

论文

激光重熔对等离子喷涂ZrO₂-NiCoCrAlY梯度涂层组织与性能的影响

向兴华,尹钟大,朱景川

华南理工大学机电工程系

摘要:

在保证梯度涂层的成分分布方式不被影响的前提下,对其ZrO₂表面层进行了激光重熔处理。经重熔处理后,ZrO₂熔化区形成了致密的结晶组织,其硬度得以大幅度提高,涂层的抗氧化性能得到较大的改善。同时,由于涂层经受了严重的不均匀受热-冷却过程,在涂层中形成了较大的残余热应力,使ZrO₂晶粒发生强烈畸变,并致使熔化区表面形成网状裂纹和少量纵向裂纹贯穿熔化区,降低了熔化区与未熔化涂层间的结合强度,对涂层的抗热震性能造成不良影响。

关键词: 激光重熔 等离子涂层 抗氧化性能

LASER REMELTION TREATMENT OF PLASMA SPRAYED ZrO₂-NiCoCrAlY GRADED COATING

Xinghua Xiang,...

Abstract:

The laser remelting treatment of plasma sprayed ZrO₂-NiCoCrAlY graded coating on TC4(Ti-6Al-4V) alloy substrate was investigated. In order to maintain the gradual composition distribution, the laser remelted zone was controlled in ZrO₂ top layer. Laser remelting treatment diminished the pores in the ZrO₂ top layer and resulted in a dense microstructure. Compared with the unmelted coating, the ZrO₂ melted zone had a higher micro-hardness and a more excellent oxidation resistance. However, owing to the graded coating being heated and cooled unevenly by the laser beam, a serious residual thermal stress was produced in the coating. Laser remelting distorted the ZrO₂ grains, some coarse cracks were formed in the coating, and the adherence strength between ZrO₂ top layer and graded layers was weakened. As a result, the thermal shock property of the graded coating was worsen.

Keywords: plasma sprayed coating laser treatment anti-oxidation property

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通讯作者: 向兴华

作者简介:

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