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FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Materials Science Department and Department of Mechanical and Industrial Engineering

Laser Welding of Shape Memory Alloys

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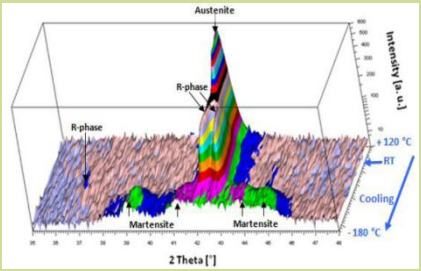
Objectives

In this work we aim to produce similar (NiTi/NiTi) and dissimilar (NiTi to other metals, such as Ti-alloys, stainless steel or NiTiCu) laser welds. In both cases, the influence of the welding parameters on the microstructure and on the functional (superelasticity and shape memory effect) and mechanical behavior of the welds will be studied.
The success in the welding of these materials will open new possibilities in terms of applications in different areas such as aeronautics, automotive and biomedical, for example.

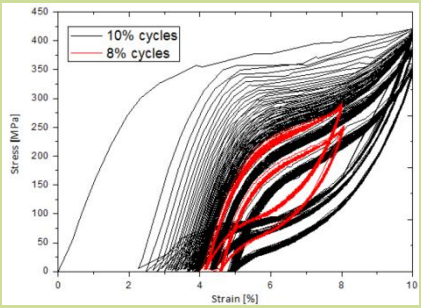
Methodology

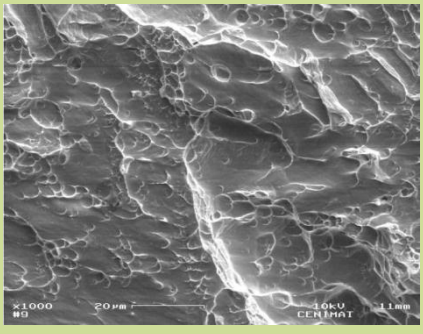
For assessing the influence of the welding parameters on the welds produced, XRD analysis (including the use of synchrotron radiation) will be carried on to verify the existence of a microstructural gradient across the samples. DSC analysis will also be used to determine the transformation temperatures of the different regions on the welds. Optical and scanning electron microscopy will be used to analyze with a greater detail the microstructure of the samples.
As a consequence of the use of shape memory alloys the mechanical cycling of the produced welds will be studied and correlated with the microstructure obtained



Expected Results

To optimize the welding parameters for the proposed similar and dissimilar welds.
Correlate the optimum welding parameters with the functional and mechanical behavior of the welds, in particular to assess the existence of superelasticity and shape memory effect.
Understand and make use of the microstructural gradient across the weld for the development of new applications using these laser processed materials as functionally graded components





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