

Lead-Free Piezoelectric Ceramic for Replacement in Gas Lighters

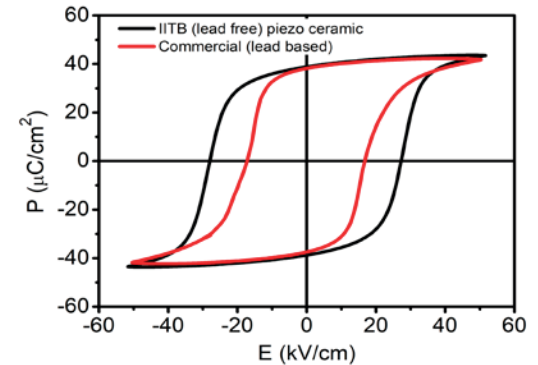
Problem Statement: Piezoelectric materials convert mechanical energy to electrical energy and vice versa. Commercially established lead-based piezoelectric materials like PZT are used in various applications, such as actuators, sensors, and transducer devices. Lead being toxic harms humans and the environment during manufacturing, use and disposal of household appliances, automobiles, and strategic and smart devices. Efforts to eliminate lead from piezoelectric ceramics have not yielded any new composition with useful piezo properties so that they may readily replace the well-established commercial compositions of PZT. Thus the problem of Pb pollution lingers on. The challenge is developing lead-free piezoelectric material for a direct and easy replacement of lead-based elements in the existing devices without requiring any other design changes and fabrication protocols.

Uniqueness of the Solution: The team has developed a new ceramic

composition with a few piezo coefficients superior to that of PZT used in the market for non-resonant (impact) applications as an alternative to lead-based appliances. The laboratory-developed lead-free ceramic has immense potential to be used in actuators, knock sensors, transducer devices, resistors, piezoceramic injectors, mist generators and ultrasonicators. In addition, it can cover all low to high-end, piezoelectricity-based applications.

Current Status of Technology: The laboratory developed lead-free ceramic is validated in the relevant field environment and is at the scale-up stage. A feasibility study of using the laboratory developed lead-free ceramic for gaslighter applications is being conducted in an Indian industrial hub.

Societal Impact: Lead-based piezoelectrics are widely used in various electronic devices. Replacing lead-based materials with lead-free materials in



different electronic devices will lead to a safer environment.

Patent(s): Nil

Relevant Industries: Automobile Sensors, Actuators, Semiconductors and Consumer Appliances.

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