

## 14. Polymers for Wafer Level Packaging

**Course Leader: Jeffrey Gotro –InnoCentrix, LLC**

### **Course Objective:**

The course will provide an overview of polymers used in wafer level packaging and the important structure-property-process-performance relationships for polymers used in wafer level packaging. The main learning objectives will be: 1) understand the types of polymers used in wafer level packages, including underfills (pre-applied and wafer applied), mold compounds, and substrate materials 2) gain insights on how polymers are used in Fan Out Wafer Level Packaging, specifically mold compounds and polymer redistribution layers (RDL) 3) learn the key polymer and processes challenges in Fan Out Wafer Level Packaging including panel level processing. We will cover in more depth the chemistries, material properties, process considerations, and reliability testing for polymers used in wafer level packaging including epoxy mold compounds and dielectric redistribution layers (RDL) for eWLP. The course has been completely updated to include a detailed discussion of the polymers and polymer-related processing for Fan-Out Wafer Level packaging (such as chip first and chip last (RDL first)).

### **Course Outline:**

1. Overview of Polymers used in Wafer Level Packaging
2. Wafer Level Process Flows (Chip-first versus Chip-last (RDL first))
3. Epoxy Mold Compounds for eWLP
4. Photosensitive Polyimides and Polybenzoxazoles
5. Pre-applied Underfills and Wafer Level Underfills, Chemistry and Process
6. High Density Substrate Materials including Coreless Substrates
7. Polymer Challenges in Fan-out Wafer Level Packaging
8. Reliability Testing for Fan-out Wafer Level Packaging
9. Wafer versus Panel Processing; Polymer Challenges and Solutions

### **Who Should Attend:**

Packaging engineers involved in the development, production, and reliability testing of semiconductor packages would benefit from the course. R&D professionals interested in gaining a basic understanding of the structure/property/process/performance relationships in polymers and polymer-based materials used in electronic packaging will also find this course valuable.

### **Bio:**

**Dr. Jeff Gotro** has over thirty years' experience in polymers for electronic applications and composites having held scientific and leadership positions at IBM, AlliedSignal, Honeywell, and Ablestik Laboratories. He has published 60 technical papers (including 4 book chapters) in the field of polymeric materials for advanced electronic packaging applications, holds 15 issued US patents, and has 4 patents pending. Jeff is an expert in thermosetting polymers and he has received invitations to speak at prestigious Gordon Research Conferences (Thermosetting Polymers and Composites). He has presented numerous invited lectures and short courses at national technical conferences. Jeff was an Adjunct Professor at Syracuse University in the Dept. of Chemical Engineering and Materials Science from 1986-1993 and has taught courses on Innovation in the MBA program at Concordia University in Irvine, CA. Jeff is a member of the American Chemical Society (ACS), the Institute for Management Consultants (IMC), IEEE Advanced Packaging Society, the International Microelectronics and Packaging Society (IMAPS), and the Society of Plastics Engineers. Jeff has a Ph.D. in Materials Science from Northwestern University with a specialty in polymer science and a B.S. in Mechanical Engineering/Materials Science from Marquette University.