FINAL ASSIGNMENT

THE EFFECT OF HYDROXYAPATITE LAYER ON BIOACTIVITY AND CORROSION RATE OF TITANIUM-12CR IN SIMULATED BODY FLUID

Submitted to Fulfill Requirement on Bachelor Degree (S1)

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PADANG, 2021

ABSTRACT

Biomaterial implant is an orthopedic treatment to treat fracture problems. The popular material used in this case is titanium. Pure titanium and its alloys have better biocompatibility and biomechanical properties than other metals, while stainless steel and cobalt chromium have lower biocompatibility and corrosion resistance than titanium. In addition, this stainless steel and cobalt chromium have a higher modulus of elasticity that will lead to a pain and bruising in the joints. Titanium type β or Ti-12Cr is interested to develop for biomedical application because that kind of alloy has an excellent biocompatibility and mechanical properties which it can be controlled. Titanium is not perfect, there is some problem in titanium such as less bioactive to induce precipitation of Calcium phosphate (CaP), it can reduce bone osseointegration with implant material. Therefore, it is necessary to do a coating treatment on the material.

In this study, the coating process on Ti-12Cr material was carried out. The coating was carried out using hydroxyapatite with the Electrophoretic Deposition method and sintered at a temperature of 700ºC. After that, an in vitro test was carried out, by immersing the material in a Simulated Body Fluid solution using an incubator shaker at a temperature of 36.5°C. This test uses time variations, namely 1 week, 2 weeks, 3 weeks and 4 weeks. After soaking, the surface of the material was examined using a macro microscope and SEM. After that, the weight loss method was used to determine the corrosion rate by comparing the weight of the material at the beginning before immersion and after immersion.

The test results with SEM observations showed the presence of apatite growth in the second week to the fourth week on the surface of the hydroxyapatite-coated material. The growth is in the form of tapered hydroxyapatite cells which will continue to increase along with the immersion of the material. In the uncoated material there are several cavities which indicate that corrosion has occurred. With the weight loss method, the corrosion rate of the uncoated material is much higher than the corrosion rate of the coated material.

***Keywords**: Implant Biomaterial, Titanium-12 Chromium (Ti-12Cr), in vitro test, Simulated Body Fluid, microstructure and corrosion rate.*