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Effect of sputtering parameters and substrate composition on the structure of tantalum thin films

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Abstract

The crystallographic properties of tantalum films deposited as a bioactive coating on Co-Cr-Mo and Ti-Al-Nb alloys have been investigated. The desired tough and ductile alpha phase of tantalum has been obtained by DC magnetron sputtering on Co-Cr-Mo and Ti-Al-Nb substrates. The thickness of the tantalum layer was between 20 - 600 nm. The crystallographic structure of tantalum thin film was dependent on the sputtering parameters such as DC power, bias voltage and gas impurities. Oxygen is an important factor for the stabilization of the tantalum alpha phase on Co-Cr-Mo substrate. The crystallographic structure and texture of tantalum thin films was found to be additionally dependent on the substrate composition. For Ti-Al-Nb substrate, oxygen content was not an important factor for the stabilization of the alpha phase. The observed shift of X-ray diffraction peaks to lower $2(\theta)$ is an indication of stress

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