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Original Article

Structural, and tribological properties of nanostructured $\alpha + \beta$ type titanium alloys for total hip



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ABSTRACT

Titanium alloys are in demand for various biomedical applications and the most popular among them being, Ti–6Al–4V. Hence, in this study, Ti–6Al–7Nb are fabricated through the route of mechanical milling using different sintering temperatures. X-ray diffraction and hardness tests were conducted to characterize the developed sams to evaluate the effect of sintering temperatures on the structural and mechanical properties. It is observed that the sams sintered at a temperature of 1250 °C had the smallest crystallite and pore size, with enhanced relative density and mechanical properties. Tribological tests were conducted at varying normal loads to characterize the wear and frictional behaviour and showed that the sams sintered at 1250 °C presented the lowest friction coefficient and wear rate.

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1. Introduction

Titanium alloys (Ti-alloys), stainless steel (SS) and Co–Cr alloys are some of the most commonly used materials in biomedical applications [1,2]. However, among all the

materials mentioned, Ti-alloys are mostly preferred for the biomedical applications, due to their higher corrosion resistance, better tribological properties, good biocompatibility, and higher hardness as compared to SS AISI 316L and Co-alloys [3–10]. Furthermore, among the Ti-alloys, Ti–6Al–4V

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