

HYDROTHERMAL SYNTHESIS OF BISMUTH SODIUM POTASSIUM TITANATE

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Amidst the urgent searching for materials that replace lead-based ferroelectric ceramics for more environmentally friendly alternatives, the system $(1-x)\text{Na}0.5\text{Bi}0.5\text{TiO}_3-x\text{K}0.5\text{Bi}0.5\text{TiO}_3$ (BNKT) is widely studied due to its formidable piezoelectric features in compositions close to the morphotropic phase boundary. Hydrothermal synthesis represents the direct obtention of phase pure BNKT at lower temperatures, higher nucleation speed, reduced stoichiometric fluctuation and lower cost than conventional routes. Only a handful of research studies discuss the influence of multiple parameters upon the hydrothermal treatment and the characteristics of the produced BNKT. The current research proposes the obtention of BNKT powders and the establishment of the interactions that rule the process. The precursors ($\text{Bi}(\text{NO}_3)_3$ or BiCl_3), mineralizer concentration (KOH/NaOH), temperature and treatment time are the variables subjected to modification. Spherical particles between 300.3 ± 77 and 679 ± 208 nm wide, cubes of 341.7 ± 124 nm side and octahedra between 240.6 ± 57 and 681 ± 168 nm side were synthesized. Except for the 12 M series for BiCl_3 , the rise in treatment time generally produces bigger particles. Mineralizer concentration seems to be a determinant factor for the appearance of octahedra.

Keywords: Hydrothermal synthesis, nanoparticles, Bismuth Sodium Potassium Titanate

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