Title: Design and Modeling of High Sensitive Gas Sensor using PolyMUMPs-based MEMS Technology

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A gas detection sensor is essential in a wide range of practical applications. However, many of the available gas sensors have excessive power consumption, damping, and low accuracy. These characteristics have a considerable influence on the sensitivity and reliability of the gas detection sensor. Therefore, nowadays, developing robust, miniaturized, and sensitive sensors to detect and monitor these gases is highly desired. Micro-Electro-Mechanical Systems (MEMS) devices that are fabricated using semiconductor materials are believed to have low power consumption and high sensitivity due to the tiny size. This paper presents a MEMS sensor, along with its model, that is based on the standard Polysilicon Multi-Users-MEMS-Process (PolyMUMPs). When the device will be exposed to an environment that contains the targeted gas, the sensing material that is deposited on the moving plate will absorb/adsorb the specified gas concentration. This interaction causes the device mass to increase, and as such the frequency of the device will change. This change is measured and correlated to the concentration change of the specified gas. Electrothermal actuation method will be used to drive the device in the dynamic mode and the output voltage will be measured using a MS3110 universal capacitive readout circuit that used to readout the small change of the static capacitance when the device is actuated. The output voltage of the gas sensor will be changed in response to the temperature of the microheater and provide an alarm signal whenever the gas levels exceed the certain level.

Biography

ABDULLAH ALGAMILI was born in Yemen in 1988. He obtained a Bachelor of Electrical and Electronic Engineering degree, specializing in electronic systems engineering from University of Aleppo, Syria, in 2012. The master degree in Electrical and Electronic Engineering in 2017 from Universiti Tun Hussein Onn Malaysia, Johor, Malaysia. Currently, he is a PhD student in the department of electrical and electronics, Universiti Teknologi PETRONAS, Perak, Malaysia. His current research interest is in Microelectromechanical systems (MEMS) actuator/sensor design and microfabrication/Sensor technology based on MUMPs technologies.



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