1. Achieving High Reliability of Lead-Free Solder Joints -- Materials Considerations

Course Leader: Ning-Cheng Lee – Indium Corporation

Course Objective:

This course covers the detailed material considerations required for achieving high reliability for lead-free solder joints. The reliability discussed includes joint mechanical properties, development of type and extent of intermetallic compounds (IMC) under a variety of material combinations and aging conditions and how those IMCs affect the reliability. The failure modes, thermal cycling reliability, and fragility of solder joints as a function of material combination, thermal history, and stress history will be addressed in details, and novel alloys with reduced fragility will be presented. Also presented are crucial parameters for high reliability solder alloy for automotive industry. Electromigration, and tin whisker will also be discussed. The emphasis of this course is placed on the understanding of how the various factors contributing to the failure modes, and how to select proper solder alloys and surface finishes for achieving high reliability.

Course Outline:

1. Main Stream Lead-free Soldering Practice
2. Surface Finishes Issues
3. Mechanical Properties
4. Intermetallic Compounds
5. Failure Modes
6. Reliability - Thermal Cycle
7. Reliability - Fragility
8. Reliability – Rigidity & Ductility
9. Reliability - Electromigration
10. Reliability - Tin Whisker

Who Should Attend:

Directors, managers, design engineers, process engineers, and reliability engineers who care about achieving high reliability lead-free solder joints and like to know how to achieve it should take this course.

Bio:

Ning-Cheng Lee is the Vice President of Technology of Indium Corporation. He has been with Indium since 1986. Prior to joining Indium, he was with Morton Chemical and SCM. He has more than 30 years of experience in the development of older materials for SMT industries. He received his PhD in polymer science from University of Akron in 1981, and BS in chemistry from National Taiwan University in 1973. He is author of “Reflow Soldering Processes and Troubleshooting: SMT, BGA, CSP, and Flip Chip Technologies”, and co-author of “Electronics Manufacturing with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials”. He was honored as 2002 Member of Distinction from SMTA, 2003 Lead Free Co-Operation Award from Soldertec, 2006 Exceptional Technical Achievement Award from CPMT, 2007 Distinguished Lecturer from CPMT, 2009 Distinguished Author from SMTA, 2010 Electronics Manufacturing Technology Award from CPMT, 2015 IEEE Senior Member, 2015 Founder’s Award from SMTA, and 2017 IEEE Fellow.