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Corrosion properties of the Ti-10Mo-9Nb alloy for biomedical application

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Beta titanium alloys have been developed for biomedical application, for example in the manufacture of orthopedic and orthodontic implants. This effort is mainly due to some specific properties that Ti beta alloys have, such as mechanical strength, biocompatibility, and corrosion resistance. Different beta stabilizing alloying elements are used in the formulation of these alloys such as Mo, Nb and Zr whose combination controls the present phases, the mechanical resistance and the Young's modulus. Therefore, the objective of this work was to analyse the corrosion resistance of Ti-10Mo-9Nb treated at 950 ?C/1h and then water quenched. The evaluation of the electrochemical behavior of Ti-10-Mo-9Nb alloy was carried out by monitoring the open circuit potential and potentiodynamic polarization curve. The tests were obtained using a naturally aerated physiological solution of 0.9% NaCl. All tests were performed at room temperature. The analyzes were carried out in a three-electrode cell: saturated calomel was the reference electrode, platinum as the counter electrode and the TiNb alloys as the working electrode. The samples used as working electrodes, were embedded in epoxi resin. The open circuit potential (OCP) was monitored for 1 hour. The anodic polarization curves were obtained in the potential range -0.25 to 1.60 V with a potential scan rate 0.001V/s. The results showed that in relation to the open circuit potential, no significant differences were observed between the Ti-10Mo-9Nb and Ti-6Al-4V alloys. The potentiodynamic polarization curves for both samples analized, showed typical behavior seen for passive alloys. Both conditions show a wide passive region, however Ti-6Al-4V alloy presents a lower value of passivation current (ipass) compared to Ti-10Mo-9Nb.