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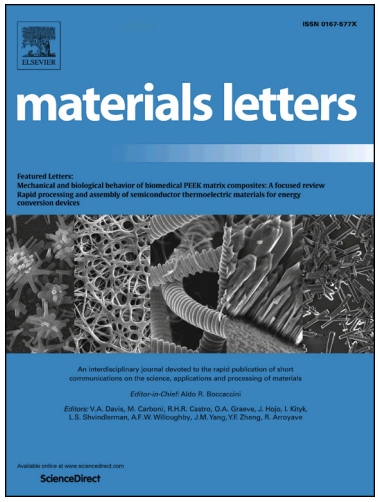

The microstructure-strength relationship in severely-deformed commercial-purity titanium

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The microstructure-strength relationship in severely-deformed commercial-purity titanium

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Electron backscatter diffraction was applied to examine the microstructure developed in commercial-purity titanium subjected to equal channel angular pressing at 200℃ to a true strain of 8.4. The microstructure was characterized by a mean grain size of 0.4 μm and fraction of high-angle boundaries of 55%. However, it also contained a significant fraction of relatively coarse (>1 μm) remnants of original grains. A microstructure-properties analysis indicated that strengthening effect of ECAP was essentially contributed by substructure.

Keywords: Metals and alloys; Nanocrystalline materials; Equal channel angular pressing; Electron back-scatter diffraction; Microstructure-strength relationship

1. Introduction

Due to its excellent biocompatibility, commercial-purity titanium is a very promising material for biomedical applications. Until recently, however, its widespread use was limited by insufficient mechanical strength. Developed in the early 1980s, equal channel angular pressing (ECAP) can provide significant material strengthening via the formation of an ultrafine-grain structure [1], thus enabling new opportunities for this material. Extensive research has conclusively

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