Effect of Extrusion on Mechanical Properties and Structures of Zn-Mg Alloys for Biomedical Applications

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Zn-Mg alloys, in which Mg is an alloying element, are proposed for medical applications as a promising biodegradable material for temporary implants in orthopedics or traumatology. They can be used to replace nonfunctional or damaged tissues. When the healing process of tissues is finished, the Zn-Mg alloys are gradually decomposed in a human body and a reoperation is therefore unnecessary. Their mechanical properties must be similar to the characteristics of human bones. Large grains are typical for the structure of cast alloys. Pure Zn and Zn-0.8Mg alloy were cast and subsequently extruded at 300°C. The structure and mechanical properties (Vickers hardness, compressive and tensile strength tests) of the cast alloys were compared with those of the extruded alloys. Pure Zn and Zn-0.8Mg alloy after the extrusion had a fine-grained structure and showed better values of mechanical properties in comparison with the cast alloys.

Keywords: Biodegradable material, Zn-Mg alloys, Extrusion

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Corrosion Behavior, Microstructure and Mechanical Properties of Novel Mg-Zn-Ca-Er Alloy for Bio-Medical Applications. by. Devadas Bhat Panemangalore.Â In this study, the effect of calcium (Ca) and erbium (Er) on the microstructure, mechanical properties, and corrosion behavior of magnesium-zinc alloys is reported. The alloys were prepared using disintegrated melt deposition (DMD) technique using the alloying additions as Zn, Ca, and Mg-Er master alloys and followed by hot extrusion. Results show that alloying addition of Er has significantly reduced the grain sizes of Mg-Zn alloys and also when compared to pure magnesium base material. The lightest density of Mg has stimulated renewed interest in Mg based alloys for applications in the automotive, aerospace and communications industries. However, Mg in the pure form has relatively low strength, limited ductility and is susceptible to corrosion. Great efforts have been made to improve the mechanical properties of Mg alloys.Â Abstract: The effect of Cd and Sb addition on the microstructural and mechanical properties of as-cast AZ31 alloys was investigated and compared. The results indicate that the difference of Sb and Cd in the microstructure and mechanical properties of as-cast AZ31 magnesium alloy is significant. Addition of 0.15%Sb (mass fraction) to AZ31 alloy can refine the matrix and Î²-Mg17Al12 phase but not form a new phase Mg3Sb2. Magnesium alloys act as ideal biomedical materials with good biocompatibility. In this paper, the extruded biomedical Mg-6Zn-0.5Nd-0.5/0.8Ca alloys were prepared and their microstructure, mechanical properties and corrosion properties were investigated. The results showed that the surfaces of Mg-6Zn-0.5Nd-0.5/0.8Ca alloys extruded at medium temperature were smooth and compact without cracks. The tensile strength and elongation of Mg-6Zn-0.5Nd-0.5/0.8Ca alloys were 222.5 MPa and 20.2%, and 287.2 MPa and 18.4%, respectively. A large number of dislocations were generated in the grains and on grai This work studied the effect of Cr content on recrystallization and grain growth in order to get a new super high strength aluminum alloy.Â The influences of Cr on dispersed phase and properties of Al-Zn-Mg-Cu-Zr alloys were investigated by mechanical testing, slow strain rate stress corrosion, intergranular corrosion, combined with optical microscope, scanning electronic microscope, transmission electronic microscopy (OM, SEM, TEM). Research shows that: with the increase of element Cr, the recrystallization and grain growth had been inhibited, the strength, toughness and corrosion resistance of the alloy increased first and then decreased; when added 0.1 wt% Cr element, the properties of the alloy are the best.