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Formation of Titanium Oxide Thin Film on Biomedical Magnesium Alloy by High Dose Titanium and Oxygen Dual Ion Implantation

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WE43 magnesium alloy is potentially biodegradable metallic stent material due to its good mechanical property and corrosion resistance. However, the fast degradation rate in the physiological environment cannot meet clinical needs. In order to further enhance the corrosion resistance, high dose titanium and oxygen ion implantation is performed to modify the surface of the WE43 magnesium alloy in this study. X-ray photoelectron spectroscopy (XPS) is used to characterize the microstructures in the near surface layer, whereas electrochemical impedance spectroscopy, potentiodynamic polarization, and immersion test are employed to investigate the corrosion resistance of the implanted alloys in simulated body fluids (SBF). The results indicate that titanium and oxygen dual ion implantation produces a titanium oxide thin film which significantly enhances the corrosion resistance of WE43 alloy. Our data suggest a simple and practical means to improve the corrosion resistance of magnesium implants.

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