Abstract

The presented doctoral dissertation consists of two main parts:

- a literature review, wherein thematic scope and reasons for the author to take up the subject of this work were discussed,
- the research part, which presents the analysis of a new series of experimental Mg-Ti_p composites fabricated by casting method.

As part of the work, composite materials based on magnesium and AM50, AZ91 alloys reinforced with spherical Ti and Ti6Al4V particles were designed and obtained using the casting method. Next, the microstructure and selected physical, mechanical and tribological properties of the fabricated metal-metal composites were examined. Based on the microstructure analysis of the materials used as matrix and composites cast in the same conditions, heterogeneous nucleation of the α-phase on the titanium particles was found. Additionaly, in the composites based on AM50 and AZ91 magnesium alloys with Ti and Ti4Al4V particles, the occurrence of the Al_8Mn_5 phase at the interface between the particles and the matrix was revealed, which indicates the heterogeneous nucleation of this phase on the Ti and Ti6Al4V particles. No new phases which could be created due to reaction between the matrix and titanium particles was revealed. In turn, tests of mechanical properties which were conducted allowed to determine the correlation between the structure of the tested materials and their properties. The introduction of Ti and Ti6Al4V particles into magnesium matrix caused an increase in hardness, compressive strength, tensile strength and yield strength of the fabricated composites with a slight increase in density compare to the materials used as matrix cast under the same conditions.

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