

## **Assessment of refinement effect of Ca and Zr alloy elements on the macrostructural evolution of Mg-3%Zn biomedical alloy in as-extruded condition**

**S. Azarmgin<sup>1</sup>, S.A. Mousavi<sup>2</sup>, Gh. Ashuri<sup>3\*</sup>**

1- M.Sc. Student of Department of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran

2- Assistant professor, Department of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran

3- M.Sc. Student of University of Tehran, Iran

\*Corresponding Author's E-mail, [ashuri224@ut.ac.ir](mailto:ashuri224@ut.ac.ir)

### **Abstract**

In current study calcium and zirconium alloy elements were selected to develop an Mg-3%Zn alloy for biomedical application due to the good biocompatibility of these elements. The effect of different contents of these alloy elements on the macrostructural evolution and mechanical properties of base Mg-3%Zn biomedical alloy was investigated. Micrographs of alloys were observed by optical (OM) and electronic microscopy (SEM). Vickers hardness test and tensile testing were performed for as-extruded samples. The mechanism by which the mechanical properties are affected by calcium and zirconium addition was discussed. The obtained results illustrate that by adding different concentration of Ca new intermetallic phases formed. Indeed, the presence of fine particles in the matrix of Mg-Zn-Ca alloys (mainly  $Mg_6Ca_2Zn_3$  and  $Mg_2Ca$ ) results in improvement of hardness. And also the addition of Ca obviously improved the mechanical properties. It worth mentioning new intermetallic was detected through the microstructural studies at higher Zr levels.

**Keywords:** Mg-3Zn alloy, Vickers, intermetallics, mechanical properties.

1 - M.Sc. Student of Department of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran, [sazarmgin@gmail.com](mailto:sazarmgin@gmail.com)

2 - Assistant professor, Department of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran, [sayedalimousavi@yahoo.com](mailto:sayedalimousavi@yahoo.com)

3 - M.Sc. Student of University of Tehran, Iran, [ashuri224@ut.ac.ir](mailto:ashuri224@ut.ac.ir)