

Bismuth zinc niobate pyrochlore, a relaxor-like non-ferroelectric

Abstract

Fixed frequency plots of ϵ and $\tan \delta$ versus temperature for $(\text{Bi}_{1.5}\text{Zn}_{0.5})(\text{Zn}_{0.5}\text{Nb}_{1.5})\text{O}_7$ (BZN) ceramics with the pyrochlore structure show relaxor-like response below ~ 180 K with frequency-independent permittivity of ~ 130 above ~ 180 K and over the frequency range of 10^3 - 10^6 Hz. Impedance data in the range, 10-180 K fit an equivalent circuit derived from the classic dielectric relaxation circuit in which the relaxation resistance is replaced by a constant phase element (CPE). Temperature dependence of the circuit parameters shows that BZN is not ferroelectric; the CPE, which is responsible for the relaxor-like behavior, gradually changes from primarily capacitive to primarily resistive with increasing temperature.