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Synthesis and Structure Analysis of Samarium Doped Barium Zirconium Titanate

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Abstract : *Barium samarium zirconium (BSZT) was prepared by a cost effective dry route method using barium carbonate, zirconium oxide, titanium dioxide and samarium oxide as the starting material by mixing ,drying , calcining the raw material and sintering it. The Curie temperature T_C remarkably shifted to lower value by increasing x in $Ba_{1-x}Sm_xZr_{0.15}Ti_{0.85}O_3$ and consisted with recent reports.*

***Key words**: Barium samarium zirconium titanate (BSZT), Curie temperature, Dry route method, sintering, calcination.*

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Introduction :

Ferroelectric ceramics was born in the early 1940s with the discovery of phenomenon of ferroelectricity as the source of unusually high dielectric constant of ceramic barium titanate (BT) capacitor (Haertling 1999).Barium titanate was the first material exhibiting ferroelectric properties such as high dielectric constant and used, in piezoelectric transducers, in medical ultrasounds, SONARS and in ferroelectric thin film memories.

It exhibits perovskite structure which is a class of naturally occurring minerals with general stoichiometry ABO_3, where A and B are cations and O is an anion. BSZT sample shows phase transition and ferroelectric behaviour with characteristics related to the substitution of Sm^{+3} ions for the Ba^{+2} (Maiti et al. 2006). With the increase of frequency, T_C shifts to higher temperature which makes the sample more ferroelectric and enhances the dielectric properties. (Chunlin et al. 2009)

In barium samarium zirconium titanate (BSZT), formed by doping Sm^{+3} ions on the A site of BZT, Sm^{+3} is a rare earth element and it is seen that doping of ceramics with rare earth oxides enhances