Organised by Material Engineering Technical Division (MaTD

Webinar Talk on When Lead-Free Isn't Trouble-Free in Semiconductor Solder Joints

Assoc. Prof. Dr. Azmah Hanim Binti Mohamed Ariff

11 MARCH 2026, WEDNESDAY

10.00AM - 12.00PM

BEM Approved CPD: 2
Ref. No. IEM26/HQ/055/T(w)

Registration Fees:
Student Members : Free
IEM Members : RM 15.00
IEM Non Members : RM 70.00
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Synopsis

The global transition to lead-free soldering has addressed environmental and regulatory concerns, yet it has also introduced new and often underestimated reliability challenges in semiconductor packaging. This webinar explores why "lead-free" does not always translate to "trouble-free", particularly as electronic devices continue to shrink while operating under increasingly demanding thermal and mechanical conditions. The session begins with a concise overview of electronic packaging and second-level interconnections, followed by a discussion on the fundamental differences between conventional Sn–Pb and modern lead-free solder systems. Key reliability concerns including rapid intermetallic compound (IMC) growth, brittle interfacial layers, multiple reflow effects, void formation, and thermal aging degradation will be highlighted using experimental insights from recent studies. Special emphasis will be placed on how alloying and reinforcement strategies (such as the addition of Bi, CNTs, graphene, MXene, and ceramic-based reinforcements) and surface finish selection (Cu, ENIG, ENEPIG, ImAg, OSP) influence solder joint microstructure, wettability, and long-term performance. The webinar will also touch on several emerging approaches as potential solutions to improve joint integrity. Designed for researchers, postgraduate students, and industry engineers, this talk aims to provide fundamental understanding into managing lead-free solder reliability in semiconductor applications, highlighting where current solutions succeed, where they fall short, and what research directions lie ahead.

Speaker's Profile

Associate Professor Dr. Azmah Hanim Binti Mohamed Ariff is a faculty member of the Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia (UPM), with over 17 years of academic and research experience in mechanical and materials engineering. She obtained her PhD in Mechanical Engineering and Bachelor of Engineering (Materials) from University Technology Malaysia. Her research expertise focuses on electronic packaging materials, particularly lead-free solder alloys, intermetallic compound formation and growth, solder joint reliability, surface finish effects (Cu, ENIG, ENEPIG, ENIAg), thermal aging and thermal cycling behaviour, and nano-reinforced composite solders. Dr. Azmah Hanim holds a H-index of 25 with over 2,000 citations, having published more than 110 peer-reviewed papers in Scopus- and Web of Science-indexed journals, including numerous Q1 and Q2 publications in the field of electronic packaging and materials. She has supervised and co-supervised over 40 postgraduate researchers, including more than 10 PhD and over 25 Master's students, and has received multiple awards for research excellence, teaching, and innovation at national and international levels.