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喷射共沉积SiC_p增强6061Al MMC的阻尼特性及位错阻尼机制

张迎元 乐永康 高灵清

(CSSC第七二五研究所, 洛阳 471039)

摘要: 采用喷射共沉积方法制备了6061Al/SiC_p MMC, 并对其阻尼机制进行了研究。发现在试验测量范围内 Q^{-1} 对 f 和 t 敏感, 对 A_m 没有依从性, m 随 t 变化只表现为线性下降, 无明显软化现象, 且6061Al/SiC_p MMC的阻尼能力比6061Al至少高一个数量级。6061Al/SiC_p MMC在试验测量温度范围内, 位错阻尼起主要作用。在低应变条件下, 随温度的升高, 由于热激活作用, 位错阻尼在不同的温度段表现出不同的作用机制, 可描述为: 位错弓出→溶质原子和气氛协同位错运动→位错从溶质原子脱钉并拖曳气氛运动→长位错摆脱气氛在强钉扎下运动→位错脱钉。

关键字: 位错 阻尼机制 MMC 喷射沉积

DAMPING CHARACTERISTIC AND DISLOCATION-INDUCED DAMPING MECHANISM OF SPRAY-ATOMIZED AND CODEPOSITED 6061Al/SiC_p MMC

Zhang Yingyuan, Le Yongkang and Gao Lingqing

(Luo Yang Ship Materials Research Institute, Luoyang 471039, P. R. China)

Abstract: In order to obtain a high damping capacity aluminum matrix composites, 6061Al/SiC_p MMC was fabricated by spray-atomization and codeposition, and the damping mechanism of the material was studied. The results show that the damping capacity Q^{-1} is sensitive to f and t , but is not related with A_m ; and m decreases linearly with t increasing and is not obviously soft during the experimental testing range. The damping capacity of 6061Al/SiC_p MMC is ten times higher than that of 6061Al. The dislocation-induced damping is the main mechanism of 6061Al/SiC_p MMC. Under low strain with increasing temperature, for thermal activation the dislocation-induced damping shows various effecting mechanism, which can

be described as follows: pinned dislocation line bows out→the motion of dislocation line is followed by the solution atoms and interstitial atom atmosphere→the motion of dislocation line breaks out from the solution atoms and drags the atmosphere→the motion of long dislocation breaks from the atmosphere and is pinned by some powerful pinning points→the pinned dislocation line breaks away.

Key words: dislocation damping mechanism MMC spray-deposition

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地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-88876765, 88877197, 88830410 传真： 0731-88877197

电子邮箱： f-ysxb@mail.csu.edu.cn