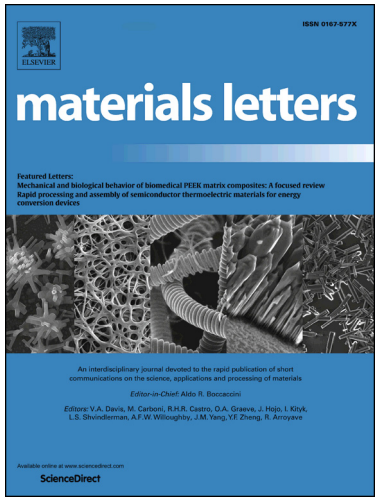

Surface properties of Mg-Gd-Zn-Zr alloy modified by Sn ion implantation

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Surface properties of Mg-Gd-Zn-Zr alloy modified by Sn ion implantation

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Abstract: To enhance surface properties of biomedical Mg-based alloys, tin (Sn) ions were introduced into Mg-Gd-Zn-Zr alloy by ion implantation. An approximately 90 nm thick Sn-implanted layer was detected by X-ray photoelectron spectroscopy (XPS). After ion implantation, the corrosion resistance was enhanced as demonstrated by polarization curves and immersion tests; besides, the implanted alloy exhibited better mechanical properties.

Keywords: Mg alloy; Ion implantation; XPS; Surfaces; Corrosion; Mechanical properties

1. Introduction

Mg alloys are promising biomaterials on account of good biocompatibility and biodegradability. The elasticity modulus and density are similar to those of human bones. Hence, Mg alloys are desirable to be used as orthopedic implant materials [1,2], the natural biodegradability of which avoids follow-up surgery. Nevertheless, the rapid degeneration of mechanical integrity under body fluid environment is the major drawback that limits their biomedical applications [2,3]. In early service of bone implant materials, if the mechanical integrity maintains stable in human body environment, biomedical Mg alloys will make more contributions for human bones to be healed [4,5].

Surface modification treatment is a feasible strategy to enhance surface properties of Mg alloys [2,6]. In particular, ion implantation is a controllable and ideal technique to improve both corrosion resistance and mechanical properties without change in the geometric dimensions and layer delamination. A suitable amount of ions were introduced into the host materials independent of

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