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Characterisation of Porous Silicon Nanowires (PSiNWr) Film Elaborated and Modified by Organic Species

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In The last years, nanostructures of materials, as the porous silicon nanowires (PSiNWs), have been used extensively studied for the development of several chemical, electro-chemical and biologic sensors, because of their physical and chemical characteristics. The PSiNWs present a unique property, like the biocompatibility and the multifunctional. The PSiNWs can be elaborated from lightly n-type (100) silicon substrate by Ag assisted chemical etching method. The obtained surfaces were grafted with organic functional groups; first, we proceed by the grafting of acid monolayer on hydrogenated PSiNWs surface by hydrosylilation reaction to form Si-C covalent bond. Then, a reactive ester is generated from the terminal acid groups and subsequently this activated surface is coupled with peptide containing amines by the formation of amide bond. This strategy is based on that used for the immobilization of biomolecules (DNA, proteins, antibodies ...) to elaborate biosensors [1-3]. At each step of the modification, the resulting surfaces were characterized by X-ray photoelectron spectroscopy (XPS). Different characterization techniques were used to investigate the resulting nanostructures, such as SEM, XPS, FTIR and electrochemical measurements.

Finally, the obtained results can find application in low-cost and high efficiency porous silicon nanowires based applications were envisaged in environmental area. The obtained hybrid structure was tested as probe electrode to the electrochemical detection of mercury in solution.

Keywords: porous silicon nanowires, sensor, XPS, mercur

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