

论文

两种电弧离子镀Ni-Co-Cr-Al-Si-Y涂层的高温氧化行为

徐朝政,姜肃猛,马军,宫骏,孙超

中国科学院金属研究所金属腐蚀与防护国家重点实验室, 沈阳 110016

摘要:

采用电弧离子镀技术在镍基高温合金DD32上制备了两种不同Cr和Al含量的Ni-Co-Cr-Al-Si-Y涂层, 分析了两种涂层的组织及结构, 对比研究了两种涂层分别在1000和1100℃时的静态氧化行为和从1000℃到室温的循环氧化行为. 结果表明: 退火后两种涂层均由γ'/γ, β-NiAl以及少量α-Cr析出相组成, 但Al含量高的Ni-Co-Cr-Al-Si-Y涂层含更多的β相. 氧化过程中由于高Al涂层具有较多的Al储存相, 在恒温氧化时能有效修复被破坏的氧化膜, 在循环氧化时氧化膜不易开裂和剥落, 在长时间氧化后仍能保持较高的Al含量, 使得涂层能抵抗更长时间的高温氧化.

关键词: Ni-Co-Cr-Al-Si-Y涂层 电弧离子镀 高温氧化

HIGH TEMPERATURE OXIDATION BEHAVIOR OF TWO NiCoCrAlSiY COATINGS DEPOSITED BY ARC ION PALTING

XU Chaozheng, JIANG Sumeng, MA Jun, GONG Jun, SUN Chao

State Key Laboratory for Corrosion and Protection, Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016

Abstract:

Two Ni-Co-Cr-Al-Si-Y (M14 and M19) coatings with different Al and Cr contents were deposited onto DD32 Ni--base superalloy substrate using arc ion plating (AIP) method. The microstructures, isothermal oxidation behaviors at 1000 and 1100 °C and cyclic oxidation behaviors between room temperature and 1000 °C of the both coatings were investigated. The results show that these two coatings are composed of γ'/γ, β-NiAl and some α-Cr precipitate phases. The only difference is that there are more β-NiAl phase precipitates in M19 coating with high Al content. M19 coating, in contrast to M14 coating, can not only repair destroyed alumina scales effectively during isothermal oxidation, but also resist further cracking and spalling of alumina scales during cyclic oxidation. High Al content in M19 coating can be kept under long time oxidation, making M19 coating long-term service.

Keywords: Ni-Co-Cr-Al-Si-Y coating arc ion plating high teperature oxidation

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通讯作者: 宫骏

作者简介: 徐朝政, 男, 1982年生, 硕士

作者Email: jgong@imr.ac.cn

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