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Title:

Characterization of electric discharge machining, subsequent etching and shot-peening as a surface treatment for orthopaedic implants

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Highlights

surface treatment of Ti alloy by electric discharge machining, etching and shot peening

surface topography enhances the proliferation of osteoblast-like cells

shot peening improves poor fatigue performance after electric discharge machining

proposed three-step surface treatment is well applicable in orthopaedics

Abstract

Presented work aims at multi-method characterization of combined surface treatment of Ti-6Al-4V alloy for biomedical use. Surface treatment consists of consequent use of electric discharge machining (EDM), acid etching and shot peening. Surface layers are analyzed employing scanning electron microscopy and energy dispersive X-ray spectroscopy. Acid etching by strong Kroll's reagent is capable of removing surface layer of transformed material created by EDM. Acid etching also creates partly nanostructured surface and significantly contributes to the enhanced proliferation of the bone cells. The cell growth could be positively affected by the superimposed bone-inspired structure of the surface with the morphological

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