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In this work, layered structured ferroelectrics $Ba_{1-x}Cu_xBi_2(Nb_{1-x}Ta_x)_2O_9$ (x = 0.5, abbreviated as BCuBNT) was prepared through chemical precursor decomposition method. A tetragonal structure of nano BCuBNT ceramic was observed in the X-ray diffraction study with I4/mmm space group having average crystalline size, 36 nm. FTIR study supported the metal oxygen bond and the band gap energy calculated from UV-VIS spectroscopy study was 2.45 eV. The effect of Cu^{2+} and Ta^{5+} substitution was studied. High temperature maximum (T_m) with diffusion characteristic as well as strong relaxation behaviour during impedance study were observed as an effect of substitution. The ac conductivity showed hopping frequency that shifted to higher frequency region with temperature. The density of states and hopping distances were measured and a structure –properties co-relationship were established. The hysteresis behaviour was also studied.

Keywords: Microstructure; Ferroelectric; Impedance; Density of states; Hopping; Hysteresis

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