Contribution ID: **253** Type: **Contributed**

Selective biofunctionalization of porous silicon through visible light induced amino silanization

Thursday, 21 June 2018 10:50 (40 minutes)

Since the discovery of porous silicon (PSi), a remarkable field of innovation has been opened through its biological applications. These often require the engineering of an interface between the inorganic material and the biomolecules. This interface is expected to passivate the PSi surface and facilitate the progress of biomolecular immobilization cascades. This process is carried out sequentially through chemical or thermal oxidation and an ulterior crosslinking of an organosilane to the hydroxyl groups generated at the surface. In the present work we first show that the two step process can be simplified through a single step process by using light activation of the PSi surface in ethanol solutions (98%) containing 0.2 % aminopropyltriethoxysilane. Noting the enhanced surface selectivity offered by light induced processes, we secondly take profit of masking and focusing options to generate biofunctional micropatterns on the surface. These have been characterized by X-ray photoelectron spectroscopy and validated by applying sandwich immunorecognition assays optically revealed by fluorescence microscopy.

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Session Classification: Biointerfaces

Track Classification: Biointerfaces