CHAPTER I
INTRODUCTION

1.1 Background

Bones plays important roles in human body such as providing shape, mechanical support and protection to the body. When bone is under some stressful and/or continuous compressive conditions and when forces overcome the toleration of the bone tissue, bone fracture will occurs [1]. One of the nature problems that can lead to a fracture is osteoporosis. In 2010, International Osteoporosis Foundation (IOF) said that the number of individuals aged 50 years and over at high risk of osteoporotic fracture worldwide was estimated at 158 million and prospect set to double by 2040 [2]. The medical treatment to osteoporosis usually is surgical operation with implant.

It is common to use stainless steel (316L), cobalt-chromium (CoCr) alloys and titanium (Ti) alloys for implant. Among these materials, titanium is preferable due to a better combination of biocompatibility, corrosion resistance, strength and elastic modulus, and relatively low weight and density, when compared to Co-Cr alloys [3]. The corrosion resistance of titanium is caused by the formation of surface oxides in the form of a continuous thin layer, leads titanium to be passive state [4]. The oxide layer increases the biocompatibility of titanium.

However, titanium is still not perfect, less bioactive to induce precipitation of Calcium phosphate (CaP), can reduce bone integration with implant material. Fabrication of a bioactive hydroxyapatite (HA) coating on the implant is a good way to improve the physiological chemical bond between the implant and bone [5]. HA can be used as a filler to replace damaged bone or a coating on implants, because its similarity with mineral component of bones, so that it will promotes bone in-growth into prosthetic implants when used in orthopedic, dental, and maxillofacial applications [6]. The growth of the hydroxyapatite layer in vivo is comparable to the growth of hydroxyapatite under in vitro conditions [7].

Based on the information in the background above, a research will be conducted on the effect of Hydroxyapatite coating on bioactivity and corrosion rate of Ti-12Cr. The test will be conducted in SBF fluid.

1.2 Problem Formulation

Based on the information in the background above, the problem formula is: Is there any effect of hydroxyapatite layer on bioactivity and corrosion rate of titanium-12cr in simulated body fluid?

1.3 Research Objective

This research will investigate degree of the effect of hydroxyapatite layer on bioactivity and corrosion rate of titanium-12cr in simulated body fluid.

1.4 Benefit

The advantages of this research are to obtained implant material that are biocompatible and become an implant alternative that is safe for the body.

1.5 Research Scope

The problem limitations of this research are :

1. Using electrophoretic deposition (EPD) coating method
2. Using Simulated Body Fluids (SBF) Kokubo with addition of HCL.
3. Tested at body temperature (37ºC)

1.6 Report Outline

This study consist of five parts. Chapter 1 contains introduction that describes background, research purposes, research advantages, problem limitations, and writing systematic. Chapter 2 consist of literature review which contains the basic theories used in this study. Chapter 3 describes methodology that was used in order to find the result. Chapter 4 explained the result of this study by presenting the pictures of wear observed by using optical microscope, the comparison chart and table. Chapter 5 explained the conclusion of this study.