

CONFERENCIA INVITADA

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Spectroscopic Optical Sensors for Welding Diagnostics

J. Mirapeix, A. Cobo, J.J. Valdiande, R. Ruiz-Lombera, P.B. Garcia-Allende, O.M. Conde, L. Rodriguez-Cobo and J.M. Lopez-Higuera

Degradation of the wall of human ascending thoracic aorta has been assessed through Optical Coherence Tomography (OCT). OCT images of the media layer of the aortic wall exhibit micro-structure degradation in case of diseased aortas from aneurysmal vessels. The OCT indicator of degradation depends on the dimension of areas of the media layer where backscattered reflectivity becomes smaller due to a disorder on the morphology of elastin, collagen and smooth muscle cells (SMCs). Efficient pre-processing of the OCT images is required to accurately extract the dimension of degraded areas after an optimized thresholding procedure. OCT results have been validated against conventional histological analysis.

The OCT qualitative assessment has achieved a pair sensitivity-specificity of 100%-91.6% in low-high degradation discrimination when a threshold of $4965.88 \frac{1}{m^2}$ is selected. This threshold suggests to have physiological meaning. The OCT quantitative evaluation of degradation achieves a correlation of 0.736 between the OCT indicator and the histological score. This in-vitro study can be transferred to the clinical scenario to provide an intraoperative assessment tool to guide cardiovascular surgeons in open repair interventions.