A Multiferroic Transducer For Audio Applications

Tech ID: 27399 / UC Case 2014-968-0

SUMMARY

Researchers in the Department of Mechanical Engineering at UCLA have developed a novel transducer for audio applications based on a multiferroic material.

BACKGROUND

Traditional audio pickups operate on the principle of sensing movement through vibrations (piezoelectric pickup) or through a magnetic disturbance (magnetic pickup). Both piezoelectric and magnetic pickups offer a unique sound that can be preferred depending on the desired effect. In the former, a piezoelectric sensor records the vibrations and transfers the signal to an amplifier. These pickups are popular in acoustic guitars, since the hollow body of the guitar resonates to produce a sufficient signal.The latter audio pickup records vibrations through the disturbance in the magnetic field surrounding the ferromagnetic strings.These pickups are popular in electric guitars, eliminating the requirement of the hollow body.Due to the design of the magnetic pickups, decoupling of the signals from each string is not possible, inhibiting optimal audio processing.These pickups are also sensitive to stray electromagnetic interference, which can result in distortion.Furthermore, the magnetic field from the pickup also influences the strings, reducing sustain and transposing upper harmonics.

INNOVATION

Researchers in the department of Mechanical Engineering at UCLA have developed a novel transducer for audio applications. The transducer is a piezoelectric/magnetostrictive multiferroic composite, which combines the best of both types of traditional audio pickups.The multiferroic pickup utilizes a reduced bias field, reducing crosstalk, increasing sustain, and minimizing the harmonic shift that is associated with traditional magnetic pickups.These multiferroic pickups can be limited to each string, allowing for a broader and flatter frequency response and thus a new and unique sound.Finally, these pickups have a smaller footprint than traditional magnetic pickups, allowing them to be placed closer to the strings.

APPLICATIONS

- Audio pickups for guitars or other stringed instruments
- Audio pickups for microphones and other vibration-based recording devices

ADVANTAGES

- Smaller footprint
- Isolated signals for each string
- Increased sustain and minimized harmonic shift
- Flatter and widerfrequency response, resulting in an uniquesound

STATE OF DEVELOPMENT

This technology has been designed, fabricated, and tested in a laboratory setting.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,524,709	12/20/2016	2014-968

CONTACT

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OTHER INFORMATION

KEYWORDS

Transducer, multiferroic, actuator, sensor, antenna, guitar, pickup, electrical guitar pickup, string instruments, smart materials, piezoelectric, piezomagnetic, mageto-strictive, audio recording, microphones

CATEGORIZED AS

- **Engineering**
  - Engineering
- **Materials & Chemicals**
  - Composites
- **Sensors & Instrumentation**
  - Other
  - Physical Measurement

RELATED CASES

2014-968-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Magneto-Optic Fiber Bragg Grating
- Bidirectional Hyperelastic Covers for Woven Stents

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