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论文

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<< << 前一页 | 后一页 >> >>

喷雾共沉积石墨增强锌基复合材料的低频内耗

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LOW FREQUENCY INTERNAL FRICTION BEHAVIOR OF GRAPHITE PARTICLE REINFORCED MMCS PREPARED BY SPRAY CO DEPOSITION

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摘要

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摘要 在Z A 2 7合金中添加5 0 m g . g - 1 S i 并采用喷雾共沉积技术制备了石墨颗粒体积分数分别为5 % , 1 0 % , 1 5 %的锌基复合材料。采用多功能内耗仪对材料的低频内耗(1 H z , 4 H z) 行为进行了测量。结果发现, 复合材料的内耗值大小与温度显著相关, 较低温度时复合材料的内耗值低于喷雾沉积材料; 随着温度的上升, 4 0 ℃以后高于喷雾沉积材料; 同时随石墨颗粒体积分数的增加, 复合材料的内耗值逐步提高且不同频率条件下内耗相等时所对应的温度值线性上升。分析了石墨复合前后材料的主要内耗机制。

关键词: 喷雾共沉积 锌基合金 复合材料 低频内耗

Abstract: Three kinds of graphite particulate reinforced zinc based MMCS with 5, 10 and 15 volume fraction percent were prepared by spray co deposition. Five percent of silicon was added to alloy ZA27 in order to get a fine matrix. The internal friction apparatus was used to evaluate the low frequency internal friction behavior of the materials investigated. Experimental results showed that the damping capacity of MMCS was related to the temperature. At the temperature below 40°C, the damping capacities of MMCS were lower than that of the as spray deposited material. While their properties were higher than it with the temperature increasing. Then the concept of thermal activation was adopted to explain the experimental results that the temperature at which the low frequency internal friction has no frequency dependency, linearly increases with the graphite volume fraction. Finally, the operative damping mechanisms were discussed in the light of the data obtained from characterization of microstructure and damping capacity.

Keywords: spray co- deposition zinc- based alloy composites low fr equency inter nal fr iction

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