The Effect of Various Annealing Cooling Rates on Electrical and Morphological Properties of TiO_2 Thin Films

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This paper investigates the effect of various postannealing cooling rates on structural and electrical properties of Titanium Dioxide (TiO_2) thin films. TiO_2 thin films were deposited on a silicon substrate using DC magnetron sputtering technique. After annealing TiO_2 thin films at 600°C, to investigate the effect of different cooling rates on TiO_2 thin films, samples were cooled down from 600°C to room temperature under 3 different rates: 2°C/min, 6°C/min, and 8°C/min. The Surface morphology, crystal structure, and electrical properties of the samples were characterized by atomic force microscope (AFM), X-ray diffraction (XRD) and Four-point probe (FPP) techniques. It is found that the rate of decreasing temperature after annealing can affect the morphology structure and electrical resistivity of TiO_2. The sample with 2°C/min cooling rate has the largest grain size and highest electrical resistivity, while the sample with 8°C/min cooling rate has the smallest grain size and lowest electrical resistivity.

Keywords: TiO_2, Annealing, Electrical properties, Thin Film, Cooling Rate.

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