Design Elements and Prototypes of Metal Oxide Based Gas Sensors

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This Thesis develops in the field of microelectronics applied to environmental monitoring. The aim of the study was to realize a chemoresistive sensor that was based on thin film technology. The first prototyping was completed by finding packaging solutions and depositing the sensitive material via drop cast. The investigation then turned to the preliminary characterization of the selected hybrid powders and the gas sensing performance data gathering. Laboratory equipment and experimental stages were set consequently, through the identification of relevant aspects in the process sequence. Characterizations are performed for many design types and sensing materials synthesized by Prof. Mattiello (LEOS, Lab of Electrochemistry and Organic Synthesis, Dept. of Basic and Applied Sciences for Engineering, Sapienza University of Rome). Morphological and elemental analysis are done in the Micro-Nano characterization and fabrication Facility (MNF) of Fondazione Bruno Kessler in Trento, by scanning electron microscopy, x-ray diffraction, ultraviolet-visible spectroscopy and x-ray photoelectron spectroscopy. The design part of the device was covered by period in the Institute for microelectronics and microsystems (IMM) of National Research Council of Rome, getting into consideration a lithographic rules and some packaging solutions.