

论文

Ni_xAl_yTi_z添加剂对K4169高温合金铸态晶粒组织的影响

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摘要: 选用K4169Fe-Ni基高温合金,研究了向熔体中加入NixAlyTiz金属间化合物对合金冷凝后的晶粒尺寸、枝晶组织等凝固组织特征的影响结果表明,加入微量NixAlyTiz细化剂并控制合金液的均匀化处理过程可显著细化晶粒,将铸件整体晶粒细化至0.1-0.2mm;达到ASTM1-3级,同时、枝晶组织出现了由树枝晶向胞状晶的转变、并且NixAlyTiz细化剂的加入对合金的结晶特性及凝固组织无不良影响。

关键词: Fe-Ni 基高温合金 晶粒细化 细化剂 枝晶组织

EFFECT OF Ni_xAl_yTi_z REFINER ON GRAIN STRUCTURES OF CAST SUPERALLOY K4169

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Abstract: Grain size and dendrite morphologies of Fe-Ni based superalloy K4169 were investigated with the melt addition of NixAlyTiz refiner. It is found that the grain size of ingots can be refined obviously to 0.1-0.2mm, close to the order of ASTM 1-3, by lowering the melting homogeneous treatment temperature during the melting and casting process. In addition, the microstructure of grains can be transferred from dendritic to cellular due to the addition of refiner at the same cooling condition. The addition of NixAlyTiz refiner has the advantages of little influence on the freezing characters, alloy composition as well as phase constitution.

Keywords: Fe-Ni superalloy grain refinement nucleant dendrite morphology

收稿日期 1998-04-18 修回日期 1998-04-18 网络版发布日期

DOI:

基金项目:

通讯作者:

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参考文献:

1 Woulds M, Benson H. In: Gell M, Kortovich C S, Bricknell R H, Kent W B, Radavich J F eds., Super alloys, Champion: The Metallurgical Society of AIME, 1984: 3

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- 2 Ewing B A, Green K A. In: Gell M, Kortovich C S, Bricknell R H, Kent W B, Radavich J F eds., Superalloys, Champion: The Metallurgical Society of AIME, 1984: 33
- 3 Mclean M. Mater Sci Technol, 1988; 4: 205
- 4 Prichard P D, Dalal R P. In: Antolovich S D, Stusrud R W, Mackay R A, Anton D L, Khan T, Kissinger R D, Klarstrom D L eds., Superalloys. Champion: The Metallurgical Society of AIME, 1992: 205
- 5 Nazmy M, Weiss B, Sticbler R. High Temperature Materials for Power Engineering II Liege: Kluwer Academic Publishers, 1990: 1397
- 6 赵惠田, 师昌绪. 金属学报, 1981; 17: 118(Zhao Huitian, Shi Changxu. Acta Metall Sin, 1981; 17: 118)
- 7 Tien J K, Borofka J C, Casey M E. J Met, 1986; 38: 13
- 8 刘林. 航空学报. 1994; 15: 1357 (Liu Lin. Acta Aeronaut Astronaut Sin, 1994; 15: 1357)
- 9 Liu L, Zhen B L, Banerji A, Reif W, Sommer F. Scr Metall Maten 1994; 30: 593
- 10 Bramfitt B L. Metall Trans, 1970; 1: 1987`

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1. 汪宏斌, 王晓宇, 张骥华, 徐祖耀. 纳米晶Fe-25%Ni合金块材的内耗研究[J]. 金属学报, 2004,40(5): 523-526
2. 张建, 李秀艳, 赵明久, 戎利建. 晶界相对Fe-Ni-Cr奥氏体合金氢脆的影响[J]. 金属学报, 2008,44(9): 1095-1098
3. 李秀艳, 戎利建, 李依依. 晶界 η 相对Fe-Ni-Cr奥氏体合金力学性能的影响[J]. 金属学报, 2005,41(11): 1155-1158
4. 甘章华, 王敬丰, 肖建中. 块体非晶合金Fe-Ni-P-B-Ga的制备与性能[J]. 金属学报, 2003,39(10): 1085-1088
5. 熊玉华, 李培杰, 杨爱民, 严卫东, 曾大本, 刘林. 铸造工艺参数和细化剂对K4169高温合金铸态组织的影响 I. 晶粒组织及晶粒细化机理[J]. 金属学报, 2002,38(5): 529-533
6. 熊玉华, 李培杰, 杨爱民, 严卫东, 曾大本, 刘林. 铸造工艺参数和细化剂对K4169高温合金铸态组织的影响 II. 枝晶组织及晶粒球化机理[J]. 金属学报, 2002,38(5): 534-538
7. 邓波, 陈淦生. 微量元素对低膨胀Fe-Ni基高温合金抗氧化性能的影响[J]. 金属学报, 2000,36(2): 155-158
8. 陈垚, 张轩雄. 用于微机械器件在Fe-Ni合金电镀沉积膜的性能[J]. 金属学报, 2000,36(5): 525-529
9. 张长青, 姚可夫. 深过冷条件下Fe-Ni-P-B合金的纳米晶凝固组织与液相Spinodal分解[J]. 金属学报, 2006,42(8): 870-874
10. 陈豫增, 杨根仓, 刘峰, 刘宁, 谢辉, 周尧和. 过冷 Fe75Ni25合金晶粒细化机制的研究[J]. 金属学报, 2006,42(7): 703-707