PRESENTER INFORMATION

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BIOGRAPHICAL SKETCH

Guido Mula is a full time Experimental Physics researcher at the Università degli Studi di Cagliari, where he works on the properties of porous silicon-based structures often filled with organic or inorganic materials as Er, Ni, melanins, polyaniline and other materials. His research interests span from biosensor to photovoltaic devices, from catalysis to optical properties. He is also particularly interested in the understanding of the factors influencing the fabrication processes of porous silicon, such as the process he patented on electrochemical nanolithography or how identical bulk Si parameters lead to porous layers with different structural properties.

GM has also expertise in fabrication and characterization of nanostructured III-V, II-VI, and silicon-based semiconductors for technology applications (telecommunications, light generation, photovoltaics, …). He is co-author of more than 80 scientific peer-reviewed publication in international journals and inventor of two patents on semiconductors technology, one of them on an innovative electrochemical nanolithographic process allowing the fabrication of ordered nano-sized indentations on semiconductor surfaces.

TITLE

Substrate doping inhomogeneities and their effect on porous Si pores formation

ABSTRACT

When you buy a silicon wafer, you ask for a given dopant, a given dopant concentration or a given resistivity, a crystallographic orientation, your preferred surface quality. Will these qualities guarantee automatically the reproducibility of your results? As a matter of fact, no, it is not that simple. The fabrication processes for the Si wafers are quite complex and their full control is not that easy, especially with high doping levels or dopants with relatively low solubilities as phosphorus. After an overview of the fabrication techniques and critical aspects, I will present large experimental differences in the porous layers prepared, with identical fabrication parameters, when using wafers with nominally identical o very similar properties and briefly discuss some possible origin of the differences. These differences among nominally identical wafers, although poorly investigated, may be a significant issue for industrialization of processes involving porous silicon structures with pore diameters roughly around or below 100 nm, where the effect of small-scale inhomogeneities in the bulk Si matrix becomes critical.