

INVESTIGATIONS AND CHARACTERISTICS OF HEAT TRANSFER IN DIFFERENT MICROSTRUCTURE DEVICES

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ABSTRACT

MEMS is a very influential and well-liked technology which is very useful to create devices or systems which are tiny integrated in nature. It is an engineering system performing electrical and mechanical functions. In a very simple language we can say that using micro fabrication techniques miniaturized mechanical and electro mechanical devices or structures can be made which is referred as MEMS. This technology getting attention of more researchers and scientists because it has the capability to take up and analyze even though for small volumes. So, this attractive feature of MEMS is very useful to design and develop gas sensor or biosensor for different sensing applications. There are endless applications of MEMS technology and because of its interdisciplinary nature almost it covers all the area of research and real life. Its applications are very fruitful in the field automotive domain, consumer domain, industrial domain, biotechnology domain and many more. Now days Production of Metal oxide gas sensor became easier because of the combination of micromachining and thin film technology. Centre of attraction for this sensor is consumption of low voltage and power. In this research work design of a micro heater has been done in multiphysics environment. As per the current issues of COVID-19 there is a huge demand of new chemical or bio sensors especially in the field of public healthcare and environment. The most important component of a chemical sensor is a Micro heater. It plays a vital role and treated as a key component due to its unique features. Even by using micro heater semiconductor gas sensor operations can be enhanced by maintaining uniform micro heater temperature. To achieve maximum sensitivity micro heater should be placed on membrane and need to maintain uniform temperature. The major challenge is choosing a perfect suited membrane material as well as acceptable micro heater geometry. Since heater reliability is much important for this kind of design and analysis so it is possible by minimizing hot spot of heater. In MEMS technology the main cause of power consumption is thermal loss. Using micromachining of the silicon substrate as per the requirement geometries can be obtained but the major factor is to give most attention on reduction of dimensions of that particular device or structure to avoid more power consumption. Finally, this study will help to understand the concept of MEMS, Multiphysics environment, importance and huge applications of micro heater.

Keywords: COMSOL, Materials, MEMS, Micro heater, Multiphysics, Sensitivity.

