Ain Shams University
Faculty of Education
Physics Department

Some Physical Properties Of Sputtering Cu-Ag And Cu-Sn Alloys And Redeposition Of Sputtered Thin Films In Different Plasma Atmospheres

THESIS
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By
IBTESAM AHMED MOUSA
[B.Sc. & Ed. (1986), G. Diploma (1987)
& Sp. Diploma (1988)]

To
Department of Physics
Faculty of Education
Ain Shams University

Supervised by
Professor. Dr. ATEF SOLIMAN RIZK
Ass. Prof. RAOUF HALIM SHINOUDA
Dr. SALWA KAMEL HABIB

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بسم الله الرحمن الرحيم

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قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا

إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ . صدق الله العظيم

اهـــــداء

الى أهل العلم أهدي عملي المتواضع ..
قطـرة من بحر علمهـم الفيـاض .
جزاهـم اللـه عنا خير الجـزاء .
والـى امـي وأبـي وزوجـي
وبفضـل دعواتهـم .. اتقـدم

ابتسام احمد موسى

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Abstract

Abstract

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The present work is devoted to investigate:

1. The glow discharge and sputtering characteristics of the two mentioned copper alloys.
2. Surface topography and sputtering behaviour of Cu-6 wt% Ag and Cu-10 wt% Sn in different plasma atmospheres.
3. Some physical parameters affecting deposition rates of films formed in a magnetron sputtering system, and
4. Target profile change due to magnetron sputtering of Cu-Ag and Cu-Sn alloys.

Summary

The work presented in this thesis is devoted to investigate the physical properties of sputtering Cu-Ag & Cu-Sn alloys and redeposition of sputtered thin films in different plasma atmospheres. Four topics are discussed: **1)** Glow discharge and sputtering characteristics of Cu-6 wt% Ag & Cu-10 wt% Sn targets. **2)** Surface topography and sputtering behaviour of the two binary alloyed targets due to their ionic bombardment in different plasma atmopsheres. **3)** Physical parameters affecting deposition rates of thin films formed in a magnetron sputtering system, and **4)** Target profile change due to deposition of backscattered material.

In the first topic, the effects of alloying silver and tin individually with copper on the glow discharge and sputtering characteristics of the two copper alloys are discussed. It was found that alloying either silver or tin with copper generally enhanced the glow discharge characteristics of pure copper in the two formed binary alloys. On the other hand, alloying silver with copper activated both oxidizing and nitriding processes of the Cu-Ag target where as tin in the Cu-Sn target hindered the two processes.

The second topic deals with surface topography and sputtering behaviour of the two alloys after treatment in different plasma atmospheres. Scanning electron microscopy was used to examine the bombarded surfaces. It was found that Ag in the Cu-Ag target increased its overall sputtering yield and consequently its surface erosion rate, while Sn on the other hand substantially reduced the sputtering yield of the Cu-Sn target.