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Dielectric, Ferroelectric and Magnetic Properties of $PbZr_{0.52}Ti_{0.48}O_3 - CoSm_{0.1}Fe_{1.9}O_4$ Ceramic Composite

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Abstract—*The study presents a ferroelectric–ferrite composite based on PZT and samarium doped cobalt ferrite (CSmFO) powders. We investigate their structural, dielectric, ferroelectric and magnetic properties by using different techniques. The PZT and CSmFO powders were synthesized separately by sol-gel auto combustion technique. The presences of individual phases were determined by powder X-ray diffraction technique. The parent phases retain their crystal structures in the composite, without formation of any new secondary phase. Dielectric properties were studied as a function of temperature and frequency presuming that the interactions between the ferroelectric and ferrite phases may result in various anomalies in the dielectric properties of these composites. To study the ferroelectric properties, P-E hysteresis loops were recorded. The study indicated the influence of the magnetic subsystem on the electrical properties. In the two-phase PZT-CSmFO ceramic composite, the magnetic component causes the decrease in dielectric constant and electric polarization. Various magnetic parameters of the composite system were studied and compared to the pure samarium doped cobalt ferrite. The composites show simultaneous effects of ferromagnetism and ferroelectricity at room temperature, thus confirming the multiferroic behaviour of the composite. The present study demonstrates the possibility of the PZT-CSmFO system as an important multiferroic composite for wide investigation.*

Keywords*: Multiferroics, sol-gel technique, phase transition, Dielectrics.*