

DEPOSITION AND CHARACTERIZATION OF TiAlN THIN FILM USING DC/RF MAGNETRON CO-SPUTTERING TECHNIQUE

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ABSTRACT

The present paper discusses about deposition of TiAlN thin films by using Magnetron Co-sputtering with both DC and RF power supplies. The substrate used for deposition is silicon.

Titanium aluminium nitride thin films have been deposited on silicon using an unbalanced magnetron co-sputter arrangement with separate titanium and aluminium targets. A range of Ti/Al/N compositions were produced by varying the RF power supply which is connected to the aluminum target. The thin films were then examined using an atomic force microscope (AFM), a scanning electron microscope (SEM), FTIR, corrosion analysis and the crystallography structure of the films were determined by X-Ray diffraction. Aluminum, titanium and nitrogen compositions (wt. % and at. %) were determined by using energy dispersive X-ray spectroscopy.

It was found that as the aluminum target power increases (100W, 125W, 150W, and 175W) the compositions of aluminum changed and the color of the films changed from gold to a blue-red. An increase in the aluminum content (10-20%) had a significant effect on the average roughness and RMS value of the films. Surface measurement analysis using the AFM results revealed that as the aluminium content increases the average roughness decreased.

KEYWORDS: TiAlN Coating, Magnetron Co-Sputtering, FTIR, AFM, Corrosion Analysis, Nano-Indentation, X-Ray Diffraction.