Corrosion Behavior of Ni-Cr Dental Casting Alloys

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Nickel–chromium (Ni–Cr) alloys have been used for dental prostheses because of their low prices and excellent properties in veneered restorations. While most Ni-Cr restorations perform well clinically, corrosion products and components of these alloys are known to have the potential to cause hypersensitivity and other tissue reactions. The aim of this study was to investigate the corrosion behavior of four different commercial Ni-Cr dental casting alloys (S1, S2, S3, S4) in simulated oral environment, related to the chemical composition and microstructure, by electrochemical methods, including electrochemical impedance spectroscopy (EIS), chronoamperometric and chronopotentiometric investigation, cyclic voltammetry studies. Samples surface characterization was done using scanning electron microscopy (SEM) before and after immersion in artificial saliva. Corroborating the results of the investigation methods, Ni-Cr alloys represent a suitable alternative for metal frameworks used in prosthetic dentistry. All dental alloys exhibit low corrosion tendency, but S1 and S2 alloys were most stable to corrosion in artificial saliva. The best electrochemical behavior has to be attributed to the composition of the alloys (containing Cr and Mo) and to the compact surface microstructure.

Keywords: Nickel-Chromium dental casting alloys, corrosion behavior, chemical composition, microstructure

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