

Spark Plasma Sintering of Aluminum-Based Composites Reinforced by Nanocrystalline Carbon-Coated Intermetallic Particles

Authors : B. Z. Manuel, H. D. Esmeralda, H. S. Felipe, D. R. Héctor, D. de la Torre Sebastián, R. L. Diego

Abstract : Aluminum Matrix Composites reinforced with nanocrystalline Ni₃Al carbon-coated intermetallic particles, were synthesized by powder metallurgy. Powder mixture of aluminum with 0.5-volume fraction of reinforcement particles was compacted by spark plasma sintering (SPS) technique and the compared with conventional sintering process. The better results for SPS technique were obtained in 520°C-5kN-3min. The hardness (70.5 ± 8 HV) and the elastic modulus (95 GPa) were evaluated in function of sintering conditions for SPS technique; it was found that the incorporation of these kind of reinforcement particles in aluminum matrix improve its mechanical properties. The densities were about 94% and 97% of the theoretical density. The carbon coating avoided the interfacial reaction between matrix-particle at high temperature (520°C) without show composition change either intermetallic dissolution.

Keywords : aluminum matrix composites, intermetallics, spark plasma sintering, nanocrystalline

Conference Title : ICTCME 2014 : International Conference on Textile Composites, Materials and Engineering

Conference Location : New York, United States

Conference Dates : June 05-06, 2014