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Non-Confidential Description - PSU No. 3165
"Modified KNN Based Lead-Free Materials with Broad Temperature Usage Range"

Keywords:

Piezoelectric ceramics, lead

Links:

Inventor Website

Inventors:

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Background

For the past 50 years, lead based perovskite (PZT) piezoelectric ceramics have dominated commercial markets for electronic devices. Piezoelectric generators, sensors, low loss actuators, and medical ultrasonic transducers require the material to function. However, upcoming environmental regulation in Europe is outlawing the use of lead-based materials with the passing of several directives such as Waste from Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS), and End of Life Vehicles (ELV). It is expected that the United States and Japan will enact similar regulations within the next 12 months that would require an alternative to lead based PZT be implemented.

Several perovskite lead-free alternatives exist. However, many piezoelectric alternatives exhibit a polymorphic phase transition around room temperature, making their usage ineffective at room temperature. The limited usage at room temperature severely limits their application.

Invention Description

The disclosed invention is a modified KNN based material. The modified KNN based material possesses comparable properties to conventional lead based piezoelectric ceramics. Yet, the material is lead-free making it a viable option environmentally, and with upcoming environmental regulation. Additionally, the material shows a very stable property behavior at normal temperatures in the range of -50°C to 200°C degrees Celsius. So, the modified material can provide a viable alternative to the lead-containing piezoelectric ceramics while environmental safety and government permissibility are ensured.

Advantages/Applications

- Comparable function and properties to conventional lead based piezoceramics
- Lead Free, environmentally safe, and permissible
- Stable property behavior at normal temperature

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