Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
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SOLDER JOINT LIFE PREDICTION OF PHOTONIC PACKAGE USING III-V MATERIALS

By

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TEAMS

Abstract

Fatigue life prediction has become very important factor in reliability of any electronic components to withstand extreme thermal stresses in industrial standard. Hence, photonic packages are widely used in telecommunication and computer applications. The primary focus of this study is to determine the thermal cycles to crack initiation of solder bump used in laser array waferboard for telecommunication applications. This includes GaAs Laser chip on waferboard and Si Substrate. Indium has proved higher fatigue life in various experimental studies in the field of reliability and lead-free material. Therefore, a solder ball was designed based on fatigue life formula as well as assembly dimensions were fixed. Here, Darveaux model is used to calculate the same as it proves accurate results. ANSYS Finite Element Method (FEM) was used in the process with mesh refinement study. Indium proved high fatigue life thus predicting failure by calculation of plastic work and stress-strain relations of the solder joint. These values were verified with calculated results and simulation results predicted close values up to 0.87% thus proving the new material a game changer in photonic package and it was concluded that III-V material proved higher reliability in the field of electronic packaging with an optoelectronic interconnect.