

Author's Accepted Manuscript

Growth behavior of intermetallic compounds and early formation of cracks in Sn-3Ag-0.5Cu solder joints under extreme temperature thermal shock

Ruyu Tian, Chunjin Hang, Yanhong Tian, Liyou Zhao



PII: S0921-5093(17)31313-8
DOI: <https://doi.org/10.1016/j.msea.2017.10.007>
Reference: MSA35610

To appear in: *Materials Science & Engineering A*

Received date: 8 August 2017
Revised date: 1 October 2017
Accepted date: 3 October 2017

Cite this article as: Ruyu Tian, Chunjin Hang, Yanhong Tian and Liyou Zhao, Growth behavior of intermetallic compounds and early formation of cracks in Sn-3Ag-0.5Cu solder joints under extreme temperature thermal shock, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2017.10.007>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Growth behavior of intermetallic compounds and early formation of cracks in Sn-3Ag-0.5Cu solder joints under extreme temperature thermal shock

Ruyu Tian ^a, Chunjin Hang ^a, Yanhong Tian ^{a,*}, Liyou Zhao ^b

^a *State Key Laboratory of Advanced Welding and Joining, Harbin Institute of Technology, Harbin, China, 150001*

^b *Shanghai Academy of Spaceflight Technology, Shanghai, China, 201109*

*Email: tianyh@hit.edu.cn, Tel: +86-451-86418359

Abstract

The microstructure evolution and growth mechanism of interfacial intermetallic compounds (IMCs) as well as the mechanism for early formation of cracks in Sn-3Ag-0.5Cu solder joints of quad flat packages (QFPs) during extreme temperature thermal shock between 77 K and 423 K were investigated. The Cu-Sn IMC layer at the Cu lead/solder interface and the Ni-Cu-Sn IMC layer at the solder/ENIG pad interface gradually thickened as well as the IMCs morphologies changed during extreme temperature thermal shock. Scallop-like Cu-Sn IMC layer and needle-like Ni-Cu-Sn IMC layer both transformed to plane-like IMCs. New Cu₃Sn phase was formed at the interface between Cu lead and Cu₆Sn₅ IMC layer after 250 cycles. The (Ni, Cu)₃Sn₄ IMC layer was completely converted into (Cu, Ni)₆Sn₅ IMC layer after 150 cycles resulting from the diffusion of Cu atoms from Cu lead and Sn-3Ag-0.5Cu solder to the

Download English Version:

<https://daneshyari.com/en/article/7974580>

Download Persian Version:

<https://daneshyari.com/article/7974580>

[Daneshyari.com](https://daneshyari.com)