Technische Hochschule Ingolstadt
Fakultät Elektro- und Informationstechnik

Bachelor/ Master Thesis

Analysis of Creep behavior and development of the material model of AuSn solder joints using simulation and Raman spectroscopy

Research Statement:

The study of AuSn solder fundamentals is pivotal in advancing electronic component reliability and performance, especially in high-stress environments. This field is expanding due to the increasing complexity of electronic devices and the need for durable and conductive materials. The creep of AuSn solder can lead to failure in electronic components due to the gradual deformation of the solder joints. This can compromise the integrity of the electronic circuit, leading to loss of function or performance over time. To prevent such failures, it is important to characterize the material properties of AuSn solder, including its creep behavior, and to develop accurate simulation models using experimental dataset with different material characterization methods. These models can predict how the solder will behave under various conditions and help to design more reliable electronic systems.

Task:

- Planning and building samples with AuSn solder
- Planning and execution of Raman spectroscopy measurements and analysis of the results
- Implementation of material characterization methods for analyzing the solder joint, using microscopy, profilometry, and acoustic microscopy (SAM)
- Development of a simulation model and validation of a State of Art AuSn creep model.
- Optimization of the model with experimental results

Profile:

- Student in Electrical Engineering, Materials Science, Mechanical Engineering or similar
- Basic knowledge regarding material behavior, particularly the creep behavior of metals
- Experience in FEM simulations, ideally with knowledge in ANSYS
- Ability and interest to work independently in a scientific environment
- Fluent in German and/or English

Start: January 2024

Location: Technische Hochschule Ingolstadt

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