

论文

时效温度对铸造超级双相不锈钢析出相的影响

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摘要:

对固溶处理后的铸造超级双相不锈钢材料进行时效处理, 利用OM, SEM, XRD和TEM分析了时效温度对析出相的影响. 结果表明, 固溶后经时效处理, 金属间相在铁素体内和铁素体/奥氏体晶界析出; 650℃时效时, 析出的金属间相主要是χ相; 750℃时效时析出σ相和χ相, 此时σ相由χ相演变而来; 850℃时效下则直接析出σ相; 950℃时效后, 少量的σ相仅在铁素体/奥氏体晶界产生.

关键词: 铸造超级双相不锈钢 时效温度 σ相 χ相

EFFECTS OF AGING TEMPERATURE ON PRECIPITATION PHASE OF A CAST SUPER DUPLEX STAINLESS STEEL

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Abstract:

Super duplex stainless steels have been extensively used in many applications owing to their excellent mechanical properties and corrosion resistance. But subjected to "aging" treatments at temperatures of 600 to 1000℃, duplex stainless steels will precipitate a certain amount of intermetallic phases such as σ phase, χ phase and chromium nitride, etc., which decrease mechanical properties and corrosion resistance of these steels. In this paper, the effects of aging treatments on the type, size and quantity of precipitation particles of a cast super duplex stainless steel after solution treatment were studied by means of OM, SEM, XRD and TEM. The results indicate that the solution annealing cast super duplex stainless steel is aged in temperatures ranging from 650 to 950℃, no phase transformation occurs in the original austenite but the intermetallic phases are precipitated in ferrite and at ferrite/austenite interfaces. The precipitated intermetallic phases are mainly χ phases during aging at 650℃. They are σ and χ phases at aging temperature of 750℃. When temperature increased to 850℃, the intermetallic phase is only σ phase. At temperature of 950℃, there is a little σ phase precipitated at ferrite/austenite interfaces. The formation of intermetallic phases is analyzed by thermodynamics, which shows that metastable χ phase can invert to σ phase at aging temperatures from 650 to 750℃. When temperature ranging from 850 to 950℃, σ phase can be directly precipitated.

Keywords: cast super duplex stainless steel aging temperatures &sigma phase &chi phase

收稿日期 2009-06-09 修回日期 2009-09-02 网络版发布日期 2009-10-10

DOI:

基金项目:

科技部科技人员服务企业行动项目2009GJC40018, 福建省青年人才创新基金项目2008F3061和福州大学科技发展基金项目2008--XQ--16资助

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