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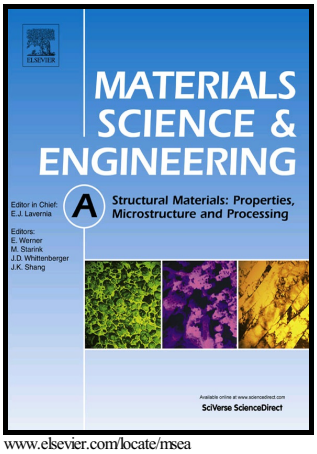

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ABSTRACT

The surface of Ti-6Al-4V was treated mechanically by applying ultrasonic nanocrystal surface modification. The effect of this treatment on the hardness, compressive residual stresses and fatigue performance were investigated. It is shown that in terms of the measured nanoindentation hardness values and the presence of compressive residual stresses, the treated sample only differed from the as-received sample in the first 200 μm to 300 μm area far from the surface. Also, the microstructure very close to the treated surface (<5 μm) was characterized using a relatively new transmission orientation microscopy technique named ASTAR™/precession electron diffraction. Based on different types of results (e.g., index map and virtual bright field image) acquired by this technique, it is concluded that titanium grains smaller than 10 nm exist within the distance of less than 1 μm from the treated surface. Difficulties associated with ASTAR™/precession electron diffraction technique to characterize this challenging near-surface area are discussed.