

# **A Short Review: Reliability Issues of Lead-Free Sn-Based Alloys for Superconducting Applications**

## **Abstract**

As the trends of electronic devices are moving to miniaturization which requires high-density electronic packaging and high-speed performance, superconducting solder alloy has attracted considerable interest to fulfill the requirements of advanced electronic packaging as it provides sufficient superconductivity which minimizing the loss of current densities carried by superconductors. In the past few decades, leaded superconducting solder alloy were widely used in the industry due to its satisfied performance. However, development of lead-free solder alloy for superconducting applications is initiated to replace leaded solder alloy due to its toxicity. Sn-based solder alloy is the most popular candidate for replacing leaded solder alloy in the industry, but the reliability of Sn-based solder alloy is concerned. This paper reviewed the reliability issues of lead-free Sn-based superconducting interconnects when subjected to high current stressing. Electromigration, thermo-migration, and the subsequence issues caused by high current stressing are covered. This article also summarized the studies done on minimizing the reliability issues of potential Sn-based superconducting solder alloy caused by high current stressing.

## **Keywords**

Electromigration; Lead-free solder; Superconducting