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Abstract

Low Power Multisensors for Selective Gas Detection †

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Abstract: The aim of this work is the realization of a generic gas multisensor device based on MOX sensitive layer. We designed and modeled a novel detection system with several heating zones associated with three sensors supported on a membrane with a few micrometers of thickness. The design was optimized to overcome the problems of response stability and selectivity and to reduce power consumption. The heat repartition and the power consumption in relation to the membrane thickness were studied by finite element simulations. The results show that a membrane thickness of 4 µm decreases the heater temperature by more than 100 K versus 2 µm thickness. Ethanol detection performances were studied. The thermoelectrical characterization concluded that the three detection areas can be heated at 533 K with a power of 53 mW. One sensor was tested in ethanol. The sensor response in 1 ppm and 100 ppm of ethanol in a 50% relative humidity atmosphere was 1.4 and 9.2, respectively. We demonstrated that this detection device can detect ethanol with high sensitivity and stability in dry and humid air with reduced power consumption resulting in 18 mW per sensor.

Keywords: multisensors; gas sensors; microhotplate; MOX sensors; air quality

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