Thesis Title	SILICON CANTILEVER ETCHING TECHNIQUES FOR ACCELERATION SENSORS
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Year	1999
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ABSTRACT

This thesis presents some successful methods and guidance techniques for fabrication of the silicon acceleration sensors. The device was started from a (100) silicon wafer with a 10-micron and 8-12 Ohm.cm n-type epi-layer on a 10 Ohm.cm p-type substrate. System of a cantilever and a proof mass carved from bulk silicon utilizing anisotropic etchants was packed with piezoresistors and temperature-compensation ones within an area of a 5×5 mm^2 chip. Three well-known etchants; EPD, KOH and Hydrazine were conducted to study how properly they can be used. Variability of many parameters to which affect the etching behavior including the temperature, agitation condition, reusability and reproducibility were carefully studied since they can significantly change the etching rate and thus the quality of diaphragm. Suitable chemical used means must be well compatible to the batch VLSI fabrication process. Suggestion of good mechanical design was available in this paper as to help ones who are making accelerometers with acceptable high sensivity. Geometrical consideration to the anisotropic etching control was also included in the simulation topic. Electrochemical Controlled Etching coming with Reactive Ion Etching of SF_6 were employed as to help improving diaphragm quality and make accomplishment in fabrication from chip to chip. The acceleration sensor has a 320-micron width, 300-micron length and 10.02-thick cantilever beam with a 0.48 milligrams proof mass. This mass is weighted about 45.28% of the design or approximately equals to 76.19% of an expected 60% remain of mass due to under etching of the process. The device has the natural frequency of 5.05 kHz. The device was tested for the sensivity to air pressure arose from a sound source. It was found that the device's sensivity was 4.26×10^6 mV/N that related to 1.137×10^{-5} N as the minimum detectable force signal or equivalent to 20.084 microns as the minimum deflection could be detected. Hence the sensor has the sensivity to acceleration about 20.084 mV/g and the linear detection range from minimum acceleration about 2.264*g* to10.568*g* with error about $\pm 0.174g$.