

Piezoelectric Microsystems for Industry

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ABSTRACT

Reliable integration of piezoelectric thin films into silicon-based microsystems on an industrial scale is a key enabling technology for a wide range of future products. However, the availability of high performance piezoelectric thin films is low and current knowledge in the field is mostly limited to the conditions and scale of academic laboratories. To enhance industrial take-up new industrial standards had to be developed [1].

The aim of the present study has been to demonstrate the capability of an established piezo-MEMS process for fabrication of devices in order to investigate the feasibility of such devices for industry. A multi-project wafer design based on SOI technology containing 5 different components; ultrasonic transducer arrays, accelerometers, ultrasonic microphones and acoustic gas sensors comprising of around 1000 membranes and cantilevers, was made to test the feasibility of piezo-MEMS technology. The design room was further expanded by bonding some of the finished devices to patterned glass wafers, at wafer level before dicing. The active piezoelectric material was a 2 μm thin film of lead zirconate titanate (PZT) deposited by a state-of-the-art chemical solution deposition (CSD) procedure providing an effective transversal piezoelectric coefficient of -15 C/m^2 [2]. Design, fabrication and testing of the packaged devices will be presented.

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