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SURFACE CHARACTERIZATION OF TiNb THIN FILMS DEPOSITED BY MAGNETRON SPUTTERING IN STAINLESS STEEL SUBSTRATES

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Titanium and niobium metals are promising in applications including, but not limited to, cardiovascular/dental/orthopedic implants, bone fixation devices, joint replacement parts, and surgical instruments due to the combination of good biocompatibility, high mechanical strength, excellent thermal stability, and optimal corrosion behaviour. Actually, most of the metallic implants are produced with stainless steel (SS) because it has adequate bulk properties to be used as biomaterials for orthopedic or dental implants and is less expensive than Ti and its alloys, but it is less biocompatible than them. The coating of this SS implants with Ti alloy thin films may be one alternative to improve the biomaterial properties at a relatively low cost. TiNb thin films were deposited in stainless steel substrates using a DC magnetron sputtering equipment, under an argon atmosphere. The behavior of TiNb thin films was studied by electrochemical and surface analysis techniques. The chemical composition and morphology of the films were analysed by means of X-ray photoelectron spectroscopy (XPS) and atomic force microscopy (AFM). The AFM images showed that all films presented nanostructured grains and low roughness. The corrosion resistance of the SS substrate increased with the TiNb deposition because of the passive films formed on their surfaces. This work received financial support from FAPESP (proposal 2009/17055-7), CAPES, CNPq, and LNLS (proposals LMF-8912 and LMF-10475).