Non-Confidential Description - PSU No. 2967
“High Temperature Piezoelectric Single Crystals with High Resistivity and Piezoelectric Coefficient”

Keywords:
piezoelectric crystals, high-temperature

Links:
Inventor website
IEEE article

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Background
The industrial community has shown a genuine need for high-temperature electronic systems, including sensors to monitor noise, vibration, and acoustic emissions. The majority of sensors currently used in the aerospace, aircraft, and automotive industries are piezoelectric, which offers simplicity of design and maintains high sensitivity over broad ranges of sound frequencies and temperatures. However, today’s piezocrystals have an upper-limit operating temperature of 650 degrees Celsius – not high enough for future requirements. Current high-temperature piezocrystals (typically lithium niobate or tourmaline) have higher production costs and/or lower piezoelectric coefficients, making them sub-optimal for common use.

Invention Description
This disclosed invention provides a method for growing high performance, high temperature piezocrystals (of calcium oxyborate or langanite) with higher resistivity and better piezoelectric behavior. Grown using conventional methods, these crystals can be produced at lower cost, yet maintain their highest resistivity at temperatures up to 800 degrees Celsius.

Advantages/Applications
- Low cost of production
- High temperature usage range
- High resistivity and RC time constant
- High piezoelectric coefficient
- Low dielectric loss
- High resistivity, time constant and piezoelectric coefficient at high temperatures make these materials promising candidates in the aerospace, aircraft, and automotive industries.