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镍基高温合金铸件的晶粒组织控制——铸造工艺参数的影响

刘林

西北工业大学应用物理系,西安,710072

GRAIN STRUCTURE CONTROL OF NICKEL-BASE SUPERALLOYS IN CASTING PROCESSES: EFFECT OF FOUNDRY VARIABLES

Liu Lin

Department of Applied Physics, Northwestern Polytechnical University, Xi'an, 710072

摘要

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摘要 以 IN 738 LC 合金为例,研究了镍基高温合金在各种铸造工艺条件下的晶粒组织。结果表明,降低合金液均匀化处理温度可以明显细化冷凝后基体的晶粒。在浇注温度、铸型预热温度以及合金液均匀化处理温度等铸造工艺参数中,后者对晶粒尺寸的影响大于前两者。

关键词: 高温合金 晶粒度 碳化物

Abstract: Grain structures of nickel-base superalloy IN 738LC are investigated under various casting conditions. It is found that grain size of γ matrix and dimension of MC carbides reduce obviously by lowering the temperature of melt homogeneous treatment. The mechanism of grain refinement can be the existence of a number of unmelted MC particles that serve as the substrata of nonspontaneous nucleation of γ matrix during freezing. By comparing melt pouring temperature, mold preheating temperature with melt homogeneous treatment temperature, it can be concluded that the last one plays a more predominant role on the grain structures than the first two. Therefore, one of the effective methods of refining grain structures is via controlling the melt homogeneous temperature.

Keywords: heat resistant alloys grain size carbides

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