Corrosion Behaviour of Tantalum Implanted with Argon and Nitrogen Ions

A. H. Ramezani [1], A.H.Sari[2]

[1] *Department of physics, west Tehran Branch, Islamic Azad University, Tehran, Iran*

[2]*Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran*

Corresponding author: ramezani@wtiau.ac.ir

Abstract

The surface bombardment with inert gases mainly produces structural changes, modifying topography and morphology that atomic force microscopy analysis reveals significant changes on the surface. In this paper the effect of nitrogen and argon ion implantation on surface structure and resistance against tantalum corrosion is investigated. These experiment nitrogen ions with the energy of 30 keV and doses of 3×10^{17} ions/cm^2 are used. Roughness variations before and after implantation are observed by Atomic force microscopy (AFM). Also the corrosion analysis apparatus is used for comparison of resistance against Tantalum corrosion before and after ion implantation. Results show that nitrogen ion implantation has a substantial effect on resistance improvement against tantalum corrosion. The aim of this article is to achieve the best condition of tantalum formation. The corrosion potential curves and roughness values obviously indicate that corrosion potential variations caused to the different doses of Nitrogen ion bombardment are inversely proportional to surface roughness.After the corrosion test, Scanning Electron Microscopy (SEM) analyzed the samples' surface morphologies. In addition, the elemental composition is characterized by energy –dispersive X-ray (EDX) analysis

Key words: Ion implantation, Tantalum, AFM, Corrosion

References:

1. A.S. Abd-El-Aziz, C.E. Carraher, C.U. Pittman, M. Zeldin (eds.), *Inorganic and Organometallic Macromolecules* (Springer-Verlag, New York, 2008)

2. P. Budzyński, P. Tarkowski, E. Jartych, A.P. Kobzev, Vacuum **63**,737 (2001)

3. Y. Liu, X. Zu, S. Qiu, X. Huang, Rare Met. **25**, 309 (2006)

4. D. Shikha, U. Jha, S.K. Sinha, P.K. Barhai, K.G.M. Nair, S. Dash, A.K. Tyagi, S. Kalavathy, D.C. Kothari, Surf. Coat. Technol. **203**,2541 (2009)