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Laser surface alloying of Al with Mo for hardness improvement

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Abstract content
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Laser surface alloying of aluminum AA1200 was accomplished with a 4.4kW Rofin Sinar Nd:YAG laser to improve the surface hardness. Alloying was carried out by depositing molybdenum metallic powder on the aluminum substrate. The laser processing parameters used are, 2kW and 4kW laser power, 3mm beam diameter, 1m/min and 1.2m/min scanning speed with 75% overlap. The aim was to improve the hardness property of the aluminum substrate. The micro-hardness measurement of the samples was performed across the top surface as well as through the clad layers using a Vickers micro-hardness tester model FM700. An indenting load of 100 g with 10 seconds dwell time was used for each hardness indent action. Average microhardness was taken from the results of five indents values for all samples. Experimental results obtained showed that the intermetallic phases formed brought a significant increase in the hardness property of the aluminium alloy. A maximum microhardness increase of over 54 times the hardness of the substrate was achieved. Cracking was experienced during the hardness testing process. This is an indication of high brittleness as a result of the high hardness achieved from the cladding experiment carried out on the samples.

Key words: Intermetallic phases, Hardness property, AA1200

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