

Comparative Study of Effects of Metal Oxides Modifications on Properties of $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})_{0.9}\text{Ti}_{0.1}\text{O}_3$ Ceramics

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This work studies effects of metal oxides (MO; M = Zn^{2+} , Cu^+ and Ni^{2+}) modifications on phase, microstructure, dielectric, ferroelectric and electrostrictive properties of $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})_{0.9}\text{Ti}_{0.1}\text{O}_3$ (PMNT) ceramics. Different contents of MO (2 and 4 mol%) were modified into PMNT ceramics. The ceramics with the density about 7.80 g/cm^3 were prepared. XRD pattern and lattice parameters of the PMNT ceramic did not change with the MO modifications. An average grain size of the PMNT ceramic increased with the ZnO and NiO modifications. The grain size was extremely enlarged with the CuO modification. A maximum dielectric constant of the PMNT ceramic was enhanced with 2 mol% ZnO and 2 mol% CuO modifications while 2 mol% NiO modification resulted in a reduction of the maximum dielectric constant. A temperature of a maximum dielectric constant (T_{max}) of the PMNT ceramic shifted toward a higher temperature with 2 mol% ZnO modification. It was decreased with 2 mol% CuO and 2 mol% NiO modifications. Polarization-electric field curve of the PMNT ceramic was well developed with a higher remnant polarization (P_r) by 4 mol% ZnO modification while it was slimmer with a lower P_r by the NiO modification. A maximum strain and an electrostrictive coefficient of the PMNT ceramic were enhanced with 2 mol% ZnO and 2 mol% CuO modifications.

Summary

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