

03-167

PROCESSING OF NEW TITANIUM ALLOYS FOR BIOMEDICAL APPLICATIONS USING ECAP PROCESS

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Titanium and its alloys have been studied for biomedical applications with the addition of new alloying elements. These materials must exhibit high corrosion resistance, biocompatibility, and excellent mechanical properties. They are normally used for replacement hard tissues for the manufacture of prosthetics devices, such as hip joint and dental implants. Usually, these alloys are obtained by melting and heat treatment and sometimes, severe plastic deformation (SPD) processes is an alternative process to obtain bars as a final product. Equal Channel Angular Pressing (ECAP) is an extrusion process indicated to obtain ultra-fine grained (UFG) in titanium alloys, not otherwise generally have obtained. These processes consist in pressed the samples in a channel with an angle using a plunger. Four types of routing processes are using: samples are pressed without rotation; rotation in 90 degrees in a clockwise direction between passes; rotation in 90 degrees in counterclockwise direction between passes and sample is rotated 180 degrees between the passes. In our group, we have been studied the use of this technique to process new beta titanium quaternary alloys. We choose a die containing an internal channel angle of 90 degrees, rotation between passes and four passes, in total. Results showed a changing in microstructure with a reduction in anisotropy and consequently better mechanical properties.