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FeAl多孔材料与不锈钢的焊接

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摘 要： 采用真空钎焊工艺，以Cu-Sn混合粉末压坯为钎料，研究FeAl多孔材料与不锈钢的焊接性能。结果表明：钎料成分和焊接工艺参数对FeAl多孔材料和434L不锈钢的焊接性能影响显著，焊接过程中成分为Cu-25%Sn(质量分数)的粉末压坯钎料在焊缝处生成$Cu_{81}Sn_{22}$和$Cu_{10}Sn_3$两种金属间化合物，成分为Cu-10%Sn的粉末压坯钎料在焊缝处生成(Cu，Sn)固溶体；采用Cu-10%Sn粉末压坯为钎料，真空下经过940 ℃保温15 min，FeAl多孔材料与不锈钢通过(Cu，Sn)连接可获得良好的焊接接头，得到的FeAl多孔材料与不锈钢焊接后的抗拉强度为83.9 MPa，可达到FeAl多孔材料母体抗拉强度的90.6%；FeAl多孔材料与不锈钢的真空钎焊机理为液态钎料对被焊母体的粘结连接及钎料元素与被焊母体元素间的互扩散和反应。

关键字： FeAl；多孔材料；真空钎焊；焊接性能

Welding of FeAl porous material and stainless steel

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Abstract: FeAl porous material and stainless steel were welded by vacuum brazing using Cu-Sn green compact as brazing filler. The weldability of FeAl porous material with stainless steel was investigated. The results show that the composition and parameters of vacuum brazing have great effect on the tensile strength of welded FeAl porous material and stainless steel. $Cu_{81}Sn_{22}$ and $Cu_{10}Sn_3$ intermetallics are formed in the brazing line when the filler composition is Cu-25%Sn. (Cu, Sn) solid solution is formed in the brazing line when the filler composition is Cu-10%Sn. After brazing at 940 ℃ for 15 min using Cu-10%Sn as brazing filler, the brazed FeAl porous material and stainless steel obtain the best tensile strength of 83.9 MPa, that is 90.6% of the tensile strength of FeAl porous material. The brazing mechanisms are the matrix materials joined by liquid brazing filler and the interdiffusion and reaction between the elements in filler and matrix materials.

Key words: FeAl; porous material; vacuum brazing; weldability

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