

The high-temperature performance of Ti-46.5Al-%xTa (x = 0.8, 4 and 8 at.%) alloys produced using SPS

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ABSTRACT:

In this study, -TiAl based alloys of composition Ti-46.5Al-%xTa (x = 0.8, 4 and 8 at.%) were fabricated by mechanical alloying and consolidated by spark plasma sintering. The main objective of the study was to evaluate the influence Ta contents had on strengthening effect of the -TiAl based alloy. X-ray diffractometry (XRD) at room and high temperatures and scanning electron microscopy (SEM) analyses were used to characterise the sintered alloys and fractured surfaces. Compression tests measured mechanical properties from 25 to 1000 °C. The results show that the addition of 0.8 at.% Ta increased the compressive strength of the -TiAl alloy from 980 N.mm⁻² (at 25 °C) to 1280 N.mm⁻² (at 850 °C). At 1000 °C, the strength of the alloys increased with increasing Ta additions. At 850 °C and higher, the mode of failure of all the sintered alloys was by intergranular fracture.