PL-3.2

Nanosensors: Current Status and Perspectives

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Nanosensors play a great role in the world of nanotechnology and are demanded nowadays due to miniaturization of electronic devices in many countries for development of faster portable diagnostics techniques or sensing systems, as well as interconnected set-ups for extensive customer applications. Size effect and introducing additives in semiconducting oxides make them suitable for sensing by tuning their selectivity, response and reliability. The present overview is aimed to summarize our results in this field and reported ones too [1, 2]. It is known that companies developing nanosensors, especially in medical applications should consider a series of characteristics (molecular, toxically, secondary reactions creating side products, etc.). I will demonstrate how networked or single nanowire/nanosensors are build by a new bottom-up approach with electronic [1], chemical [3], physical [2], magnetic properties of emerging semiconducting oxide materials leading to their tuning towards new applications in nanotechnology, nanoelectronics and biomedical fields. Improvements in the last years were made following new requirements of selectivity, response, reliability and lower power consumption of the nano-sensors [4]. One of the major factors driving market for nanosensors is increasing demand for nanosensors in homeland security (e.g. detection of biotoxines, radiations, etc). In this work, we report on a single nanowire/nanorod/nanotetrapod nanodevices fabricated by using platinum complex maskless nanodeposition in the dual beam focused electron/ion beams (FIB/SEM) scientific instrument Dualbeam Helios Nanolab (FEI). The bottom-up method is based on the assembly of nanoscale building blocks to design and growth the desired nanostructure based sensor. The main advantages of such approach are the nanomaterial growth control with near atomic precision and synthesize it with desired/tuned chemical compositions which are not accessible or very expensive with conventional top-down technologies. These nanodevices open absolutely new perspectives for nanoelectronics and biomedical applications. I gratefully acknowledge the support of the Kiel University, Germany for an invited professor and visiting scientist positions in 2019. This research was partly supported by the Technical University of Moldova. This research was partly supported by the STCU within the Grant 6229.

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