Reaction Temperature Variations on $BaTiO_3$ Nanowires for Piezoelectric Miniaturization

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Piezoelectric generators have been attracted with extensive interests due to their high conversion efficiency from mechanical stress to electric charge. Recently, performance enhancement of piezoelectric thin films has been conducted via development of free-standing 1 dimensional (1D) nanostructures on conductive substrates for feasible piezoelectric applications. Here, density control of 1D nanowire is required to prevent nanostructure agglomeration, which is a causative factor in low piezoelectric power. The 1D nanostructure agglomeration is directly related to comprehensive effect of nanowire's aspect ratio and surface tension between nanostructures. In this study, we have synthesized $BaTiO_3$ nanowires via practical two-step hydrothermal method. First, in order to develop high density nanowires without agglomeration, reaction temperature variations in TiO_2 nanowire synthesis were conducted by adjusting reaction of acceleration rate, nucleation temperature and growth temperature. Next, perovskite $BaTiO_3$ nanowires were topo-chemically transformed from TiO_2 nanowires to be used as piezoelectric materials, then its piezoelectric properties were investigated by PFM measurement.