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Effects of niobium (Nb) on mechanical properties of laser coated Nitinol (NiTi) used for surface modification of Ti6Al4V alloy

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Abstract

Laser surface treatment is widely used as an engineering technique due to its special characteristics and several advantages over other surface modification techniques. In the present study, elemental mechanically pre-alloyed powder consisting of Niobium, Titanium and Nickel was deposited onto a grade 5 Titanium alloy substrates to form a high wear resistance coating. This was such that the surface mechanical properties of the base metal can be improved. The fabricated samples were characterised using optical microscopy, scanning electron microscopy (SEM) with energy dispersive spectroscopy (EDS), Differential Scanning Calorimeter (DSC), micro hardness tester and wear machine. The deposited coatings were well bonded and consisted of various phases. Hardness was seen decrease with increase in Nb content while wear resistance increasing with increase in niobium content.