

Galvanic Corrosion of Two Non Noble Dental Alloys

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This study aims to evaluate the corrosion resistance of two non-noble dental alloys, namely, the Wiron®88 (Ni–Cr–Mo) and the Remanium 2000+ (Co–Cr–Mo–W). A noble alloy, the V-Gnathos® Plus (Au–Pt) previously studied was also considered for the purpose of comparison. The study was conducted in artificial saliva, pH 7.1, at 37 °C, by cyclic and linear sweep voltammetry, electrochemical impedance spectroscopy and chronoamperometry. The R_p value of the alloy of high contents of Ni, the Wiron®88, was $26.2 \pm 0.2 \text{ k}\Omega \text{ cm}^2$ and of the one with high contents of Co, the Remanium 2000+, was $22.5 \pm 0.6 \text{ k}\Omega \text{ cm}^2$. Data from linear polarization resistance and electrochemical impedance spectroscopy lead to the same order for the resistance against corrosion. The order from the less to the more reactive alloy is: Wiron®88 → Remanium 2000+. The galvanic cell obtained by coupling the two non-noble alloys presents very low cell potential (a few mV, -18 mV), while the galvanic cell between one noble alloy (the V-Gnathos® Plus) and the Wiron®88 showed a higher cell potential (-104 mV). Both galvanic couples, under short circuit, have lead to the release of cations, namely, Co^{2+} , in the case of the Wiron®88|Remanium 2000+ and Ni^{2+} for the Wiron®88|V-Gnathos® Plus, galvanic couples, respectively, with the ionic concentrations reaching values of 12.15 and 7.30 $\mu\text{g L}^{-1}$ (7.30 ppb), respectively. SEM micrographs obtained after 25 days immersion in artificial saliva, at 37 °C, showed the formation of well-defined pits on the surface of the two non-noble alloys.

Keywords: dental alloys – Wiron®88 – Remanium 2000+ – ions release – galvanic couples