

Accepted Manuscript

Less-rigid coating in Ti obtained by laser surface alloying with Nb

Lisiane Rocha Azevedo de Carvalho, Edwin Sallica-Leva, Emilio Rayón Encinas, João Batista Fogagnolo



PII: S0257-8972(18)30399-2
DOI: doi:[10.1016/j.surfcoat.2018.04.038](https://doi.org/10.1016/j.surfcoat.2018.04.038)
Reference: SCT 23322
To appear in: *Surface & Coatings Technology*
Received date: 13 November 2017
Revised date: 29 March 2018
Accepted date: 14 April 2018

Please cite this article as: Lisiane Rocha Azevedo de Carvalho, Edwin Sallica-Leva, Emilio Rayón Encinas, João Batista Fogagnolo , Less-rigid coating in Ti obtained by laser surface alloying with Nb. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:[10.1016/j.surfcoat.2018.04.038](https://doi.org/10.1016/j.surfcoat.2018.04.038)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Less-rigid coating in Ti obtained by laser surface alloying with Nb

Lisiane Rocha Azevedo de Carvalho ^a, Edwin Sallica-Leva ^a,
Emilio Rayón Encinas ^b, João Batista Fogagnolo ^{a,*}

^a *University of Campinas, School of Mechanical Engineering, Rua Mendeleiev 200, 13083-860 Campinas, SP, Brazil*

^b *Institut de Tecnologia de Materials – Universitat Politècnica de València, Camino de Vera, s/n - 46022 Valencia, Spain*

Abstract: The fabrication of parts with stiffness gradation specifically designed to attain higher mechanical and/or biomedical performance is receiving increasing scientific and technological interest. This work reports the use of laser surface alloying to introduce Nb into the surface layer of Ti pieces and thus obtain continuous coatings composed of Ti-Nb alloys. By controlling the laser processing parameters, coatings with lower Young's modulus and higher hardness compared to the substrate, practically free of cracks and with very low porosity were obtained, using energy densities in the range of 24 to 65 J/mm². However, compositional heterogeneity mainly due to microsegregation during the solidification process was observed. Increasing the energy density resulted in deeper fusion zones, which increased the substrate fusion and thus decreased the Nb content and produced a coating with a microstructure predominantly composed of α/α' acicular phase. On the other hand, the Nb content of the coatings produced with lower energy densities was high enough (~20-30 %_{in mass}) to (meta)stabilize the less-rigid α'' and β phases, which promoted the highest reductions in the Young's modulus of the investigated coatings. Besides the lower stiffness, all coatings presented at least twice the hardness of the substrate. Maps of the properties constructed from the nanoindentation results showed that, despite the compositional heterogeneity, homogenous values of Young's modulus and hardness were attained and

Download English Version:

<https://daneshyari.com/en/article/8023633>

Download Persian Version:

<https://daneshyari.com/article/8023633>

[Daneshyari.com](https://daneshyari.com)