# Piezoelectric Micromachined Ultrasonic Transducers Pmuts

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**Piezoelectric Micromachined Ultrasonic Transducers Pmuts**

Piezoelectric Micromachined Ultrasonic Transducers (pMUTs) offer a new approach for developing two dimensional array type ultrasonic transducers for real-time, three dimensional medical imaging. The studies reported in this dissertation represent part of the efforts towards

**PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS (pMUTs)**

Piezoelectric micromachined ultrasonic transducers (PMUTs) are

a better candidate for fingerprint sensing compared to CMUTs, though there is no need for DC bias voltage for both Tx and Rx operation. In fact, PMUTs AC only working regime reduces the charging effect in the dielectric/piezo improving the reliability of the device.

**Anatomy of a Piezoelectric Micromachined Ultrasonic Transducer**

Piezoelectric Micromachined Ultrasonic Transducers for Medical Imaging. Authors: Katherine Smyth and Sang-Gook Kim. Department of Mechanical Engineering Diagnostic medical ultrasound imaging is becoming increasingly widespread because it is relatively inexpensive, portable, compact, and non-invasive compared to other diagnostic scanning techniques.

**pMUTs | Park Center for Complex Systems: Micro Nano ...**

Piezoelectric sensors and actuators are also being actively

researched, including surface acoustic wave sensors , tactile sensors , artificial basilar membranes , micro-energy harvesters , and piezoelectric micromachined ultrasonic transducers (pMUTs) . Among these applications, piezoelectric thin-film-based pMUTs are reviewed in this paper, given their promise for next-generation ultrasonic transducers.

**Review of piezoelectric micromachined ultrasonic ...**

Piezoelectric micromachined ultrasonic transducers (pMUTs) have recently emerged as highly promising candidates for a range of practical applications that include fingerprint sensing, gesture recognition, range finding, non-destructive testing and medical imaging, due to their low power consumption and small form factor.

**AlN-on-Si Square Diaphragm Piezoelectric Micromachined ...**

Piezoelectric Micromachined Ultrasonic Transducers for Fingerprint Sensing Abstract Fingerprint identification is the most prevalent biometric technology due to its uniqueness, universality and convenience. Over the past two decades, a variety of physical mechanisms have been exploited to capture an electronic image of a human fingerprint.

**Piezoelectric Micromachined Ultrasonic Transducers ...**

Here we describe piezoelectric micromachined ultrasonic transducers (pMUTs) fabricated using aluminum nitride (AlN). Relative to capacitive micromachined ultrasonic transducers (cMUTs), pMUTs have lower electromechanical coupling but do not need the high polarization voltages (approaching 1000V) and small capacitive gaps required by cMUTs [1].

**CMOS-Compatible AlN Piezoelectric Micromachined Ultrasonic ...**

This study presents encapsulated piezoelectric micromachined ultrasonic transducers (PMUTs) fabricated by surface micromachining, forming high fill-factor arrays for high transmitting pressure...

**High fill factor piezoelectric micromachined ultrasonic ...**

Abstract: This paper presents the design, fabrication, and characterization of piezoelectric micromachined ultrasound transducers (PMUTs) based on scandium aluminum nitride (Sc x Al 1-x N) thin films (x = 15%). ScAlN thin film was prepared with a dual magnetron system and patterned by a reactive ion etching system utilizing chlorine-based chemistry with an etching rate of 160 nm/min.

**Design, Fabrication, and Characterization of Scandium ...**

By utilizing the array solution methods previously established for the thickness-mode piezoelectric devices and capacitive

micromachined ultrasonic transducers (cMUTs), the single pMUT circuit model can be extended to models for array structures.

**Equivalent Circuit Models for Large Arrays of Curved and ...**

A piezoelectric micromachined ultrasonic transducer (pMUT) operating at dual frequencies (3.75 MHz and 18 MHz) was designed to achieve an ultrasound-on-a-chip solution for next-generation...

**Dual-frequency piezoelectric micromachined ultrasonic ...**

In recent decades, micromachined ultrasonic transducers (MUTs) have been investigated as an alternative to conventional piezocomposite ultrasonic transducers, primarily due to the advantages that microelectromechanical systems provide.

**Review of piezoelectric micromachined ultrasonic ...**

The prototype transducers are fabricated in a CMOS-compatible process with radii of 100-230 μm using aluminum nitride (AlN) as the piezoelectric layers with thicknesses varying from 715 nm to 950 nm, and molybdenum (Mo) as the electrodes with thicknesses of 130 nm.

**Curved and bimorph piezoelectric micromachined ultrasonic ...**

Piezoelectric micromachined ultrasound transducers (PMUTs), diaphragm-like thin film flexural transducers typically formed on silicon substrates, are a potential solution for integrated transducer arrays.

**Piezoelectric Micromachined Ultrasound Transducer (PMUT ...**

Novel Ultrasonic Fingerprint Sensor Based on High-Frequency Piezoelectric Micromachined Ultrasonic Transducers (PMUTs) The

goal of this project is to design and fabricate a novel ultrasonic fingerprint sensor based on high-frequency Piezoelectric Micromachined Ultrasonic Transducers (PMUTs).

**Novel Ultrasonic Fingerprint Sensor Based on High ...**

A piezoelectric micromachined ultrasound transducer (PMUT) is disclosed. The PMUT consists of a flexural membrane that is piezoelectrically actuated. These membranes are formed on a first substrate...

**US10562069B2 - Piezoelectric micromachined ultrasonic ...**

Piezoelectric Micromachined Ultrasonic Transducers (pMUTs) are being used to push the limits of real-time 3D medical ultrasonic imaging in areas such as intravascular ultrasound (IVUS) and intracardiac echocardiog- raphy (ICE).

**Vibrational Analysis of Ultrasonic Transducers**

@article{Smyth2017HighEC, title={High electromechanical coupling piezoelectric micro-machined ultrasonic transducer (PMUT) elements for medical imaging}, author={Katherine Marie Smyth and Charles Sodini and S.-G. Kim}, journal={2017 19th International Conference on Solid-State Sensors, Actuators and ...

**High electromechanical coupling piezoelectric micro ...**

ultrasonic transducer (cMUT) and a piezoelectric micromachined ultrasonic transducer (pMUT). The cMUT has a cavity sandwiched between the top and bottom electrodes which require fewer layers leading to simple fabrication. To produce an ultrasound beam, the deflection of the top electrode

**Development of a High-Density Piezoelectric Micromachined ...**

The pMUT structure is made up of a cavity covered by a flexible piezoelectric membrane. This will mechanically deform with applied electrical stimulation. A spin-coating process is used to deposit a PZT film onto a silicon-on-insulator (SOI) substrate with Ti/Pt electrode layers.