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Laser Surface Alloying of Aluminium (AA1200) Alloy for Improving Hardness Property

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Abstract content
   (Max 300 words)

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Laser alloying of AA1200 alloy was carried out using a 4.4 kW Rofin Sinar Nd:YAG laser. The main objective was to improve the microhardness of the alloyed surface without affecting the bulk material. The alloying element used was stellite VI which is cobalt-chromium base alloy. The process involves melting the substrate with the laser beam thereby simultaneously depositing the powder particles into the melt pool. This results in a change of microstructure and composition of the material. Laser process parameters were varied to achieve the desired surface properties. Hardness was used as criteria to as assess the performance of the laser alloyed zone. From the results, it was observed that a significant increase in hardness from the substrate ± 24 HV to ± 758 HV of the alloyed matrix was obtained. The formation of hard intermetallic and refined microstructures were responsible for the hardness improvement. There were some cracks which were evidenced along the matrix of sample 3 and 4 which was a result of 4 kW power used. It is recommended to use a power of 3 kW to produce a matrix that is free from cracks and have good metallurgical bonding.

Keywords: Laser alloying, intermetallics, stellite VI.

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