Abstract

The paper focuses on the modeling and analysis of MEMS piezoresistive pressure sensors based on shape and performance parameters. The different shapes of diaphragms namely square, rectangular and circular diaphragms made of silicon were modeled and their performance parameters namely deflection and stress were analyzed. The simulations performed using the FEM software Intellisuite® proved that the better shape for the design of a piezoresistive pressure sensor is one with the square shaped diaphragm. The square shaped diaphragm with varying thickness is simulated and tested till their burst pressures. The work is then high lightened on the modeling of MEMS piezoresistive pressure sensors with two different square shaped diaphragms, one with silicon and the second with silicon and silicon dioxide stack using the FEM software Intellisuite®, and comparing the performance parameters of the two sensors. The diaphragm deflection in silicon pressure sensor was found to be less when compared to SOI pressure sensors, and the SOI pressure sensor is capable of giving more output voltage and exhibits more voltage sensitivity. The thickness of SOI layer plays an integral part of sensor design. Unlike the silicon pressure sensor, the SOI pressure sensor is able to operate at large pressures by changing the dimension of the diaphragm while
maintaining appreciable voltage sensitivity.

References

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**Index Terms**

Computer Science

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**Keywords**

MEMS deflection stress piezorsistive pressure sensor voltage sensitivity