FUNCTIONALIZATION OF POROUS SILICON WITH SH^- GROUPS: EFFECT OF THERMAL OXIDE

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Porous silicon (PSi) has been intensively used as a host matrix for biosensing applications. For this purpose, it is usually necessary to functionalize the surface of PSi, to improve the linkage of bio or organic groups to it. SH- groups are common candidates for doing this function. In the present work we report about the functionalization of PSi with 3- mercaptopropyltrimethoxysilane (MPTS) paying special attention to the effect of having an oxidized PSi surface. To prove the functionalization of the material, fluoresceine (FM) was used as a testing dye and photoluminescence (PL) was used as testing technique. We report some effects of the sequence of processes on the PL of PSi functionalized with FM. PSi layers were prepared from p- type (100) wafers with of 0.01- 0.02 ??cm resistivity by electrochemical anodization. PSi layers were oxidized at 300 °C for 3, 30 and 60 min under 10 ml/min of oxygen flux. The PL spectra show that the oxide grown for 60 min passivates the surface dangling bonds that produce the PL of PSi. PSi layers were oxidized at same conditions for 60 min while the PSi layers of other set were not. Both sets were silanized by dipping them into an MPTS, and washed with propanol. The PL spectra show that the intensity of the PL broad band of PSi is reduced which means that indeed a silanization process of PSi took place. Then the samples were dip into a 1.2 mM FM, let dry and the FM washed away from the PSi samples with a buffer phosphate solution and let dry. From PL spectra it is seen clearly, that the PSi sample with no thermal oxidation performed, after having been silanized with MPTS and functionalized with FM still shows a PL contribution of PSi, while the PSi oxidized does not.

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