

Simulation of an AlN Thin Film Resonator for High Sensitivity Mass Sensors

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Abstract

The objective of this paper is to show the simulation of a piezoelectric thin film device and its application as a sensor. Piezoelectric aluminum nitride thin film clamped at two ends is simulated using COMSOL Multiphysics software. The device consists of the piezoelectric thin film suspended on a cavity etched on a silicon substrate. Two metal electrodes are placed at the two fixed sides of the thin film. Under an alternating electric field the piezoelectric film will vibrate. The eigen frequency analysis is done to calculate the fundamental resonance frequency of vibration using COMSOL Multiphysics. The addition of small mass on the film will produce shift in the resonance frequency. This device has applications as high sensitivity mass sensor because of the ultra-light mass of the thin film.

Figures used in the abstract

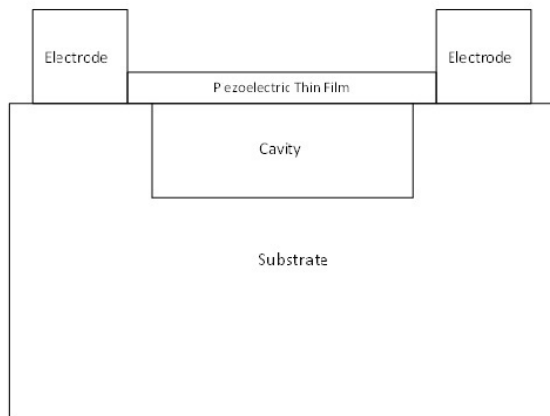


Figure 1: Proposed device structure.