Paragraph Ran in the Queries

Paper Title: Phase formation and mechanical analysis of sintered Ni25Al25Co15Fe15Mn8Ti7Cr5 high entropy alloy

Content :

Physical and mechanical properties of the sintered NiAlCoFeTiMnCr HEA

The density, relative density, and percentage porosity variations of the sintered $Ni_{25}Al_{25}Co_{15}Fe_{15}$ $Mn_8Ti_7Cr_5$ HEA are shown in Table 3. The overall density of the fabricated HEA has been influenced by the inherent density of each alloying element and the SPS processing route adopted. The sintered density could be seen to be lower than the computed density in Table 1, this can be attributed to the presence of pores. The precipitated BCC eutectic phase may not have completely dissolved along the grain boundaries, resulting in partial wettability and some clustering or agglomeration. This is another explanation for the reduction in densification [29]. High porosity materials are prone to material failure, including cracks and fractures. However, for a material failure to occur, the percentage porosity needs to be higher than the critical level of 4 % [35]. A successful manufacturing approach was indicated by the fabricated HEA's percentage porosity, which was less than 1 %.

The sintered HEA's behavior with respect to microhardness showed an excellent microhardness value of 135.8 HV. The result shows how the developed HEA's mechanical properties are influenced by grain size. The findings indicate that the weight and particle size constituents of the interphase in continuous matrix alloys improved the alloy's load-bearing capacity and decreased its deformation susceptibility. The material's exceptional hardness resulted from strong adhesive bonding at the alloying element's interface, which was brought on by the alloying material inclusions' larger surface areas [29]. The combined effect of electromagnetic energy and green compact of powders create a more dense and uniform material, which was made possible by the SPS at a crucially shorter sintering time [34]. The strengthening of the HEA was made possible by phase refinement [11].