**Abstract**

Lead free piezoelectric 0.94(Na0.5Bi0.5)TiO3-0.06BaTiO3 (NBT-BT) ceramics were synthesized in MPB composition by conventional solid state reaction method. The crystalline nature of NBT-BT ceramic was studied by XRD and the size of the grains are determined by SEM. The X- ray diffraction results reveal that Ba2+ diffuse into the Na0.5 Bi0.5TiO3 lattices to form a solid solution with a pure perovskite structure. Because of the strong ferroelectricity and MPB, the ceramics exhibit high piezoelectric properties: d33 = 206 pC/N. Td (depolarization temperature) and Tm (temperature at with the dielectric constant epsilonr reaches a maximum) were observed through the phase transition in dielectric studies. In addition, the prepared ceramic exhibits relaxor characteristic, which probably results from the cation disordering in the 12fold coordination sites. Pr and Ec of the prepared ceramics were determined from the P-E hysteresis loop.