**74c Self-Aligned Immobilization of Proteins on Silicon Dioxide Surfaces**

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In the last decade, the field of Bio-MEMS has emerged as an application using both microsystem technology and biotechnology. Novel surface nanotechnologies have been developed to selectively modify artificial surfaces with active bio-layers to be used for biosensors, cell studies and tissue engineering. These methods include local deposition of bio-molecules using ink-jet, laser ablation, vapor deposition, photochemical structuring and photolithography techniques. Currently, the most popular technique is contact printing, where the printing process allows the transfer of molecules to various surfaces in a wide concentration range with high efficiency. However, this may not be an attractive method if a precise alignment to prefabricated fine features is required or if precise immobilization of different proteins on the same chip is needed. Photolithography is a well-established technique in batch fabrication of ICs with high resolution and precise alignment. Patterns are transferred from a mask to a photoresist layer--and from the photoresist to a thin film of bio-molecules immobilized on a surface. However, the solutions used to develop and strip the photoresist layer lead to stability problems for functional proteins. In this work, we utilized standard photolithographic procedures to generate stable patterns consisting of a functional protein (protein A + IgG antibody) next to end-grafted PEG self-assembled monolayers on silicon dioxide surfaces. The PEG patterns were generated using the lift-off method, while the immobilized proteins were self-aligned on the surface not protected by the PEG layer. Both the PEG and the protein layers have been characterized by demonstrating their proper functionality at the end of the fabrication process. Physical characterization of the surface modifications included optical microscopy, contact angle measurements, and AFM profiling. Protein patterns were shown to be biologically active by the selective (antibody-antigen) binding of microparticles covered with IgG antigen; typically, selectivities on the order of 0.96 were obtained.