

8.1. Summary

- $\text{Bi}_{2/3}\text{Cu}_3\text{Ti}_4\text{O}_{12}$ (BCTO) and $\text{Bi}_3\text{LaTi}_3\text{O}_{12}$ (BLTO) ceramic were synthesized by semi-wet route at low temperature and single phase formation was confirmed by XRD studies.
- The elemental compositions of BCTO and BLTO ceramics obtained by EDX data were fit as per stoichiometric ratio of the elements in both the ceramics.
- Dielectric constant of BCTO ceramic was found higher than BLTO ceramic at all measured temperature and frequency.
- The blocking temperature of BCTO and BLTO ceramics obtained by magnetic measurement was found to be 25 K and 155K, respectively.
- The composite BCLT-55, BCLT-91 and BCLT-19 were synthesized by the combination of BCTO and BLTO ceramic with different composition at low temperature. Both the phases were observed from XRD and HR-TEM analysis.
- The dielectric constant of BCLT-55, BCLT-91 and BCLT-19 composites were found to be 1.3×10^4 , 23×10^5 and 3147 at 503, 463, and 503 K and 100 Hz. the dielectric constant is highest in the case of BCLT-91 composite.
- The Neel's temperature obtained by magnetic measurement was found to be 25 K for all the synthesized composite.
- The coercivity was found lowest (14Oe) for the BCLT-55 composite which shows soft magnetic nature of the composite.

8.2 Future Scope

In general, this work has been important for nature. The everyday increasing demand for various applications, semiconducting technology sustain blest in its drive for high transistor densities and faster transistor.

Ceramic has inorganic and non-metallic materials constituted from metal and a non metal compounds. New days ceramic materials have enormously expanded many possible applications. Most of the new materials have used in our daily life. There is now a strong researcher effort to discover the new ceramics and their composites for various applications. Composite have played an important role in industrial application. Composites have constituted penetration into devices end-use segments and the development efforts newer composition for existing and novel application.

- The bismuth copper titanium oxides ($\text{Bi}_{2/3}\text{Cu}_3\text{Ti}_4\text{O}_{12}$) may be used in various applications because of its high dielectric constant and low coercivity value.
- Bismuth lanthanum titanium oxides ($\text{Bi}_3\text{LaTi}_3\text{O}_{12}$) ceramics shows great interested in ferroelectric materials for its application in non-volatile random access memories (NRAM) and advanced MOS transistors.
- The composite materials of BCTO and BLTO shows enhanced properties as compared to its parents components and may be used in capacitors, microelectronic devices and electronic chips, transistors.
- The synthesized composite materials show soft magnetic behavior due to low coercivity.

- The properties of ceramics and composite largely depend on the synthesis route, sintering duration and sintering temperature. In future, these composite may be studied by changing the synthesis route and sintering condition.
- The internal properties of the composite may be studied by impedance analysis to see the electrical and dielectric properties of grain and grain boundaries.
- Electrical polarization of the composite may be studied with variation of temperature by P-E loop tracer.