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DD8高温合金平界面区及胞晶界面区的晶粒竞争生长

刘志义¹ 傅恒志²

(1. 石油大学(华东)机械系, 东营 257062;
2. 西北工业大学国家凝固技术重点实验室, 西安 710072)

摘要: 研究了DD8高温合金在平界面及胞晶区的晶粒竞争生长。结果表明: 在同一试样上进行的从平界面区到胞晶区以及枝晶区的双晶粒耦合竞争生长过程中 $\langle 110 \rangle \times \langle 110 \rangle$ (前一方向与热流方向平行, 后一方向垂直两半园柱籽晶界面) 晶粒逐渐淘汰 $\langle 100 \rangle \times \langle 110 \rangle$ 晶粒, 在相反的抽拉过程中, $\langle 100 \rangle \times \langle 100 \rangle$ 晶粒逐渐淘汰 $\langle 110 \rangle \times \langle 110 \rangle$ 晶粒。在平界面区及胞晶界面区的晶粒竞争生长中, 两籽晶界面处液相原子与 $\langle 110 \rangle \times \langle 110 \rangle$ 晶粒的固相原子形成的结合键多, 而与 $\langle 100 \rangle \times \langle 110 \rangle$ 晶粒的固相原子形成的结合键少, 造成了 $\langle 110 \rangle \times \langle 110 \rangle$ 晶粒淘汰了 $\langle 100 \rangle \times \langle 110 \rangle$ 晶粒, 由于相同的原因 $\langle 100 \rangle \times \langle 100 \rangle$ 晶粒淘汰了 $\langle 110 \rangle \times \langle 110 \rangle$ 晶粒。

关键字: 高温合金 定向凝固 晶粒竞争生长

COMPETITIVE GRAIN GROWTH OF DD8 HIGH TEMPERATURE ALLOY IN PLANAR AND CELLULAR INTERFACE REGION

Liu Zhiyi¹, Fu Hengzhi²

(1. Mechanical Department, University Petroleum (East China), Dongying 257062 ;
2. National Key Laboratory of Solidification Processing, Northwestern University Technology, Xi'an 710072)

Abstract: The competitive grain growth of DD8 high temperature alloy in planar and cellular interface region has been investigated. The results showed that $\langle 100 \rangle \times \langle 110 \rangle$ (the formers' crystal direction is parallel to the axial direction of the seed, the laters is normal to the linked surface of two semicylinder seeds.) grain was eliminated gradually by $\langle 110 \rangle \times \langle 110 \rangle$ grain, and $\langle 110 \rangle \times \langle 110 \rangle$ grain was gradually eliminated by $\langle 100 \rangle \times \langle 100 \rangle$ grain. Mechanism analyses indicated that who was the winner depending more or less on the number of the formed link bond between its liquid atoms and solid atoms on both sides of the grain boundary, in contrast, competitive grain growth in dendrite region depended on the growth of dendrite at grain boundary and the capability of restraining the development of the opposite side.

Key words: high temperature alloy directional solidification competitive grain growth

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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