Piezoelectric Properties of $Pb(Ni_{1/3},Sb_{2/3})O_3$-$PbTiO_3$-$PbZrO_3$ Ceramics Modified with MnO_2 Additive

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Effects of MnO_2 additive on the ceramic and piezoelectric properties of 0.12PNS-0.48PT -0.40PZ (PNS-PT-PZ) ceramics were investigated. Addition of small amount of MnO_2 increased the sintered density and promoted the grain growth of PNS-PT-PZ. The grain size increased to the maximum at 0.15 wt% MnO_2, further increasing MnO_2 to 0.2 wt% decreased the grain size. Addition of 0.15 wt% MnO_2 to PNS-PT-PZ produced a relatively higher density and maximum grain size which gave the best piezoelectric properties of kp ~ 68%, ε_r ~ 3069, Qm ~ 181 and $\tan\delta$ ~ 5.4 x 10^{-3} for applications.

Keywords: Piezoelectric properties, MnO_2, PZT