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# Fabrication of Functional Nano-structured Surfaces for Protein Based Sensor

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Patterning of surface with active and non-active spots at sub-micron level is one of the main issues for the development of protein and cell based sensors for drug screening application. The vision is that nano-patterned surfaces with high chemical contrast may allow the triggering of specific interactions exclusively and therefore improve drastically the signal to noise ratio of the bio-analytical devices. Many studies have been undertaken to develop reliable method of chemical nanopatterning and to study the effect of the nano-structured materials on the protein adsorption or on the cell adhesion. Several approaches have been used successfully but several issues still to be addressed. On one hand, the excellent results obtained by using a bottom-up approach (molecular assembly, auto-nano-fabrication) are now far to be scaled to high-throughput systems. On the other hand, top-down approach is often too expensive and time consuming (e.g. electron beam lithography) otherwise is giving very promising results. In this work, we present a novel method combining well-established techniques of material processing with low-cost and fast fabrication steps, such as plasma deposition and etching techniques using nanospheres masking of polymeric materials. Several type of nanostructures (ranging from 70 to 250 nm) such nano-domes, nano-wells and nano-spots consisting of materials with chemical and/or biological functionalities suitable for biosensor applications are produced in our laboratory. In this work examples of this research activity will be illustrated. In particular the fabrication process and characterization of Poly Acrylic Acid nanodomes (Fig.1) and nano-wells will be described and discussed. The selective biological response the nano-patterned surface is demonstrated with protein assays i.e. BSA is selectively bound to the functionalised nanostructures, whereas no protein adhesion is detected in the surrounding anti fouling matrix (Fig.2).

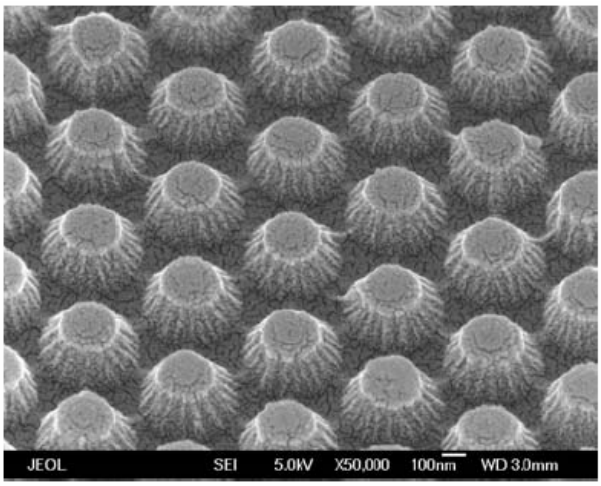


*Figure 1. SEM picture of the functionalized nano-domes*

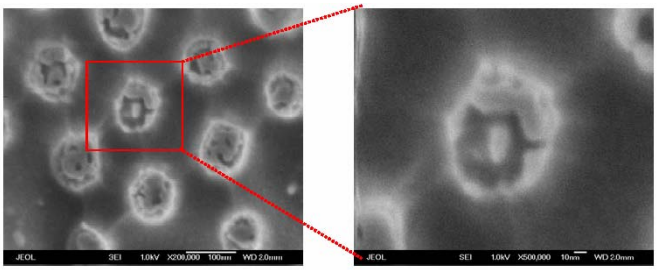

*Figure 2. BSA clusters selectively bound on the top of the functional domes*