

Nd: YAG laser treatment of aluminium – TiB₂ coated: Optimization of corrosion properties

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ABSTRACT

As the reports in the literature regarding corrosion performance of Al/TiB₂ MMC are rather contradictory, the optimization of laser surface alloying parameters for these composite coatings seems to be necessary. The characterization of the MMC was carried out by optical microscopy (OM), scanning electron microscopy (SEM/EDS) and x-ray diffraction (XRD). Partial melting of the alloying powder occurred and the chemical reactions with the α -Al in the matrix led to the formation of AlTi and AlB₂ phases. Eutectics of TiB₂/Al and TiB₂/Ti were observed. The results of the tests indicate that TiB₂ reinforcement does not give significant increase in microhardness of aluminium. The corrosion resistance of a single laser trackline MMC in a 3.65 % NaCl solution was improved, especially for the sample produced at high scan speed, with the lowest volume fraction of TiB₂ particles.