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喷射沉积70%Si-Al合金电子封装材料的组织与性能

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摘 要: 采用喷射沉积与热压相结合的方法制备电子封装用70%Si-Al合金坯料, 采用扫描电镜和金相显微镜观察合金的显微组织。结果表明: 采用喷射沉积与热压相结合的方法可获得直径为76.2 mm、厚度为6 mm的70%Si-Al合金样品; 合金中初晶Si的长大受到抑制, 初晶Si相的尺寸仅为20-50 μm , 分布均匀且形成连续骨架; Al相围绕Si相间隙呈连续网络分布, 这种结构有利于提高材料热导率, 降低其线膨胀系数; 通过与后续热压相结合制备的70%Si-Al合金样品, 其室温热导率达到110 W/(m·K), 400 $^{\circ}\text{C}$ 时线膨胀系数仅为 $9.6 \times 10^{-6}/\text{K}$ 。

关键字: 70%Si-Al合金; 电子封装; 热导率; 喷射沉积

Microstructure and properties of spray deposition 70%Si-Al alloy for electronic packaging applications

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Abstract: 70%Si-Al alloy was prepared by spray deposition and hot pressing technology. The microstructures of the alloy were investigated by scanning electron microscopy and metallographic microscopy. The results show that by spray deposition and hot pressing technology 70%Si-Al alloy with a diameter of 76.2 mm and a thickness of 6 mm can be obtained. The growth of primary silicon in 70%Si-Al alloy can be inhibited, and its grain size is only 20~50 μm . The distribution of primary silicon forms a continuous framework and the Al phase encircles the interval of Si phase continuously. The increase of thermal conductivity and decrease of the coefficient thermal expansion are mainly because of this structure. Its thermal conductivity reaches up to 110 W/(m·K) at room temperature and the coefficient of thermal expansion is just $9.6 \times 10^{-6}/\text{K}$.

Key words: 70%Si-Al alloy; electronic packaging; thermal conductivity; spray deposition

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