# SEMICONDUCTOR OXIDE EVALUATION OF MECHANICAL AND LASER MARKED ASTM F139 STAINLESS STEEL VIA HYPERFINE INTERACTIONS AND MOTT-SCHOTTKY TECHNIQUES

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The investigation on the corrosion resistance of biomaterials and the effects of manufacturing processes, including marking for traceability, is extremely important to evaluate whether the surface modification caused by the laser treatment affects theirs electrochemical properties. The engraving process by laser beam has been used to ensure the identification and traceability of orthopedic implants. This study evaluates the influence of the laser parameters, specifically the pulse energy and speed rate, on the corrosion resistance of the ASTM F139 austenitic stainless steel (SS), treated via Nd: YAG laser beam, by electrochemical methods. The electrolyte used was a phosphate buffered solution (PBS), with pH 7.4, at 37 °C. This biomaterial's electronic properties were evaluated by Mott-Schottky approach. The results showed that the alternating laser parameters changes the protective properties of the oxide layer, dislocates its flat band potential and influences its susceptibility to localized corrosion. These results were confirmed by the hyperfine interactions (HI) nuclear technique, which evaluated the semiconductor properties of the SS passive film.