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Abstract

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Abstract: The aim of this work is the realization of a generic gas multi-sensor device based on MOX sensitive layer. We have designed and modeled a novel detection system with several heating zones associated with three sensors supported on a few micrometers thickness membrane. The design has been optimized to overcome the problems of response stability and selectivity, and to reduce the power consumption. The heat repartition and the power consumption in function of the membrane thickness were studied by finite element simulations. The results show that a membrane thickness of 4 µm decrease the heater temperature of more than 100 K versus 2 µm thickness. Ethanol detection performances were studied. The thermo-electrical 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 50% relative humidity atmosphere was of 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 a reduced power consumption resulting in 18 mW per sensor.

Keywords: multi-sensors; gas sensors; micro-hotplate; MOX sensors; air quality