Highly Responsive PMUT

Published date: March 23, 2017

Technology description

Ultrasonic imaging is one of the most important and widely used medical imaging techniques, which uses high-frequency sound waves to view soft tissues such as muscles, internal organs as well as blood flowing through blood vessels in real time. With the advancement of microelectromechanical systems (MEMS), ultrasonic devices operated based on plate flexural modehave shown remarkable improvements in bandwidth, cost, and yield over the conventional thickness-mode PZT sensors. MEMS fabrication technologies can be utilized to realize both capacitive (cMUTs) and piezoelectric (pMUTs) micromachined ultrasonic transducers However, these devices could enjoy much more widespread applications if they were adjustable , better focused with lower energy requirements.
In response to this challenge, Investigators at University of California at Berkeley have developed innovative design and fabrication concept to make piezoelectric micromachined ultrasonic transducer (pMUT) based on a CMOS compatible fabrication process for the first time. The prototype device shows a resonant frequency in the MHz range with a DC displacement exceeding 1nm/V (more than one order of magnitude higher than typical pMUTs at similar frequencies). As such, this new class of pMUTs has the potential of replacing the state-of-art pMUTs for high electromechanical coupling ultrasonic transducer arrays.

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
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
Shaped Piezoelectric Micromachined Ultrasonic Transducer Device
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

fingerprint ID sensing
body movement sensing
sensing for Google Glasses
medical imaging

Advantages

low power
high sensitivity
high efficiency
tunable

Institution

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