Fatigue resistance of a laser-treated biomaterial

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One of the main characteristics required for biomaterials is its surface finish. The same metallic implant may have a varied surface finish; from polishing, for regions where there is mobility, to high roughness to ensure greater adhesion. The laser beam has been used for surface treatments such as hardening and marking, for example. Another application of the laser beam is the texturing of surfaces. The objective of this work was to characterize the fatigue resistance, in the tensile-traction regime, of samples of ISO 5832-1 austenitic stainless steel, treated by an Yb doped optical fiber laser beam. For comparison purposes, samples without laser marking treatment were also evaluated. The markings consisted of the recording of the surfaces of the specimens by generating parallel and juxtaposed characters. The results indicated an increase in the average roughness in the laser-marked areas, which become regions of stress concentration, favoring the appearance and propagation of cracks that trigger fatigue failure. The samples treated by laser showed lower fatigue resistance compared to the untreated ones. Acknowledgments: The authors would like to thank CNPq for the financial support.