Stoichiometry and Phase Control in Thermally Stable $BaxSr_{1-x}TiO_3$ (x=0, 0.50, 0.67, 1.0) Thin Films by an Optimized Wet Chemical Route

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We describe an optimized chemical synthesis route to obtain BaxSr1−xTiO3 (x=0, 0.50, 0.67, 1.0) thin films with impeccable stoichiometry control. The molar ratios of the precursors were altered to produce cubic phase of SrTiO3, Ba0.5Sr0.5TiO3, Ba0.67Sr0.33TiO3 and tetragonal phase BaTiO3 thin films on single crystalline p−Si (110) and quartz substrates. The stoichiometric control was evident from the considerable binding energy shift in x−ray photoelectron spectroscopy and from the noticeable shift in the main (110) peak in the x−ray diffractometer. The Raman spectroscopy of the BaxSr1−xTiO3 (x=0, 0.50, 0.67, 1.0) thin films on quartz substrates showed characteristic vibration modes at ~303, 516 and 730 cm−1. The active modes of BaTiO3 signify the tetragonal phase, which is important for its various technological advantages. The above findings are important for assessing device compatibility of cost efficient solution processed BaxSr1−xTiO3 thin films.