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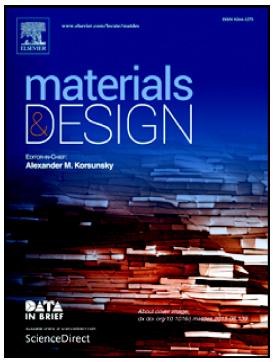

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Development of a novel TiNbTa material potentially suitable for bone replacement implants

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Abstract

A novel (β+γ)-TiNbTa alloy has been developed by a combined low energy mechanical alloying (LEMA) and pulsed electric current sintering process (PECS). Microstructurally, this material presents interesting characteristics, such as a submicrometric range of particle size, a body-centered phase (β-TiNbTa) and, mainly, a novel face-centered cubic Ti-based alloy (γ-TiNbTa) not previously reported. Related to mechanical performance, the novel (β+γ)-TiNbTa shows a lower E (49 ± 3 GPa) and an outstanding yield strength (σ_y > 1860 MPa). This combination of original microstructure and properties makes to the (β+γ)-TiNbTa a novel material potentially suitable as biomaterial to fabricate bone replacement implants, avoiding the undesirable and