

Corrosion behaviour and effect of surface finishing in the formation of nano structure on NiTi Alloy

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Abstract

Nitinol – NiTi (Nickel-titanium alloy) is used in orthopaedic and orthodontic applications due to its attractive and exceptional properties such as super elasticity and shape memory effect. Conversely NiTi releases harmful Ni ions from the implants to living tissues that could be toxic to cell, tissue and organs. Thus, it is necessary to have a barrier for such release of ions from the implant. In the present work, we investigate the formation of nano structured oxide layers by anodic oxidation on different surface finished (mirror finished, 600 and 400grit polished) nickel - titanium alloy (NiTi) in electrolyte solution containing Ethylene glycol and NH_4F . The anodized surface was characterized by XRD, FESEM and EDS. The corrosion behavior of the treated and untreated samples was investigated through electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization studies in simulated body fluid (Hanks' solution). The investigations show that the native oxide on the sample is replaced by nano structure by anodisation. Corrosion resistance of the anodized sample is comparable with that of the untreated samples.

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