

Mechanical Properties of ECAP-Biomedical Titanium Materials: A Review

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Abstract : The wide use of titanium (Ti) materials in medicine gives impetus to a search for development new techniques with elevated properties such as strength, corrosion resistance and Young's modulus close to that of bone tissue. This article presents the most recent state of the art on the use of equal channel angular pressing (ECAP) technique in evolving mechanical characteristics of the ultrafine-grained bio-grade Ti materials. Over past few decades, research activities in this area have grown enormously and have produced interesting results, including achieving the combination of conflicting properties that are desirable for biomedical applications by severe plastic deformation (SPD) processing. A comprehensive review of the most recent work in this area is systematically presented. The challenges in processing ultrafine-grained Ti materials are identified and discussed. An overview of the biomedical Ti alloys processed with ECAP technique is given in this review, along with a summary of their effect on the important mechanical properties that can be achieved by SPD processing. The paper also offers insights in the mechanisms underlying SPD.

Keywords : mechanical properties, ECAP, titanium, biomedical applications

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