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Arash Fattah-Alhosseini, Farid Reza Attarzadeh, Saeed Vafaeian, Meysam Haghshenas, Mohsen K. Keshavarz

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Electrochemical behavior assessment of Tantalum in aqueous KOH solutions

Arash Fattah-alhosseini [1*], Farid Reza Attarzadeh[2], Saeed Vafaeian [1], Meysam Haghshenas [3], Mohsen K.Keshavarz[4]

[1] Department of Materials Engineering, Bu-Ali Sina University, Hamedan 65178-38695, Iran

[2] Research Institute of Petroleum Industry, Corrosion division, Tehran, 14857-33111, Iran

[3] Department of Mechanical Engineering, University of North Dakota, Grand Forks, USA

[4] Department of Mechanical Engineering, Polytechnique Montreal, Montreal, Canada

([*] Corresponding Author, Fax: +98 81 38257400, E-mail: a.fattah@basu.ac.ir)

The current work aims at studying passive and electrochemical behavior of tantalum in KOH solutions of varied concentrations ranging from 0.01 to 1M using various electrochemical methods. Electrochemical impedance spectroscopy (EIS) results show that the passive film formed on tantalum loses its protectiveness upon addition of KOH concentration. Indeed, the passivity undergoes a drastic change moving toward higher KOH concentrations. The semiconductive behavior of the passive films formed on tantalum is also investigated by employing Mott–Schottky analysis in conjunction with point defect model (PDM). Although semiconducting behavior remains the same as n-type, KOH concentration greatly affects the levels of donor densities. Moreover, Mott–Schottky analysis showed that flat band potential is quite sensitive to KOH concentration.

Keywords: Tantalum; Passive film; EIS; Mott–Schottky; Alkaline solution.