Structural and dielectric response of Barium strontium titanate compound

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The perovskite compound with composition Ba0.75Sr0.25TiO3 have been synthesized by the conventional solid state reaction method to understand the response of structural, micro-structural and dielectric properties. The structural parameters obtained by Rietveld refinement of X-ray diffraction data revealed that the sample crystallises with tetragonal perovskite type symmetry and (P4mm) space group [1] which is in proper accordance with the parameters calculated manually. The scanning electron micrograph (SEM) images reveal the grain growth and grain connectivity [2]. The effect of Sr doping on electronic properties remains significant because Sr inclusion at the A-site modifies the band structure and affects Ti-O bonding. As a result, BST is ferroelectric and has a high dielectric constant. Further, we performed electrical measurements and P-E loop analysis on BST. After doping, the value of the dielectric constant increased.

Figure 1: Left panel represent the Rietveld refinement of X-ray diffraction (XRD) and right panel represent the dielectric of Ba0.75Sr0.25TiO3 compound respectively.

[1] S. Tariq, M. I. Jamil, A. Sharif, S. M. Ramay, H. Ahmad, N. ul Qamar and B. Tahir, Exploring structural, electronic and thermo-elastic properties of metallic AMoO3 (A= Pb, Ba, Sr) molybdates, Applied Physics A 124.1 (2018) 44.

[2] C. J. Bartel, C. Sutton, B. R. Goldsmith, R. Ouyang, C. B. Musgrave, L. M. Ghiringhelli and M. Scheffler, New tolerance factor to predict the stability of perovskite oxides and halides, Sci. adv. 5.2 (2019) eaav0693.