

عنوان مقاله:

Metallurgical Assessment of Graphite Reinforced Al-Cu-Mg Nanocomposites Produced by the Shaker Mill Method

محل انتشار:

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نویسندگان:

Lintang Dwi Kartika - *Advance Materials Laboratory, Department of Mechanical Engineering, Gunadarma University, Jalan Margonda Raya Number 100, Depok 16424, West Java, Indonesia*

Haris Rudianto - *Advance Materials Laboratory, Department of Mechanical Engineering, Gunadarma University, Jalan Margonda Raya Number 100, Depok 16424, West Java, Indonesia*

خلاصه مقاله:

This research investigated the effects of graphite content on the sintering behavior of Al-۴.۵Cu-۱.۵Mg produced by the shaker mill method. The shaker mill method was chosen because it is able to form uniform nanoparticles in a such short time due to its very high-speed milling. Powder morphology after the shaker mill was investigated. The damaging, fracturing, and cold-welding process during the shaker mill happened in such a shorter time leading to more homogenously dispersed graphite-reinforced Al-۴.۵Cu-۱.۵Mg matrix nanocomposite. Sintering under high-purity argon gas for ۹۹.۹۹% was carried out to produce high-density material from ۵۵۰°C to ۶۲۰°C. Sintering properties showed that graphite content for more than ۰.۵wt% decreased sintering density which leads to a lower hardness value. Based on microstructures, a higher amount of graphite is prone to have bigger porosity due to its agglomeration which leads to produced voids between grains. Agglomeration of graphite is still the main challenge for the manufacturing of graphite-reinforced metal matrix nanocomposites. Aluminum carbide Al₄C₃ was found and it was expected as a result of a reaction between Al and graphite during very high-speed milling. Aluminum carbide acts as an interface between matrix and reinforcement when in certain conditions is able to transfer load from matrix to reinforcement particles leading to improved mechanical properties. Intermetallics of Al-Cu and Al-Mg were also found after sintering.

کلمات کلیدی:

Powder metallurgy, Aluminum Nanocomposites, Graphite, Shaker Mill, Sintering

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