Cytocompatibility Evaluation and Surface Characterization of Tini Deformed by High-Pressure Torsion

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ABSTRACT

Effect of high-pressure torsion (HPT) deformation on biocompatibility and surface chemistry of TiNi was systematically investigated. Ti–50 mol% Ni was subjected to HPT straining for different numbers of turns, N = 0.25, 0.5, 1, 5 and 10 at a rotation speed of 1 rpm. X-ray photoelectron spectroscopy observations after 7 days of cell culture revealed the changes in the surface oxide composition, enrichment of Ti and detection of nitrogen derived from organic molecules in the culture medium. Plating efficiency of L929 cells was slightly increased by HPT deformation though no significant difference was observed. Albumin adsorption was higher in HPT-deformed samples, while vitronectin adsorption was peaked at N = 1. HPT deformation was also found to effectively suppress the Ni ion release from the TiNi samples into the cell culture medium even after the low degree of deformation at N = 0.25.

KEYWORDS: Titanium–nickel; Nanocrystalline; Amorphous; Severe plastic deformation; X-ray photoelectron spectroscopy

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