Corrosion and Biocompatibility Behavior of the Micro-Arc Oxidized AZ31B Alloy in Simulated Body Fluid

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The corrosion behavior of AZ31B magnesium alloy in simulated body fluid (SBF) was investigated in this study. In order to improve its corrosion resistance, a micro-arc oxidation (MAO) treatment was performed on the AZ31B specimen. Specimens subjected to different processing durations in the electrolyte containing silicate, sodium hydroxide and sodium citrate were prepared with pulsed direct current first. The then measured potentiodynamic polarization curve of the specimen in SBF revealed that the one with 30-min treatment had the best corrosion resistance. After submersion of the MAO specimen in SBF for several days, the microstructural examination on the cross-section showed the infusion of SBF through the porous and cracked oxide and induced corrosion near the substrate. At the same time, a homogeneous layer of apatite appeared on the surface of the specimen in the original porous oxide layer. This apatite layer was confirmed by the measured Ca/P molar ratio of 1.54-1.67 through its thickness. Moreover, the cell toxicity of this AZ31B specimen was tested using mouse neuroma cells. The cultivation of the cell in cytotoxicity test showed good survival rate and the axon was grown on the division of the cells.

Keywords: AZ31B, micro-arc oxidation, simulated body fluid (SBF), corrosion, cytotoxicity

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