

Effect of laser parameters on the properties of high entropy alloys: A preliminary study

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**Abstract**

This preliminary study investigates the fabrication of Al-Co-Cr-Fe-Ni-Cu and Al-Ti-Cr-Fe-Co-Ni High Entropy Alloys with the Laser Deposition Technique. The effect of the laser parameters on the microstructure and hardness properties of the advanced materials were studied for aerospace applications. The results revealed that significant 300% increment occurs in the microhardness from 200 to 600 HV for the AlCoCrFeNiCu alloy system and 70% increment from 500 to 850 HV for the AlTiCrFeCoNi system as the laser power increases from 600 W to 800 W. However, as the scanning speed increases, the microhardness decreases. There were no notable changes in the microstructure interface of both alloys with a change in process parameters and further analysis showed the AlCoCrFeNiCu alloy had a transitional columnar dendritic structure while the AlTiCrFeCoNi alloy had the equiaxed dendritic microstructure with the direction of the grains observed along with the height of the deposit. The hardness properties of AlTiCrFeCoNi observed was attributed to the Ti content known to improve strength by facilitating a solid laves phase which suggests a potential application for aerospace wear-resistant coatings.