Electrochemical behavior of MP35N implant alloy in simulated physiological media

施俊明

Shih CC;Shih CM;Chou KY;Lin SJ;Su YY

摘要

Abstract

For years, MP35N alloy has been regarded as a very high corrosion-resistant material and has been widely used in various medical applications such as orthopedic implants, lead wire for pacemakers, and cardiovascular stents. Previous researchers of this alloy revealed corrosion pits or localized oxidation on the surface of this material after exposure to Ringer's solution. Therefore, a detailed examination of this multiphase alloy was designed to understand its electrochemical properties and to explore its corrosion behavior. Corrosion resistance of MP35N was investigated by open-circuit potential, anodic polarization, potentiostatic control, electrochemical impedance spectroscopy, and linear voltammetry techniques. Compositional studies of oxide film were examined by electron spectroscopy for chemical analysis. Surface morphologies of MP35N after electrochemical studies were characterized by scanning electron spectroscopy. Elemental distribution and chemical composition was identified by energy dispersive spectrum. Results indicate that chemical composition of the oxide film after passivation plays an important role in the determination of corrosion resistance of MP35N in Ringer's solution. A high concentration of hydroxyl and hydrate groups inside the passivated oxide film is beneficial to the corrosion resistance of this multiphase alloy.