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Effects of deposition time on the structural and properties of nano-scale grain size beta-tantalum thin films produced by a magnetron sputtering system DAVOUD DORRANIAN, Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran, ELMIRA SOLATI, Physics Department, Science Faculty, Islamic Azad University, Karaj Branch, Karaj, Iran, MOHAMMADREZA HANTEHZADEH, MAHMOOD GHORANNEVISS, AMIRHOSSEIN SARI, Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran — This work investigated the effect of deposition time on beta-tantalum films deposited by direct current magnetron sputtering at ambient temperature on BK7 glass and 304 steel substrates. The films were characterized by X-ray diffraction, atomic force microscopy, four point probe, profilemeter, and spectrophotometer. The AFM micrographs showed the grain size was about 20-30 nm and 100-140 nm for glass and steel substrates, respectively. The salient feature in the present tantalum thin film with a nano-scale grain size is the higher resistivity of glass substrate samples in comparison with bulk coarse-grained tantalum. Due to the condition in this experiment, it can be claimed that in the case of tantalum sputtering, the sputtering power of 135 W leads to formation of nano-scale grain size thin films. Film properties are influenced by the substrate temperature even if the difference is so small due to heat conductivity of two materials such as glass and steel.

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