

MEMS SYNOPSIS

MEMS is well known as Micro-Electro-Mechanical System, and is a technology that in its most general form can be defined as miniaturised mechanical and electro-mechanical elements (i.e., devices and structures). These elements are made using the techniques of microfabrication.

MEMS consists of the following four components.

- 1) Microactuators
- 2) Microsensors
- 3) Microelectronics
- 4) Microstructures

Microsensors and actuators are transducers, which convert energy from one form to another form.

MEMS consists of two structures i.e., movable (rotor) and fixed (stator) plates. The rotor plate is suspended on the top of stator by support of four flexible beams and maintaining specific selected initial gaps to form actuation and sensing parallel plate capacitors.

A polymer of a certain thickness is coated on the rotor plate, which is sensitive to the specific biomarkers. Hence, it functions as a sensing element for the various gases and vapors.

Doping the chemiresistive films with Nobel metals enhances the sensitivity of many sensors toward vapor detection.

The advantage of using MEMS sensors for biomedical applications is that they are tiny and believed to have a very high sensitivity. In addition, MEMS resonators are based on frequency shift sensing which is considered as high accuracy measurement technique.

Due to vertical movement of the rotor plate toward the stator plate the device is dominantly affected by only squeeze film damping (b_{sq}). Depending upon the value of b_{sq} , the device can be underdamped, overdamped or critically damped. Only the underdamped devices can be used as resonators for mass sensing applications.

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