Testing Methodology and Analysis of Fusing Current of Printed Conductive Inks on Dielectric Substrates

Speaker: Elicia K. Harper, Emily K. Engel, Susan C. Trulli, and Kara P. Upton -
Raytheon Integrated Defense Systems, Andover, MA 01810

E-Mail: Elicia.Harper@raytheon.com

Abstract

Printed electronics and additive manufacturing (AM) are becoming more prevalent in microelectronic packaging for RF devices due to the low cost of fabrication, ease of customization and the advantages of rapid prototyping. One benefit of AM in microelectronic packaging is the ability to write DC & RF interconnects with conductive ink. Characterization of new materials for AM is an important part of the process to leverage this new technology, yet significant work has not been done in determining the DC handling capability of printed conductors. This work outlines a process for sample preparation and a methodology for determining the fusing current of various conductive inks. Inks were printed onto various dielectric substrates and sintered using different curing processes. Four-wire measurements were performed and different current levels were applied to the samples until the printed line fused. Based on the measured fusing current, the temperature rise of the line is extracted through equations and compared to thermal simulations. This presentation compares the fusing current of printed traces of different inks based on various substrates and curing methods.