

Development of surface phases in $\text{Ba}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3 - \text{Ba}(\text{Ga}_{1/2}\text{Ta}_{1/2})\text{O}_3$ microwave dielectric ceramics.

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Abstract:

Ceramics in the system $\text{Ba}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3 - \text{Ba}(\text{Ga}_{1/2}\text{Ta}_{1/2})\text{O}_3$ (BZN -BGT) were prepared by the mixed oxide route. Powders were calcined at 1200 °C for 4 hours and sintered at temperatures in the range 1300-1450 °C. Products were characterised by SEM, XRD and WDS techniques. Dielectric properties were measured at 3GHz. The end member BZN exhibits $\epsilon_r=37$ and $Q_{xf} = 90,000$.

During processing of the ceramics two secondary phases developed on the surfaces of the sintered ceramics as a result of Zn evaporation: $\text{Ba}_8\text{Zn}_1\text{Ta}_6\text{O}_{24}$ (816) and $\text{Ba}_4\text{Nb}_5\text{O}_{15}$ (BN). On the basis of this analysis, ceramics having the compositions of the two secondary phases were prepared independently by the mixed oxide route. Both ceramics have a hexagonal structure; the 816 phase has space group of P63cm.

Keywords: perovskites, niobates, secondary phase, dielectric properties