

Improving Biocompatibility of Cobalt Based Alloy Using Chemical Etching and Mechanical Treatment

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Abstract.

Biomedical grade of cobalt based alloy have found a plethora of applications as medical devices especially in dental and articulation joints like in total ankle, knee and hip arthroplasty. However, the long-term performance of this material is highly dependent on their ability to withstand in harsh aqueous environment effects such as corrosion and wear once they are used inside a human body. Loss of surface integrity and subsequent leaching of toxic metal ions as well as particles to the surrounding tissues may undermine biocompatibility of metallic implants, also potentially causing untimely loss of mechanical function and device failure. In this study, a biomedical grade of Co-Cr-Mo alloy surface was treated with various surface modification techniques such as chemical etching and mechanical roughening in order to improve its biocompatibility. Investigation was done to study which techniques possesses the positive effect in cell growth and excellent cell response on the treated surface of Co-Cr-Mo alloy. In-vitro study showed that human osteoblast cells grown with good adherence and spread out with an intimate contact on the chemical etched surface after 14 days of incubation. It is believed that porous structure with grooves owned by chemical etched surface helps in anchoring the cells to the substrate surface and facilitates cells growth since more protein molecules expected to have more sites on CT surface. On mechanical roughened surface, the cells appeared to show slightly less extended cell membranes and remained rounded.