

SELECTING A SURFACE PREPARATION TREATMENT ON A MEDIUM ENTROPY Ti-Zr-Ta-Ag ALLOY

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Abstract. *All metallic alloys undergo some surface pretreatment before coating deposition. This preparation step influences the surface roughness and can also change the surface chemical composition, therefore influencing the coating adhesion and the physicochemical characteristics of the coated alloy. Choosing an appropriate surface pretreatment can maximize the coated alloys performances. In this work, we aimed to comparatively analyze the surface of the Ti-Zr-Ta-Ag alloy before and after two different surface pretreatments. The surface composition and morphology were investigated using atomic force microscopy, scanning electron microscopy, and energy dispersive spectroscopy, while surface energy and mechanical properties were investigated using contact angle measurement and Vickers hardness test.*

Keywords: surface preparation, titanium alloy, acid etching, alkaline treatment

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1. Introduction

In the context of enhanced negative effects associated with traditionally metallic alloys implants due to the increased aggressivity of bacteria [1,2] and to the allergenic and toxic potential of metals [3–5], new strategies are under investigation to improve the performance of metallic biomaterials. In the last decades such strategies have been especially focused on surface modifications and chemical composition changes [6,7].

It is to mention that such negative aspects, with impact on safe use and people health are controlled by the European Commission (EC) [8–10], which is continuously introducing new directives and regulations in the frame of new carcinogenic, mutagenic or toxic to reproduction substances (CMR) [10]. An example is the substitution of biomaterials according to the Regulation 2017/745 of the European Parliament in two transition periods, the first one starting in 2017 and the second one in 2021. The manufacturers need to find until 2025 alternatives to substitute the well-known CoCr implants that have carcinogenic

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