Preparation of Magnesium-zinc Alloy by Mechanical Alloying

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Mechanical alloying is one of the ways how to prepare nanostructured and amorphous metallic materials. In this paper we used this method to prepare Mg-Zn alloy containing 50 wt.% of zinc. Powders produced by milling in a planetary ball mill were consequently compacted by the SPS method, a very fast method which prevents grain coarsening. The prepared samples were subjected to a closer examination - microstructure, phase composition, hardness and short-term thermal stability were studied. We found out that the prepared powder consisted of Mg and Mg_7Zn_3 phases, which were very fine and homogeneously distributed. After the SPS compacting, the metastable Mg_7Zn_3 phase decomposed and new phases (Mg, MgZn, $MgZn_2$, Mg_2Zn_{11}) formed. The compacted sample possessed relatively inhomogeneous microstructure and hardness about 260 HV5. Investigation of the short-term thermal stability was accomplished by annealing at temperatures up to 300 °C. We observed changes in hardness – it regularly decreased up to 200 °C and then it slightly increased.

Keywords: Mg-Zn alloy, mechanical alloying, SPS

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