

The Structure and Dielectric Properties of Bismuth-Nickel-Niobium Oxide Based Ceramics

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Bismuth nickel niobate based dielectric ceramics have been prepared by conventional solid state reaction technique. The structure and dielectric properties of this ternary oxide system have been investigated by X-ray diffraction analysis and temperature dependences of dielectric constant and loss factor measured at a wide range of frequencies (1 kHz to 100 kHz). The structure of compounds along the composition line of $\text{Bi}_2\text{O}_3:\text{Nb}_2\text{O}_5=1:1$ has been studied by XRD, there exist cubic pyrochlore, tetragonal pyrochlore, and some other impurity phases determined by the compositions. Besides the low temperature dielectric relaxation found in the liquid nitrogen temperatures, there also exists another high temperature dielectric loss peak for most samples, the estimated activation energy of approximately 0.70 eV demonstrates that loss of conduction process arises from the impurities and/or the defects.

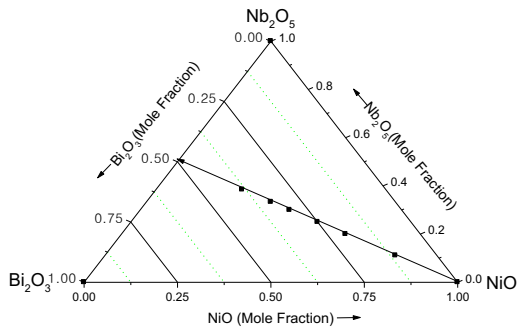


Fig. 1: The compositions to be concerned in our study (along the black line starting from NiO end)

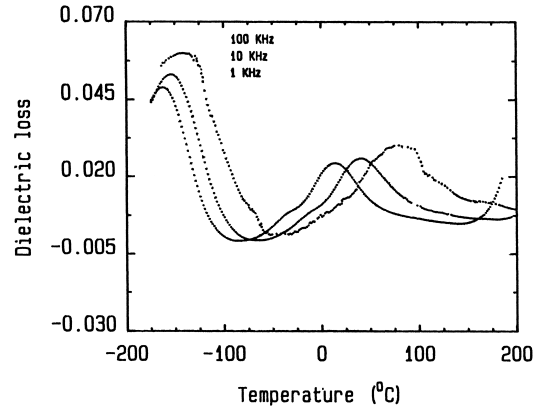


Fig. 3: Dissipation factors Vs temperature for typical composition

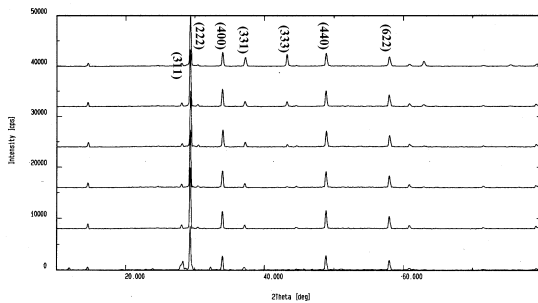


Fig. 2: XRD patterns for compositions along the $\text{Bi}_2\text{O}_3/\text{Nb}_2\text{O}_5=1/1$ line