

Derivative Optical Spectroscopy of Thin Films of Alkaline-Earth Titanates: Critical Points

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Abstract. This paper analyzes UV Vis absorption spectra of amorphous thin films of barium strontium titanate (BST) deposited by RF magnetron sputtering on SiO₂ at different substrate temperatures. The Tauc procedure was used to determine optical band gaps for direct and indirect interband transitions. This procedure was accompanied by derivative spectroscopy useful in case of multicomponent systems. Higher-order derivatives were used to find the so-called critical points related to the optical interband transitions at various regions in the Brillouin zone. Three critical points were identified in BST thin films spectra of dielectric function. All optical band gaps and energies of critical points were found to decrease with the substrate temperature at the deposition.