# Study of the effect of nanosecond laser texturing on the corrosion behavior of Ti6Al4V and Ti6Al4V parts produced by powder bed fusion

Fernanda Martins Queiroz[1], Gleicy de Lima Xavier Ribeiro[2,3], Renato Spacini de Castro[4], Rogério Góes dos Santos[4], Joaquim Francisco Bertuol Porto[4], Leandro Sousa da Silva[4], Alexandre Vieira[2,1], Luis Umbelino dos Santos[4], Maysa Terada[2,4], Wagner de Rossi[2], Isolda Costa[5]

[1]Escola e Faculdade de Tecnologia SENAI Suíço-Brasileira "Paulo Ernesto Tolle", [2]Instituto de Pesquisas Energéticas e Nucleares, [3]Instituto Senai de Inovação em Manuftura Avançada e Microfabricação (*Medições Avançadas*) , [4]Instituto Senai de Inovação em Manuftura Avançada e Microfabricação, [5]Instituto de Pesquisas Energéticas e Nucleares (*CCTM*)

*e-mail: mq_fernanda@yahoo.com.br*

Biomedical industry demands surfaces that facilitate osteointegration, especially in implants. Currently, this functional surface is obtained by coating the metallic implant with ceramic materials, such as hydroxyapatite, or with polymeric materials. However, these layers can suffer from detachment, residual stresses, and cracks during the process, favoring implant corrosion. Laser texturing is a surface structuring process that can improve osteointegration by generating functional hydrophilic surfaces. An alternative for the manufacture of components used as biomaterials can be additive manufacturing, followed by laser texturing. The 3D manufacturing process allows obtaining parts with complex geometry, weight reduction, and customized products that can serve the dental and biomedical sector. Combining metallic additive manufacturing with laser texturing would be an alternative in obtaining parts with functional hydrophilic surfaces, which improves osteointegration. In both cases, a careful study of the corrosion behavior of the surfaces obtained is necessary, since the evolution of this phenomenon can influence the osteointegration of the implant, causing the release of metal ions in the body and even the rejection of the component. This study compared the corrosion behavior of laser texturing Ti6Al4V components with components manufactured using laser power bed fusion of the same alloy followed by laser texturing. The Ti6Al4V components by laser powder bed melting were obtained by varying the scanning speed and power using a Yb laser. For laser texturing of the surfaces, a fiber optic laser of Yb was used. The corrosion behavior of the surfaces was evaluated by electrochemical impedance spectroscopy and characterized by SEM. The wettability was determined by the sessile drop method. The results showed the differences in the corrosion behavior of the surfaces produced by the different methods, in the hydrophilic character and microstructure.