Effect of heat treatment on the microstructure, microhardness, and wear characteristics of AlCrFeCuNi high-entropy alloy

The International Journal of Advanced Manufacturing Technology, volume 111, pages2021–2029 (2020)

Free fulltext link: https://rdcu.be/caaWr

N. Malatji, T. Lengopeng, S. Pityana, A.P.I. Popoola

ABSTRACT:

The comprehensive properties exhibited by dual-phase high-entropy alloys (HEA) increase their prospects of finding use in engineering applications. However, the distribution of the phases that are present in the alloys has a significant effect on their mechanical performance. Therefore, the homogeneity of microstructure in these alloys remains critical for the improvement of their mechanical properties. In this study, AlCrFeCuNi HEA was fabricated by a direct laser metal deposition technique. The effect of heat treatment on the microstructure, microhardness, and wear performance of the alloy was investigated. The microstructural analysis revealed that the alloy was characterized by a dendritic microstructure with a dual-phase (BCC + FCC) composition. Microstructural changes were achieved at all heat treatment temperatures with grain growth starting to occur at 950 °C and dissolution of the BCC phase happening at 1100 °C. Good anti-wear characteristics were obtained for alloy heat treated at 950 °C.