

The Effect of Ba/Sr Ratio on Electrical and Optical Properties of $\text{Ba}_x\text{Sr}_{(1-x)}\text{TiO}_3$ ($x = 0.25; 0.35; 0.45; 0.55$) Thin Film Semiconductor

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Ferroelectric $\text{Ba}_x\text{Sr}_{(1-x)}\text{TiO}_3$ thin film semiconductors with Ba/Sr ratio deposited on silicon using chemical solution deposition (CSD) method have been investigated, followed by annealing at 850°C for 15 hours. Observations by I-V meter, LCR meter, and oscilloscope were employed to characterize the electrical properties of the thin films and the observation of fourier transform spectroscopy (FTIR) and particle size analyzer (PSA) to characterize the optical properties. The results showed that the dielectric constant was given around 2–18. Moreover the obtained films were found to be resistor because the I-V graph of each sample was ohmic either in dark or bright environment. The increase of BST mol fraction at dark environment is proportional to the increase of the curve slope. While at bright environment gives the highest curve slope for BST with fraction $x = 0.45$. Based on electrical conductivity of thin films, we conclude that the thin films are semiconductor. Moreover, functional group and particle size of sample were analyzed using FTIR and PSA analyzer. The augmentation of Ba would decrease the transmittance band of OH^- and increase the transmittance band of C-O because the radius of Ba is higher than Sr. The particle distribution size of BST 0.45 is 134.93 nm smaller than BST 0.25 which gives 186.26 nm, BST 0.35 gives value of 467.86 nm and BST 0.55 is 407.49 nm.

Keyword $\text{Ba}_x\text{Sr}_{(1-x)}\text{TiO}_3$; thin films; electrical properties; optical properties; semiconductor.

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