



Evaluation of the Electrochemical Behavior and Ni Ions Release of Modified Surface of NiTi in Simulated Body Fluid

Jafar Khilil Allafi^a, Hosein Maleki galeh^a, Vida Khalili^b, Shima Nakisa^a, Mehdi Javidi^c

^a Sahand University of Technology, Tabriz, Iran; ^b Research Center for Advanced Materials, Sahand University of Technology, Tabriz, Iran; ^c Shiraz University, shiraz, Iran

Natural hydroxyapatite has been electrophoretically deposited on NiTi shape memory alloy at a constant voltage, namely at 40, 60 and 80 V in 120 s. After sintering at 800 °C, the electrochemical behavior of samples in Simulated Body Fluid (SBF) was studied by Electrochemical Impedance Spectroscopy (EIS) and Polarization test. Also Ni ions release of uncoated samples and HA-coated samples was evaluated by Atomic Absorption Spectrometer (AAS) in SBF. Surface morphology of the HA coatings was studied using Scanning Electron Microscope (SEM). Compared to coated samples and no coated one, evaluation of electrochemical behavior and release of nickel ions in the body simulations suggest that coated ones are chemically stable and provided corrosion resistance for NiTi and reduced Ni ions release. The coating deposited at 60 V is considered as optimized coating because of having a uniform and dense surface in comparison with other coatings that results in most corrosion resistance. Comparison of Ni ions release of NiTi coated at 60 V and NiTi reveals that Ni ion concentration decreases from 12 $\mu\text{g}\cdot\text{cm}^{-2}$ (for NiTi) to 0.02 $\mu\text{g}\cdot\text{cm}^{-2}$ (for NiTi coated at 60 V) in SBF.