CORROSION ANALYSES OF ANODIZED ALUMINUM FOR BIOMEDICAL PURPOSES

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Introduction and objective: Anodic aluminum oxide has attracted a lot of interest due to the regular arrangement of nanopores, ease of control of the nanopores diameter, large specific surface area, low cost, good thermal stability, absence of toxicity and biocompatibility. The geometric arrangement of nanopores makes it possible to use alumina as a mold for the synthesis of various nanostructures, such as nanopores, nanotubes, nanorods and nanowires that have many advantages in advanced application areas due to their unique chemical, physical, mechanical, and optical properties [1,2]. The objective of this work was to study the corrosion susceptibility of anodized aluminum samples for biomedical applications.
Methodology: In the present work, the localized corrosion resistance of AA6061aluminum alloy anodized in oxalic acid solution (C2H2O4) and sulfuric acid (H2SO4) was evaluated by electrochemical techniques. Prior to the anodization stage, the samples were electrolytically polished in a solution of perchloric acid and ethanol.
Results and discussion: All samples showed a protective behavior on their surfaces, higher corrosion potentials in relation to the standard reference sample and a shift towards lower values of corrosion current densities in relation to the sample without passivation treatment. These results indicate that the anodizing treatments of AA6061 aluminum surfaces in oxalic or sulfuric acid are effective in producing surfaces resistant to localized corrosion and can therefore be used to coat this type of surface, ensuring an increase in the useful life of the devices.
Conclusions: The results indicated superior corrosion resistance in the anodized samples in both conditions. Therefore, it is necessary to constantly advance research on the use of nanoporous anodic alumina coatings on biomaterials surfaces.

References

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