

# A Simulation Study on Interfacial Reaction Between Sn3Ag0.5Cu and Sn0.7Cu Using Different Substrates After Reflow Soldering



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**Abstract** Reflow soldering is a process to create joining between the board and electronic component in order to make sure the electronic devices may function well. The aim of this study is to determine the solder joint strength through simulations using data from previous researchers. Two type of solder alloys were used namely Sn3Ag0.5Cu (SAC305) and Sn0.7Cu (SC07) with two types of substrate such as laminated copper and pure copper. Simulation was conducted using Fusion 360 software. Besides, the information and data on intermetallic compound formation and growth, as well as thickness were gathered and presented in this study to support the simulation results. Results showed that pure SAC305/copper substrate produced lower shear strength which was 15.17 MPa as compared to SAC305/laminated copper with the value of 26.67 MPa. Meanwhile SC07/pure copper also gave lower shear strength which was 5.62 MPa as compared to SC07/laminated copper which was 5.45 MPa. In terms of IMC, it was found that mainly  $\text{Cu}_6\text{Sn}_5$  was formed at the solder joint interface with an average thickness of 3  $\mu\text{m}$  for SAC305, and 5  $\mu\text{m}$  for SC07 for both substrates. Hence it can be concluded that SAC305 with laminated copper substrate showed a good performance to produce a reliable electronics product.

**Keywords** Reflow soldering · Solder alloy · Intermetallic compound · Solder joint strength

## 1 Introduction

The SnPb solder has been progressively prohibited due to the serious impact of lead onto environment and human health [1–4]. This in turn making lead-free solders such as SnAgCu, SnCu and SnAg becoming a suitable candidate to replace lead-containing solders due to its solder properties as well as mechanical properties superior than SnPb solder [5–8]. Among those lead free solders, the Sn3Ag0.5Cu (SAC305) and

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