Nanosensors and Sensors Based on Heterostructured Materials for Safety and Biomedical Applications

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The development of multifunctional nanosensors based on advanced nanomaterials is in the focus of the scientific and engineering community today, as it is one of the largest and fastest growing market segments. Scientific research

on heterostructured micro- and nano-materials contributes to the miniaturization and performance improvement of existing solid-state sensors and light/image detectors, which are key components of many electronic, optoelectronic, safety, and biomedical circuits. Multitasking nanosensors are in high demand for small-sized smart wearable devices (e.g., smartphones with environmental, safety, or biomedical sensors) and other applications (from high-capacity information storage to biochemical sensing, analysis chemical and biological, etc.) due to reduced power consumption and improved performance. The challenges of using the properties of semiconducting oxides for practical application will be discussed and strategies for the fabrication, characterization, and integration of nanodevices through new technologies will be outlined. The integration and applications of the single nanowire as sensing devices and, in particular, as multifunctional nanosensors are in demand too. In addition, the contribution of crystalline nanosensor and nanophotonic systems will be highlighted to act as an enabling technology for scientific achievements in other research areas. In this talk, nano-heterostructured semiconductor oxides as core nano-building blocks for nanodevices, namely our contribution to building a new route to nanodevices through top-down and bottom-up approaches to hybrid nanotechnologies will be discussed based on our research and comparison with current scientific literature.