Tutorial Session

ICPST-43 (2026)

The 43rd International Conference of Photopolymer Science and Technology

June Tue 23, 2026 13:00 - 14:40
Room A [Arcrea Himeji, Medium Hall]

Tutorial Session
EUV Mechanisms | PFAS Free Sustainability | 3D Integration

T-1
Introduction to EUV Lithography

Harry Levinson [1]

[1] HJL Lithography

This course explains the basic principles of extreme ultraviolet (EUV) lithography. Key elements of EUV lithographic technology and the challenges for each are described: multilayer reflectors, sources of EUV light, optics, resists exposure systems, masks, and computational lithography. Emphasis will be on those aspects of EUV lithography that differ significantly from optical lithography. Descriptions are given of the ways in which physics and costs influenced choices made during the development of EUV lithography. High-NA EUV lithography will be described, and paths for extending EUV lithography even further will also be discussed.

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T-3
Using Resist Lithographic Responses to Map the Projected Image for Material Evaluation and Process Design

John Petersen [1 2], Pervaiz Kareem [1]

[1] imec, [2] University of Maryland, College Park

This tutorial provides a unified overview of how optical and EUV photoresists record and process aerial images. It examines resist bulk and lithographic responses, showing how nonlinear sampling, image contrast, and chemical contrast define feature size, process bias, and isofocal behaviour. Focus–exposure analysis, NILS, and intensity-threshold sampling are used to quantify resist-induced imaging biases. Unbiased PSD analysis characterizes LER/LWR, correlation length, and stochastic limits arising from photon statistics, electron blur, reaction-diffusion, and development percolation. Comparisons of chemically amplified and metal-oxide resists reveal material-specific roughness and RLS trade-offs, guiding OPC development and resist optimization.

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T-5
Why Are Photosensitive/Non-Photosensitive Polymers Important in Advanced Semiconductor Packaging?

Takafumi Fukushima [1]

[1] Tohoku University

Photosensitive and non-photosensitive polymers play essential roles in enabling next-generation semiconductor packaging. Their unique combinations of patternability, mechanical reliability, dielectric performance, and process versatility support the ongoing shift toward heterogeneous integration, chiplet architectures, and fine-pitch interconnects. Photosensitive polymers enable high-resolution formation of RDLs and microvias, while non-photosensitive polymers provide superior thermal stability, warpage control, heat dissipation, and dielectrics for large-area and high-power aapplications. This tutorial explains the fundamental properties, processing methods, and integration challenges of these materials, and highlights emerging trends that make polymers indispensable for achieving performance, scalability, and manufacturability in advanced semiconductor packaging.

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T-6
Advanced Packaging Materials and Co-Creative Evaluation Platforms at Resonac

Sadaaki Katoh [1]

[1] Resonac Corporation

Resonac positions itself as a co-creative chemical company, aiming to solve advanced packaging challenges that cannot be addressed by a single company alone through co-creation with diverse stakeholders. As part of this approach, Resonac has established the Packaging Solution Center and the co-creative evaluation platform JOINT2, while further expanding these activities and evolving them into initiatives such as US-JOINT and JOINT3. For 2.xD and 3D packages, higher-density integration requires close collaboration across materials, equipment, and substrate technologies. This presentation introduces Resonac’s co-creation activities, along with its high-performance materials portfolio used within these collaborative frameworks

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T-7
Photopolymers Enabling Fine-Pitch Cu RDL Damascene: Materials, Process, and Integration

TOSHIYUKI OGATA [1]

[1] TAIYO HOLDINGS CO., LTD.

This tutorial reviews redistribution layer (RDL) technology for advanced packaging, including fan-out wafer-level packaging, system-in-package, and 3D ICs. It describes the evolution from semi-additive processes using plating resists for fine-pitch wiring to Cu damascene-based RDL derived from front-end interconnect technology. The focus is on photopolymer performance requirements, material design strategies, and process integration challenges for achieving submicron, fine-pitch Cu RDL suitable for next-generation semiconductor packaging.