AFM and fluorescence confocal microscope. The choice of the biomolecule is based on the ultimate use of the device. Thus, wheat germ agglutinin (WGA), has been chosen because it is a protein that provides an specific cellular recognition due to its capacity to recognize some specific sugars of the cell membrane[2]. We are also involved in the immobilization of fluorescein derivatives, in order to build sensors of reactive oxygen species [3]. Biofuncionalization of WGA and fluorescein have been performed on silicon micronanosubstrates in order to probe their activity in living cells and also WGA has been immobilized in AFM tips in order to measure adhesion forces.

Also, we have been exploring bi-functionalization solution processes to be able to immobilize two diferent (bio)molecules on a substrate formed by two different materials, like gold and silicone. These experiments will permit to combine in one micronanotool two different activities such as cellular recognition and sensing. .

References

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[3] A. Gomes, E. Fernandes, J. Lima J. Biochem. Biophys. Methods **65** (2005) 45–80

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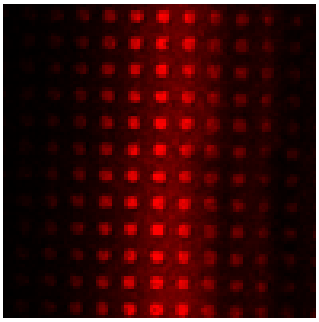
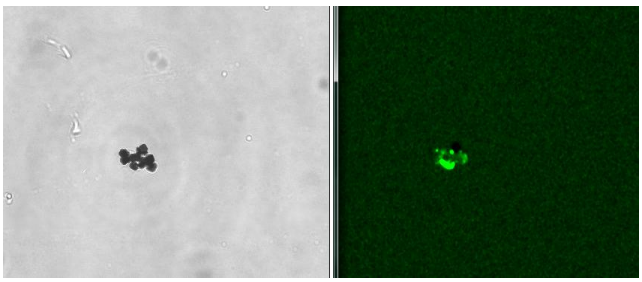
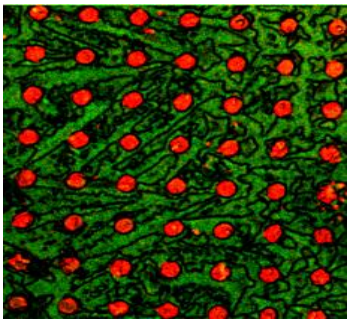
Figures



WGA immobilization



Optical and fluorescence image of fluorescein immobilization in a micronanosubstrate



Bifunctionalization confocal image