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Corrosion behavior of 316l stainless steel as biomaterial in physiological environment

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The field of biomaterials is considered as fascinating and challenging. It is fascinating because of its potential applications and the need to improve the quality of life. It is challenging due to the various complexities that is faces when biomaterials meet biological environments for longevity of life by maintaining or restoring tissues or organ functions. The stainless steels, especially 316L type is the most used metallic biomaterials for biomedical applications due to their good biocompatibility, low price, excellent corrosion resistance, availability, easy processing and high strength. Due to these favorable properties 316L stainless steel has become the most attractive biomaterial for dental implants, stents and orthopedic implants. In dentistry it is used in a variety of applications such as: temporary crowns, sterilized instruments, arch wires, brackets in orthodontics, etc. In vitro corrosion evaluation of an implant material in biological solution is the first step in biocompatibility characterization. The aim of this study is to evaluate the corrosion behavior of 316L stainless steel in two saliva solutions, with different pH values and chlorides content by electrochemical methods, in view of orthodontic applications. In situ electrochemical measurements as: open circuit potential (OCP), polarization resistance (Rp), potentiodynamic polarization (PD), cyclic voltammetry polarization (CV) and electrochemical impedance spectroscopy (EIS) were performed to monitor the corrosion process. The optical images of the tested samples have been observed before and after corrosion experiments using an optical microscope (Optika XDS-3 MET) to understand the nature of corrosion and the damages produced by this process.

Biography

Nicoleta Simionescu is a PhD student in Materials Engineering domain at Faculty of Engineering, Dunarea de Jos, University of Galati, Romania. Her field of study is the corrosion of metallic biomaterials in different environments which simulates the fluids of the human body.

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