



# Introduction to and Advances in 2.3D Fan-Out Wafer Level Packaging (FO-WLP)

Instructor: Beth Keser, Volantis Semiconductor, [bethk@kesers.com](mailto:bethk@kesers.com)

**Class Time (1:00 PM – 5:00 PM)**

## **COURSE SUMMARY**

Fan-out wafer level packaging (FO-WLP) technologies have been developed across the industry over the past 20 years and have been in high volume manufacturing for over 16 years. FO-WLP has matured enough that it has come to a crossroads where it has the potential to change the electronic packaging industry by eliminating wirebond and bump interconnections, substrates, leadframes, and the traditional flip chip or wirebond chip attach and underfill assembly technologies across multiple applications. After scale-up and high-volume manufacture of simple single-chip Fan-Out Wafer Level Packaging (FO-WLP) solutions by companies like Qualcomm and Infineon, now many premier semiconductor companies and OEM's have adopted Advanced Fan-Out structures including Apple, AMD, MediaTek, and HiSilicon. These companies are leveraging foundry technologies like InFO offered by TSMC as well as OSAT solutions from ASE, Amkor, SPIL, PTI, and DECA.

The introductory portion of this course will cover the advantages of FO-WLP, potential application spaces; package structures available in the industry; materials, equipment and process challenges; and reliability. The advanced topics will cover potential application spaces, advanced package structures available in the industry, adopting 2.3D chips first and chips last fan-out technology for chiplets, technology roadmaps, and benchmarking. The challenges of moving from 300mm FO-WLP to panel will also be discussed.

## **Course Outline**

- Definitions and Advantages
- Applications
- Early Package Structures
- Materials
- Equipment
- Design Rules & Reliability
- Advanced Applications including Chiplets
- Package Structures including Advanced FO technologies
- Technology Roadmap
- Panel Challenges
- Benchmarking

## **Who Should Attend?**

Engineers and managers responsible for advanced packaging development, package characterization, package quality, package reliability and package design should attend this course. Suppliers who are interested into supporting the materials and equipment supply chain should also attend. Both newcomers and experienced practitioners are welcome.

## **INSTRUCTOR BIO**



**Beth Keser, Ph.D.**, a recognized global leader in the semiconductor packaging industry with over 30 years of experience, received her B.S. degree in Materials Science and Engineering from Cornell University and her Ph.D. from the University of Illinois at Urbana-Champaign. Beth's excellence in developing revolutionary electronic packages for semiconductor devices has resulted in 50 patents and patents pending and over 50 publications in the semiconductor industry. Previously, Beth had led wafer level packaging development and product qualification teams at Motorola, Freescale, Qualcomm, and Intel. In 2019, Beth published *Advances in Embedded and Fan-Out Wafer-Level Packaging Technologies* (Wiley) and in 2021 is released her second book *Embedded and Fan-Out Wafer and Panel Level Packaging Technologies for Advanced Application Spaces: High Performance Compute and System-in-Package* (Wiley).

Beth was awarded the 2021 IEEE EPS Exceptional Technical Achievement Award for seminal contributions and leadership in FO-WLP. Currently, Beth is VP of Packaging at the photonics start-up Volantis Semiconductor, VP of Technology at IMAPS (imaps.org) an IEEE Fellow and IEEE EPS Distinguished Lecturer.