

## **Tunable Inductor for Tuning Inductance at a High Frequency**

### **1. Technology:**

University researchers at ceramic composite laboratory have patented a electrostatically tuned inductor with low consumption of power, easy synthesis and fabricating technique, fairly high tunability. Under this invention a tunable inductor made up of multiferroic composite comprising of piezoelectric/magneto-strictive materials. An easy process of fabrication is also used in this invention. The tunable inductor is prepared based on a Magnetolectric (ME) core. The ME core is synthesized through solid state reaction technique followed by quenching in normal atmosphere with microwave as a source. The invented product, displayed remarkable inductance tunability of upto few MHz.



**Fig. 1 Image of Tunable Inductor**

### **2. Problem Addressed:**

The patented ME core tunable inductor addresses the limitations of magnetic flux interference, large area, magnetic flux leakage, accessibility, fixed inductance, limited tuning and frequency ranges. This new ME core tunable inductor overcomes these challenges by operating and tuning voltages at high frequency. Moreover, the ME tunable inductor is in the form of toroid with the close loop core which contains maximum magnetic field within it. Consequently, a fairly large inductance developed compared to the existing inductors. Due to symmetry of toroid, little magnetic flux escapes the core (leakage flux). Thus, creates less electromagnetic disruption to the adjacent circuits. The toroidal shape is desirable for inductors because it permits relatively high inductance value with few turns of wire and geometry of the core makes its self-shielding. The latter attribute makes the toroid inductor easier to be utilized in real life radiofrequency circuits.

### **3. Industrial Applications:**

The patented ME tunable inductor can be adopted by the applications such as telecommunication, television, AV filter designs, signal conditioning and other noise filters. Tunable inductors can be used in RF circuits, tunable filters, phase shifters, voltage-controlled oscillators, tunable low-noise amplifiers, and other RF components that utilize passive electronic components on-chip and off-chip. Inductors are widely employed in these front-end components, as well as other electronic applications, as one of the three fundamental components for electronic circuits. Tunable inductors, in particular, are critical components in the development of intelligent, reconfigurable radios. The above industries can commercialize the present invention in the future as it offers multiple advantages over the existing electronic inductors.

### **4. Patent Application Number: 202341076464**