BIMORPH PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS

Tech ID: 24475 / UC Case 2015-051-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,864,553	12/15/2020	2015-051

BRIEF DESCRIPTION

Piezoelectric Micromachined Ultrasonic Transducers (pMUTs) have attracted industry attention for their good acoustic matching, large bandwidth, miniaturization, and low cost-by-batch fabrication. pMUTs have the advantages of low power consumption and large deflection for high-acoustic power applications. However, low electromechanical coupling has been a serious drawback for pMUT applications, in some cases foreclosing key opportunities.

In response to this challenge, researchers at UC Berkeley have developed a bimorph pMUT with unique advantages which dramatically improve the device capabilities: the bimorph pMUT utilizing two active AlN layers in a CMOS-compatible process. This innovative design is the first bimorph pMUT with two active piezoelectric layers separated by a common electrode.

The prototype bimorph pMUT has a resonant frequency of 198.8 kHz and central displacement of 407.4 nm/V. Under the differential drive scheme using the dual electrodes at low frequency, the measured central displacement is 13.0 nm/V, which is about 400% higher than that of a unimorph AlN pMUT. This revolutionary dual electrode bimorph pMUT presents a new class of design/fabrication for exciting pMUT applications, including range finders and gesture recognition devices.

APPLICATIONS

- Ultrasonic gesture recognition
- Range finding
- Finger print identification
- Medical imaging
- Energy harvesting

ADVANTAGES

- 10X improved linearity
- 400% improvement central displacement
- 4X performance enhancement

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OTHER INFORMATION

CATEGORIZED AS

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