

## Accepted Manuscript

Title: Structural, Mechanical and Tribological  
Characterization of Chromium Oxide Thin Films Prepared by  
Post-annealing of Cr Thin Films

Author: K. Khojier H. Savaloni Z. Ashkabusi N.Z. Dehnavi



PII: S0169-4332(13)01434-7  
DOI: <http://dx.doi.org/doi:10.1016/j.apsusc.2013.07.123>  
Reference: APSUSC 26097

To appear in: *APSUSC*

Received date: 15-4-2013  
Revised date: 21-7-2013  
Accepted date: 24-7-2013

Please cite this article as: K. Khojier, H. Savaloni, Z. Ashkabusi, N.Z. Dehnavi, Structural, Mechanical and Tribological Characterization of Chromium Oxide Thin Films Prepared by Post-annealing of Cr Thin Films, *Applied Surface Science* (2013), <http://dx.doi.org/10.1016/j.apsusc.2013.07.123>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

***Structural, Mechanical and Tribological Characterization of Chromium Oxide Thin Films Prepared by Post-annealing of Cr Thin Films***

K. Khojier<sup>1,\*</sup>, H. Savaloni<sup>2</sup>, Z. Ashkabus<sup>3</sup>, N. Z. Dehnavi<sup>3</sup>

<sup>1</sup>*Department of physics, Chalous branch, Islamic Azad University, Chalous, Iran.*

<sup>2</sup>*Department of physics, University of Tehran, North Kargar Street, Tehran, Iran.*

<sup>3</sup>*Department of physics, Faculty of science, Central Tehran branch, Islamic Azad University, Tehran, Iran.*

\*Corresponding author's email: khojier@iauc.ac.ir/ k\_khojier@yahoo.com, Tel: +98 191 2226601, Fax: +98 191 2226605

**Abstract**

This paper addresses the structural, mechanical and tribological properties of chromium oxide thin films produced by post-annealing of Cr thin films. First, chromium thin films were deposited on Si substrate by DC magnetron sputtering technique, and then post-annealed at different temperatures (200-600 °C) with flow of oxygen. Crystallographic structure of samples was obtained using X-ray diffraction (XRD) method. The XRD patterns showed Cr<sub>3</sub>O structure for annealed samples at 200 °C and 300 °C and Cr<sub>2</sub>O<sub>3</sub> structure for annealed samples at 500 °C and 600 °C. The sample annealed at 400 °C also showed a transition (mixed) phase consisting of both of these phases. Nano-strain investigation for all samples showed compressive strain. Surface physical morphology of samples was studied by Atomic Force Microscopy (AFM) and Scanning Electron Microscopy (SEM). These studies showed smaller grains and smoother surfaces for annealed films at lower temperatures, while the increasing of annealing temperature caused the increasing of grain diameter and surface roughness. Nano-indentation and scratch tests were used to investigate the mechanical and tribological properties, respectively. The results showed that the post-annealing of Cr thin films wasn't a suitable method for preparation of Cr<sub>2</sub>O<sub>3</sub> hard coatings; however this method was suitable for

Download English Version:

<https://daneshyari.com/en/article/5352634>

Download Persian Version:

<https://daneshyari.com/article/5352634>

[Daneshyari.com](https://daneshyari.com)