

Bismuth Nickel Niobate with Small Negative Temperature Coefficients of Dielectric Constant

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Bismuth nickel niobate ceramics have been prepared by conventional solid state reaction technique. Dense ceramic body was obtained at relative low temperature about 1000°C. The structure and dielectric properties of selected composition line in this ternary oxide system, shown in fig.1, that is NiO:Nb₂O₅=1:1 line, have been investigated by X-ray diffraction analyses and temperature dependences of dielectric constant and loss factor measured at some frequencies. The structure of compounds around or upward the batch point of Bi₂O₃:NiO:Nb₂O₅=1:1:1 is cubic pyrochlore, while departed from this composition point and located within downward direction there exist at least two phases, including cubic pyrochlore, tetragonal pyrochlore, and some other phases, as illustrated in fig. 2. A commonly occurred low temperature dielectric relaxation can be observed in most compositions (Fig. 3), with the index factor being 1.5 or so after curve fitting according as the ε-T empirical equation of ferroelectrics. Besides, the changing tendency for the dielectric constant and the temperature coefficients of dielectric constant versus chemical compositions has made clear.

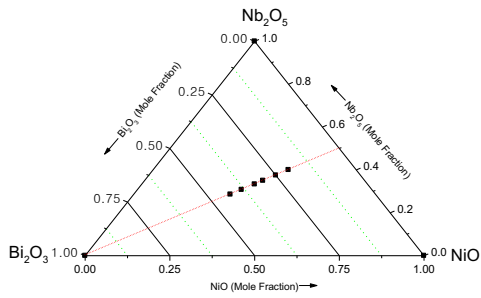


Fig. 1: The compositions to be concerned in our study (along the red dotted line)

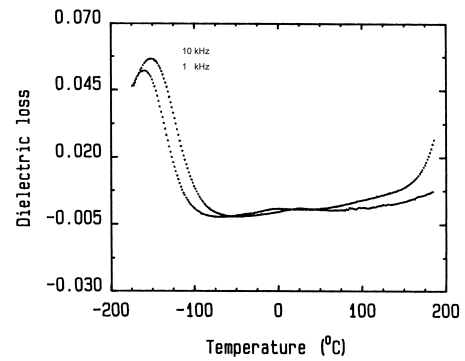


Fig. 3: Dissipation factors vs. temperature for typical composition

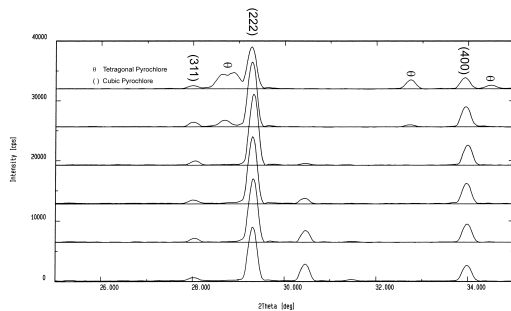


Fig. 2: XRD patterns for compositions along the Bi₂O₃/Nb₂O₅=1/1 line