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γ -TiAl基合金的表面激光处理及超塑性扩散连接

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摘要: 较系统地研究了TiAl基合金激光快速熔凝组织细化特征及该类组织的超塑连接规律。结果表明, 激光处理后试样表面熔凝区的组织主要为胞状枝晶组织, 经后续热处理可转变为细小的等轴晶粒组织, 并形成了良好的超塑连接条件。利用该表面组织对试样进行超塑扩散连接, 探讨了连接温度、压力和时间对连接效果的影响。表面细化组织试样与整体细化组织试样的超塑连接具有基本相同的连接规律。在连接温度900 °C, 连接压力60 MPa, 连接时间1*1h条件下, 可以实现试样的超塑扩散连接。

关键字: TiAl基合金; 显微组织; 激光表面处理; 连接

Superplastic forming and diffusion bonding of laser surface melted TiAl intermetallic alloy

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Abstract: The character of fine-grained structure obtained by laser surface processing and its rule of superplastic forming and diffusion bonding of TiAl based alloy were investigated systemically. The results show that, after laser surface processing, a melt layer with cellular-dendrite structure is formed, which could transform into very fine-grained structure during the annealing treatment. Superplastic forming and diffusion bonding between the surfaces with fine-grained structure was carried out, with which the bonding effects brought by temperature, stress and time were discussed respectively. Both the sample with surface fine-grained structure and that with integrate fine-grained structure have the same rule essentially. The results show that, at the condition of 900°C and 60MPa, sound superplastic diffusion bonding could be obtained after kept 1h.

Key words: TiAl based alloy; microstructure; laser surface treatment; bonding

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