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Effects of B-site Co_2O_3 Doping on Microstructure and Electrical Properties of $\text{Na}_{0.25}\text{K}_{0.25}\text{Bi}_{2.5}\text{Nb}_2\text{O}_9$ Ceramics

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Effects of B-site Co_2O_3 Doping on Microstructure and Electrical Properties of $\text{Na}_{0.25}\text{K}_{0.25}\text{Bi}_{2.5}\text{Nb}_2\text{O}_9$ Ceramics

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Abstract

The effects of cobalt addition on the properties of $\text{Na}_{0.25}\text{K}_{0.25}\text{Bi}_{2.5}\text{Nb}_2\text{O}_9$ (NKBN)-based ceramics have been investigated in details. It was found that the ceramics possess a pure phase of bismuth oxide layer-type structure. The Curie temperature T_c gradually increases from 653 °C to 662 °C with increasing the Co modification. The electrical properties of NKBN-based ceramics are improved significantly by the addition of Co. The piezoelectric constant d_{33} , dielectric loss $\tan \delta$, mechanical quality factor Q_m and remanent polarization P_r for the NKBN ceramics with 0.20 wt% Co_2O_3 modification were found to be 23 pC/N, 0.35%, 3028, 12.03 $\mu\text{C}/\text{cm}^2$, respectively. Thermal annealing studies indicated that the cobalt-modified NKBN ceramics system possesses stable piezoelectric properties, demonstrating that the cobalt-modified NKBN-based ceramics are the promising candidates for high-temperature applications.

Keywords: Bismuth layer-structured; piezoelectric ceramics; microstructure;

$\text{Na}_{0.25}\text{K}_{0.25}\text{Bi}_{2.5}\text{Nb}_2\text{O}_9$

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