

Synthesis of BSTO Nanoparticles and Its Ink-formulation For Ink-jet Printed Flexible Piezoelectric Devices

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BaSrTiO₃ (BSTO) nanoparticle having ~50 nm in diameter was synthesized by a simple hot-injection solution process. The as-synthesized nanoparticles showed high crystalline tetragonal phase after annealing at 700 °C in oxygen ambient. The BSTO NPs were further formulated as an ink using chlorobenzene as a solvent for inkjet printing of piezoelectric devices supported on flexible PI substrate. The ink-jetting behavior of the as-formulated ink samples showed that the dispersing media and digitally-controlled number of over-printing are important factors for optimizing the uniformity and thickness of printed films with smooth edge definition. Polarization vs. electric field (P)E dependencies of as-printed nanoparticle films were measured at frequency 2 kHz from -3 to +3 V using TF Analyzer Measurement System (TFAMS). The synthesized BSTO ceramic opens up a new range of applications for flexible electrical printed devices with unique mechanical, ferroelectric, piezoelectric, pyroelectric, dielectric, and elastic properties that find use in multilayered capacitors, and random access memories.