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Evaluation of Reactive Induction Sintering as a Manufacturing Route for Blended Elemental Ti-5Al-2.5Fe alloy

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Abstract

This work focuses on gaining a better understanding of the feasibility of using reactive induction sintering to obtain the alloy Ti-5Al-2.5Fe using Ti, Al and Fe powders (i.e. via a blended elemental approach). For this, powder compacts were induction sintered under various temperature/time combinations like 700-1250 ºC and isothermal holding of 0-15 minutes. Compositional homogeneity, microstructure evolution and mechanical properties of the sintered Ti-5Al-2.5Fe alloy were investigated. It was found that by increasing the sintering temperature and isothermal holding time, sintered Ti-5Al-2.5Fe components with a homogeneous chemical composition and a Widmanstätten microstructure can be produced. The tensile strength increases with the sintering temperature/time reaching comparable values to the wrought alloy; however the residual porosity has a significant impact on the ductility of the alloy. This study demonstrates that reactive induction sintering is suitable to shorten the production route of blended elemental Ti alloys to be used in non-critical applications where ductility is not the main requirement.

Keywords: *Titanium alloys; Powder metallurgy; Induction sintering*