

Voltage oscillatory behavior during Nb plasma electrolytic oxidation

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Electrolytic plasma oxidation is a technique that has been widely studied to obtain oxide films, such as Niobium oxides, that are interesting due to their properties as a semiconductor material, biocompatibility, and high corrosion resistance [1]. The electrochemical behavior during this process can change according to the PEO parameters used and can influence characteristics such as thickness, morphology, and crystal structure of the oxide film. When produced under specific conditions, anodic silicon oxides exhibit oscillatory voltage behavior [2]. This work observed voltage oscillations as a function of time during the synthesis of Niobium oxide films by electrolytic plasma oxidation in a galvanostatic regime, similar to those observed in Silicon anodization. Niobium substrates were anodized in a $C_2H_2O_4$ solution using a DC source, a data recorder, and an electrolyte temperature control system. The samples were characterized by scanning electron microscopy (SEM), dispersive energy spectrometry (EDS), and X-ray diffraction (XRD). It was observed that the oscillatory behavior of Niobium can be compared to that of silicon and is related to synthesis parameters such as electrolyte temperature, current density, and anodizing time.

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References

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