

Advanced Packaging: Introduction to Polymers

SYLLABUS

INSTRUCTOR INFORMATION

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PROGRAM DESCRIPTION

This course offers an introduction to the types of polymers and polymer composites used in advanced packaging applications. Topics will include:

- Introduction to advanced packaging, package types, and trends in packaging architecture.
- High-density interconnect (HDI) laminates and substrates, build-up film substrates, and advanced laminates for 5G mobile applications.
- Overview of polymers used in electronic packaging.
- Key polymer properties, such as the glass transition temperature, coefficient of thermal expansion, modulus, and rheological properties.
- High-density interconnect (HDI) materials and process.
- Build up films (chemistry, process, properties).
- Low dielectric constant and low dielectric loss materials and applications, such as antenna in package (AIP).

Taught by an industry expert with 40+ years of experience in the field, this two-week program utilizes interactive webinars and on-demand recordings to develop a solid grasp of the concepts necessary for success as an advanced packaging engineer or product development professional.

LEARNING AND PERFORMANCE OBJECTIVES

This course provides R&D scientists, product development specialists, packaging engineers, and process development engineers with a balanced understanding of the types and applications of polymers used in advanced packaging. Upon completion, participants will be able to:

- Understanding of the role of polymers in advanced packaging.
- Learn how key physical properties such as glass transition temperature, coefficient of thermal expansion, modulus, and rheological properties play a role in advanced laminates and substrates.
- Gain insights into how advanced laminate substrates and HDI substrates play a key role in advanced packaging.
- Comprehend how polymers and polymer-related processes enable complex advanced packaging applications.
- Study the emerging/future packaging types for various industries, such as mobile and advanced computing.

COURSE STRUCTURE

- Instructor and participants meet online twice per week from the comfort of their own home.
- Participants can view recorded online sessions to review course content and class discussions.
- Course materials are accessible 24/7 on the Edge Learning Management System.
- Participants can access the course virtually on any device with an Internet connection and a major web browser, including Chrome, Firefox, Safari, Edge, and Internet Explorer.

SUPPLEMENTAL MATERIALS

- Materials for Advanced Packaging – CP Wong Editor, Springer 2009
- Embedded and Fan-Out Wafer and Panel Level Packaging Technologies – B. Keser and S. Krohnert, Wiley, 2021

COURSE SCHEDULE

WEEK 1 – INTRO. TO POLYMERS USED IN ADVANCED PACKAGING

- This course provides a comprehensive introduction to advanced packaging, exploring various package types and emerging trends in packaging architecture. We emphasize high-density interconnect (HDI) laminates and substrates, build-up film technologies, and innovative laminate materials engineered for 5G mobile applications.
- An overview of 3D or heterogeneous integration.
- Overview of polymers used in electronic packaging, explaining the rationale behind selecting specific chemistries, key properties, and measurement of polymer properties such as the glass transition temperature, coefficient of thermal expansion, modulus, and rheological properties.
- Structure, property, and process performance relationships in various package types. The presentation of the types of material interactions leads to package reliability and reliability testing.

WEEK 2 – HIGH-DENSITY PACKAGING APPLICATIONS ENABLED BY ADVANCED POLYMERIC MATERIALS

- High-density interconnect (HDI) materials and process. Types of HDI structures, polymer material properties, and the manufacturing process used to fabricate HDI laminates, with a focus on the key polymer-related processes such as lamination, laser drilling, and lead-free reflow reliability.
- Build up films (chemistry, process, properties). Detailed description of the chemistry, processing, and testing of build-up film laminates. An extensive discussion of Ajinomoto build-up films and other types of build-up films.
- Low dielectric constant and low dielectric loss materials and applications, such as antenna in package (AIP). Present the emerging packing structures, materials used, chemistry impact on the dielectric loss factor, and performance in packaging.
- Overview of leading-edge advanced packaging architectures such as underfills, fan-out panel level packaging (advanced package built on a PCB-like substrate with modified PCB processing), and heterogeneous integration, and how HDI and build-up films play a role in future packages.