USE OF HIGH ENERGY MILLING AND POROSITY CONTROL IN THE DEVELOPMENT OF THE Mg-Zn SYSTEM AIMING BIOMEDICAL APPLICATIONS

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SUMMARY

The development of metal alloys with porosity controlled by powder metallurgy has been shown to be suitable for obtaining Biomaterials due to the control of mechanical strength and modulus of elasticity, in addition to the possibility of controlling the open porosity, essential for osseointegration. Magnesium alloys have shown encouraging results when used as tissue engineering supports. The possibility of reabsorption of implants by the living organism has aroused great interest in the scientific and medical community. Although a considerable number of studies encourage the use of magnesium alloys in bioactive and ecological implants for load support in orthopedic applications, a larger research effort is still essential to fully evaluate, *in vivo*, the long-term capacity of such supports. Due to the excellent physical and mechanical properties of magnesium alloys compared to other permanent alloys (non-degradable), porous magnesium alloys have become good candidates to develop biodegradable supports for bone treatments. Porous magnesium alloys could be used in applications where it would be interesting to use a biodegradable metallic material, maintaining the requirements of mechanical strength, modulus of elasticity, corrosion resistance and adequate osseointegration. In this work, a new processing route for porous alloys of the Mg-Zn system via powder metallurgy will be presented. The use of high-energy milling for the reduction, uniformity

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and homogenization of grains and particles in the system will be presented. The powders produced are characterized to monitor the milling process. Afterwards, the powders are mixed, submitted to conformation by pressing, followed by synthesis. Results of microstructural evaluations will be presented along the preparation process, regarding the formation of the stoichiometry of interest and the controlled formation of porosity. Controls for composition, porosity and final densities are carried out through variations in the granulometry of the powders. Characterization results of the microstructure and mechanical properties of compacted and heat treated samples will be presented.

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