

Improved dielectric performance of barium strontium titanate multilayered capacitor by means of pulsed laser deposition and slow injection sol-gel methods

ABSTRACT

A Pt/BST/NiFe/Cu multilayered capacitor was fabricated incorporating a polycrystalline Ba_{0.5}Sr_{0.5}TiO₃ (BST) film deposited using the pulsed laser deposition technique. Qualitative X-ray diffraction analysis confirmed a perovskite structure for the deposited BST dielectric films which were fired at various temperatures. No intermediate phase was discernable with a post-annealing temperature of 750°C and highly crystallized thin film was obtained at a post-annealing temperature of 800°C. The fabricated capacitor with a BST film thickness of 665 nm exhibited respectable electrical performance with a dielectric constant, k of 657 and a dielectric loss, $\tan \delta = 0.0137$ at room temperature at an applied frequency of 1 MHz. The recorded charge storage density and leakage current density were 4.6 C cm⁻² and 33 nA cm⁻², respectively, with ± 5 V bias.

Keyword: Barium strontium titanate; Capacitor; Dielectric characteristics; Sol-gel process