

论文

Cu/Sn63-Pb37 双金属结构在模拟湿热大气环境中的电化学腐蚀行为初探

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摘要:

针对电子装备中Cu/Sn63-Pb37偶对在模拟湿热大气环境中(40°C, 95%RH)的腐蚀特性,用薄液膜下原位零阻安培表腐蚀电化学测试技术结合SEM、FT-IR及XRD等表面分析手段,获得了电偶对的阳极电偶电流密度和电偶电位随时间的变化规律及腐蚀试样表面形貌和腐蚀产物组成的信息,阐述了Cu与Sn63-Pb37之间的电偶腐蚀特征和电化学机制,并揭示了金属表面腐蚀产物膜的形成进程及其对电偶腐蚀行为的影响。结果表明,Cu作为偶对中的阳极发生腐蚀而Sn63-Pb37作为阴极受到保护,腐蚀产物对Cu表面腐蚀进程具有阻滞作用,实验后期Sn63-Pb37表面的阴极活化作用加强,并破坏其表面的稳态氧化膜促使其发生腐蚀。

关键词: 电偶腐蚀 Cu Sn63-Pb37焊料

Electrochemical Corrosion Behaviors of the Galvanic Couple Cu/Sn63-Pb37 in simulated atmosphere

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Abstract:

The Cu/Sn63-Pb37 galvanic couple appeared in most electronic devices. This paper was to investigate the corrosion characteristics and mechanisms of this couple, which was exposed in the typically simulated air condition at 40°C with 95%RH. The in-situ electrochemical information of the couple have been performed with related zero resistance ampere techniques under thin moisture film. According to the time dependent features of galvanic potential and anodic galvanic current density results, the Cu acted as anode and the Sn63-Pb37 acted as cathode during exposure. The gradual formed corrosion products, which were detected by FT-IR and XRD, restrained the anodic polarization behavior occurring on Cu surface. The hydrolyzed CO2 on the Sn63-Pb37 surface induced the breakdown of Pb oxides formed in air naturally, which was confirmed from the SEM surface morphologies. Despite the exact corrosion rates was not obtained from the galvanic current density data, the changing trend were valuable for estimating the atmospheric corrosion behavior of the Cu/Sn63-Pb37 couple.

Keywords: galvanic corrosion Cu Sn63-Pb37 solder

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