

Dielectric properties of $(\text{Na}_{0.5}\text{Bi}_{0.5})_x\text{Sr}_{1-x}\text{TiO}_3$ ($x=0 - 0.6$) ceramics

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Abstract

Ceramic materials with composition $(\text{Na}_{0.5}\text{Bi}_{0.5})_x\text{Sr}_{1-x}\text{TiO}_3$ ($0 \leq x \leq 0.6$) were prepared by natural sintering at 1200-1400°C. Their dielectric properties were studied between 10 and 500 K in the frequency range 100 Hz - 1 MHz. Three groups of compositions were distinguished: (i) $x = 0$: ϵ'' shows two peaks at low temperature (20 and 28 K at 100 Hz) and two additional peaks at 70 and 90 K. (ii) $x = 0.02$: two anomalies of ϵ' at 25 and 35 K (at 100 Hz) as well as the associated maxima of ϵ'' were observed. (iii) $x = 0.02$: in addition to the low temperature relaxation modes already observed in (ii) and whose intensities decrease as x increases, ϵ' and ϵ'' exhibit a strong frequency dispersion and the temperature of their respective maxima increases with increasing frequency, significant of a ferroelectric relaxor behaviour. The data are discussed in terms of existence of dipoles induced by the substitution of (Na,Bi) for Sr in the perovskite A-sites and their interaction as isolated dipoles or dipole clusters.