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Characterisation of Porous Ti-20Zr Binary Alloys Produced by Powder Metallurgy as Implant

Eyyüp Murat Karakurt
Brunel University London, Uxbridge, London

In present work, the effect of porosity level and sintering time on the microstructure and mechanical performance of a Ti-20Zr alloy (at %). It was produced following a standard powder metallurgy route and was sintered at 1200 ˚C, under a pressure of 300 MPa, for different times (4, 6 and 8 h). Ammonium bicarbonate (NH4HCO3) was the space holder. Porous Ti-20Zr (at.%) alloys were prepared in two ranges of porosities. The metallographic examination of Ti-20Zr binary alloy was performed by optical microscopy (OM), scanning electron microscopy (SEM), and energy dispersive spectrometry (EDS) analysis. Uniaxial compression tests were carried out to determine the mechanical behaviour of the material. As expected, the porosity level played a crucial role on the Young's modulus and ultimate compressive strengths (UCS). Consequently, the Ti-20Zr (at.%) binary alloy with 46% porosity level sintered for 4 h exhibited an elastic modulus close to the cortical human bone (around 30 GPa). These results confirm that the porous Ti-20Zr (at.%) alloys have high potential as implant, due to favourable mechanical performance such as low Young's modulus and UCS.

Biography

Porosity level, Binary alloy, Powder metallurgy, Ammonium bicarbonate, Space holder.

1929254@brunel.ac.uk