

Design and Simulation High Sensitive MEMS Capacitive Pressure Sensor with Small Size for Glaucoma Treatment

Authors : Yadollah Hezarjaribi, Mahdie Yari Esboi

Abstract : In this paper, a novel MEMS capacitive pressure sensor with small size and high sensitivity is presented. This sensor has the separated clamped square diaphragm and the movable plate. The diaphragm material is polysilicon. The movable and fixed plates and mechanical coupling are gold. The substrate and diaphragm are pyrex glass and polysilicon, respectively. In capacitive sensor the sensitivity is proportional to deflection and capacitance changes with pressure for this reason with this design is improved the capacitance and sensitivity with small size. This sensor is designed for low pressure between 0-60 mmHg that is used for medical application such as treatment of an incurable disease called glaucoma. The size of this sensor is $350 \times 350 \mu\text{m}^2$ and the thickness of the diaphragm is $2 \mu\text{m}$ with 1μ air gap. This structure is designed by intellisuite software. In this MEMS capacitive pressure sensor the sensor sensitivity, diaphragm mechanical sensitivity for polysilicon diaphragm are 0.0469Pf/mmHg , $0.011 \mu\text{m/mmHg}$, respectively. According to the simulating results for low pressure, the structure with polysilicon diaphragm has more change of the displacement and capacitance, this leads to high sensitivity than other diaphragms.

Keywords : glaucoma, MEMS capacitive pressure sensor, square clamped diaphragm, polysilicon

Conference Title : ICMBE 2016 : International Conference on Medical and Biomedical Engineering

Conference Location : Los Angeles, United States

Conference Dates : April 05-06, 2016