Synthesis and Characterization of Ferroelectric $Ba_xSr_{1-x}TiO_3$ Thin Films by Solution Method

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We develop an optimized chemical synthesis route to obtain $Ba_xSr_{1-x}TiO_3$ (x=0, 0.50, 1.0) thin films with accurate stoichiometry control. The molar ratios of the precursors were altered to produce single crystalline cubic phase of $SrTiO_3$, $Ba_{0.5}Sr_{0.5}TiO_3$, and tetragonal phase $BaTiO_3$ thin films on various substrates. The analyzed Raman spectrum for the $Ba_xSr_{1-x}TiO_3$ thin films on quartz substrates shows characteristic vibration modes at ~303, 515 and 716 cm^{-1}. The active modes of $BaTiO_3$ signify the tetragonal phase, which is important for its various technological advantages. The above findings are important for evaluating device compatibility of cost efficient solution processed $Ba_xSr_{1-x}TiO_3$ thin films.