Shaped Piezoelectric Micromachined Ultrasonic Transducer Device

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Technology description

Piezoelectric Micromachined Ultrasonic Transducers (pMUTs) have attracted industry attention for their good acoustic matching, small geometry, low cost-by-batch fabrication, and compatibilities with CMOS and consumer electronics. While planar pMUTs have reasonable performance over bulk piezoelectric transducers, certain deficits remain in terms of coupling and acoustic pressure outputs, DC displacements, bandwidth, and power consumption. To address these deficiencies, researchers at the University of California, Berkeley, have developed a next generation of shaped pMUTs which are no longer fully defined by resonance frequency and can accommodate larger pressure outputs and bandwidths. This new pMUT apparatus can significantly boost overall performance while dramatically reducing power as compared to flat diaphragm state-of-the-art pMUTs.

Additional Technologies by these Inventors

A Direct-Write Piezoelectric Pvdf Nanogenerator

Finger-Powered, Pressure-Driven Microfluidic Pump

Wafer Level Chip Scale Packaging Technology For Integrated Mems Devices

Single-Layer Microfluidic Device

Highly Responsive PMUT

Self-Curved Diaphragms By Stress Engineering For Highly Responsive pMUT

Cross Reactive FET Array for Gas Mixture Detection

3D Printing Methods for Making Electronic Components

Piezoelectric Micromachined Ultrasonic Transducer Device and Methods

Advanced Chemical Sensing Method and Apparatus

Supercapacitors By Solid Electrolyte-Coated Fiber-Based Electrodes

Single Crystal Transition Metal Dichalcogenide Grown In “Jelly”

Application area

- Gesture recognition
- Body movement sensing
- Finger print identification

- Medical imaging (including harmonic imaging)
- Medical diagnostics and vital signs monitoring
- Range finding
- Sensors in hand-held devices

Advantages

- Design freedom means geometry and size no longer fully defined by resonance frequency
- At least 1-2 orders of magnitude increase in pressure (10x-100x)
- Velocity bandwidth 5-20x higher than state of the art, with broadband acoustic transmission at all frequencies within the consumer and medical range of interest (250kHz-25 MHz)
- Ability to be designed for a wide range of beamwidths (directionality) over wide range of frequencies
- Leverages standard foundry-based CMOS processes
- No added fabrication steps or complexity over state-of-the-art pMUTs

Institution

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