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论文

新型纳米结构颗粒增强无铅复合钎料性能

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摘要：

为了解决传统复合钎料制备中强化颗粒容易粗化的问题，提高无铅复合钎料的性能，选用共晶Sn-3.5Ag、Sn-3.0Ag-0.5Cu钎料作为基体，3种不同类型具有纳米结构的有机-无机笼型硅氧烷齐聚物(POSS) 颗粒作为增强相而制成复合钎料。研究了复合钎料的铺展性能、钎焊接头的力学性能和抗蠕变性能。结果表明，复合钎料的润湿性能均优于基体钎料的润湿性能，复合钎料钎焊接头的剪切强度和蠕变断裂寿命均明显提高。在相同条件下，Sn-Ag-Cu基复合钎料钎焊接头的性能优于Sn-Ag基复合钎料钎焊接头。

关键词： 硅氧烷齐聚物 复合钎料 铺展性能 剪切强度 蠕变断裂寿命

Properties of new nano-structured particles reinforced lead-free composite solders

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Abstract:

In order to solve the coarsening problem of reinforcing particles in fabrication of traditional composite solders and enhance the properties of lead-free composite solders, the eutectic Sn-3.5Ag and Sn-3.0Ag-0.5Cu were selected as solder matrix, and three different nano-sized polyhedral oligomeric silsesquioxane(POSS) particulates were used as reinforcing particles to form composite solders. The spreadability properties, mechanical performance, and creep rupture lives of solder matrix and their new composite solders with different mass fractions were studied. The experimental results indicate that the new composite solders and their joints show better wettability, mechanical properties, as well as longer creep rupture lives than those of the solder matrix. Besides, Sn-Ag-Cu composite solder joints exhibit better properties compared with Sn-Ag composite solder joints.

Keywords: POSS composite solder spreadability property shear strength creep rupture life

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