

May 28 – May 31, 2024 • Gaylord Rockies Resort & Convention Center, Denver, Colorado, USA



INTRODUCTION

With pleasure I invite you on behalf of the IEEE Electronic Components and Technology Conference (ECTC) Program Committee to submit an abstract for the 74th ECTC, which will be held from May 28 – 31, 2024, at the Gaylord Rockies Resort and Convention Center in Denver, Colorado. Sponsored by the IEEE Electronics Packaging Society (EPS), ECTC is the premier international conference in electronics packaging technology and

covers a broad range of topics, including components, materials, assembly, reliability, modeling, interconnect design and technology, device and system packaging, heterogeneous integration, wafer level packaging, photonics and optoelectronics, IoT, 5G, quantum computing and systems, 2.5D and 3D integration technology, and other emerging technologies in electronics packaging.

The ECTC Program Committee comprises 200+ experts from diverse technical fields and is dedicated to creating an engaging technical program. ECTC regularly draws over 1,500 attendees from 20+ countries. The 73rd ECTC welcomed 1,619 registered attendees from 26 countries. It featured 369 technical papers presented in 36 oral sessions and five interactive sessions, including a student-focused session. Additionally, nine special sessions covered various topics in advanced packaging like for harsh environments, hybrid bonding, high density

substrates, quantum computers, next-generation communication systems, photonics, as well as topics in workforce diversity and the CHIPS and Science Act initiative. The Technology Corner Exhibits showcased products and services from 117 companies. The 73rd ECTC received valuable support from our awesome sponsors. We plan to maintain ECTC's tradition as a premier platform to showcase the latest developments in the electronic components industry, where packaging drives device and system performance scaling.

The 74th ECTC will once again showcase Special Sessions and, concurrently, a diverse array of Professional Development Courses (PDCs) on its inaugural day. Esteemed leaders in their respective fields will curate the Special Sessions, providing high-level introductions into the cutting-edge topics within electronics packaging. Renowned experts will conduct the PDCs, enabling participants to expand their technical expertise. Across the subsequent three days, six parallel technical sessions will offer the most recent research and advancements in electronics packaging R&D, along with special panel discussions that highlight industry trends and best practices. Complementing the technical program, the Technology Corner Exhibits will feature leading companies specializing in electronic components, materials, and packaging, showcasing their latest innovations.

On behalf of the ECTC Program Committee, I look forward to seeing you at the 74th ECTC, taking place at the Gaylord Rockies Resort and Convention Center, Denver, Colorado, from May 28 – 31, 2024.

Michael Mayer, 74th ECTC Program Chair

MAJOR TOPICS

Highly rated abstracts are accepted for presentation at the ECTC conference. During abstract submission, authors are asked to choose the subcommittees whose topic areas best fit their abstracts. Please select two different program subcommittees in order of preference that should evaluate your submission for acceptance. Abstracts are rated according to the included original and previously unpublished, non-confidential, and non-commercial information on new developments, technology, and knowledge in the areas including, but not limited to, those given in the next ten paragraphs, one for each of ECTC's ten technical subcommittees.

Applied Reliability: Reliability of 2D, 2.5D, Si bridge, 3D, chiplets, WLSP, FOWLP, FOPLP, & heterogeneous integration; Interconnect reliability in micro-bump, micro-pillar, Cu-pillar, TSV, RDL, stacked-die; Interconnect reliability in hybrid-bond, flip chip & wire bonded packages; Novel reliability test methods, life models, FA techniques & materials characterization; Component and board level reliability in computing, HPC, mobile, networking; Component and board level reliability in automotive and harsh/high-temperature environments, AI, and displays; Product reliability for LED, memory, IoT, and autonomous vehicles; Product reliability of medical/wearable electronics.

Assembly and Manufacturing Technology: Assembly and manufacturing challenges for new markets; Die bonding methods and processes, die and package singulation manufacturing; Wafer level process/materials technologies, new & next generation substrates; Smart factory/ manufacturing encapsulation; Assembly related test/yield hardware development electronics; Integrating advanced thermal solutions in manufacturing and assembly; Process advancements/ yield enhancements in assembly and manufacturing; inspection, sampling, metrology, new processes; Heterogeneous integration and process: chiplets, 3D stacking, bridge technology, large body, warpage management; Shielding/protection technologies and manufacturing.

Emerging Technologies: Emerging, novel, and unique packaging and material technologies; Soft and intelligent packaging, flexible/stretchable hybrid electronics and bioelectronics; Extreme harsh environment; Nanomanufacturing; AI electronics packaging and its application; EV-power electronics and energy storage; MEMS & NEMS; Packaging for wide band gap devices; Anti-tamper, cryptography; Additive, subtractive or hybrid manufacturing, smart manufacturing industry 4.0; Packaging for quantum computing and other cryonic application; Electro-optical integration; Green and sustainable electronics, Net zero strategy/technology.

Interconnections: Interconnects for chiplets, heterogeneous integration, hybrid bonding, C2W, W2W, fan-out, panel-level, TSV; Interconnects for 2.5D/3D, Si/glass/organic interposers, fine-pitch/multi-layer RDL, SiP; Interconnects for thermo-compression/laser assisted/transient liquid phase bonding, low temperature solder; flip-chip, micro-bump, Cu pillar; Wirebond, Al ribbon bond; Printable interconnects, flexible interconnect, quantum interconnect, optical interconnects; Interconnection material, characterization and reliability; Conductive/ non-conductive adhesives, ACF, under-fill, molding compounds; Thermal interface materials, thermal/mechanical/electrical tests and reliability; Interconnects for AI, Silicon photonics, HPC, mobile, 5G, IoT, power and rugged electronics, medical and health; Interconnects for automotive, aerospace, flexible hybrid electronics, micro-LED display.

Materials & Processing: Wafer & panel level packaging materials and process advancements; Advanced materials and processes for FOWLP, FOPLP, 2.5D/3D, SiP, TSV, chiplets; Harsh environment resistant materials; Packaging substrates, flexible, stretchable, and

wearable electronics; Temporary wafer bond/debond materials, TCB and hybrid bonding, conductive adhesives; Advanced wire bonding; Emerging electronic materials and processes; Novel solder metallurgies; Dielectrics and underfills, molding compounds, thermal interface materials.

Packaging Technologies: 2XD & 3D-IC architecture, design, energy efficient C2C links, structures, thermal strategies, methods and processes for HPC/AI/NPU/HBM/CPU/GPU/ Quantum/PIC/PIM; Heterogeneous (chiplet) integration for 2.5D/3D-IC; Silicon/glass/organic Interposer & advanced package technology; DD Cu/Cu TSV/Hybrid Bonding; Embedded die/bridge, flexible, advanced substrates & modules; Fan-out wafer and panel level packaging; Advanced flip-chip, SiP, CSP, PoP & CPO; RF, wireless, MEMS sensors & IoT; Automotive, wireless power and power electronics; Bio, medical, flexible & wearable packaging.

Photonics: Integration, assembly, and packaging of photonics components for computing, communications, data processing, mobility, healthcare, green energy, agriculture, environment, climate monitoring, space, atmosphere, automobile, underwater, defense, process integration, free space optics, microscopy, 3D printing of micro-optical components, quantum technologies and systems, new materials, telecom (5G/6G), datacom, IoT, artificial intelligence (neuromorphic networks), medical devices, bio-photonics sensors, automotive/LIDAR, aerospace, defense, cryogenic, high temperature, harsh environments, RF/MW photonics, free-space optics, AR/VR, WDM, high-power lasers, micro-LEDs, 3D light-field displays, imaging, environmental sensors, optical fiber, connectors, connectorization, and waveguide interconnects. Co-packaged optics, hybrid, heterogeneous, 2D/3D, Photonic Integrated Circuits (PICs) including their wafer scale integration. Optical characterization, equipment, and tools for photonics packaging.

RF, High-Speed Components & Systems: Chiplet, heterogeneous integration, chip-to-chip, die-to-die, SiP/MCM/system co-design (chip/pkg/board) 5G/6G, IoT, cloud computing, autonomous vehicles, AI/machine learning Antennas, sensors, power transfer; wired/ wireless communications, RF to THz Multiphysics/multiscale modeling & characterization of interconnects, modules, components, and systems Opto-electrical (OE) hybrid integration, analog packaging, power electronics modeling/characterization high-speed/frequency (RF, mmWave, THz) signal integrity, power integrity, and EMI/EMC

Thermal/Mechanical Simulation & Characterization: Thermal/mechanical simulation and characterization at component, board, and system levels for all packaging technologies; Reliability related modeling and testing including fracture mechanics, fatigue, electromigration, warpage, delamination, moisture, drop, shock and vibration; Modeling for harsh environments (thermal, chemical, etc.); Material constitutive relations; Chip-package interaction for heterogeneous integration, wafer fabrication and package assembly process related modeling; Novel modeling techniques including multi-scale physics, co-design approaches; Quantum computing; Measurement methodologies, characterization and correlations, model order reduction, sensitivity analysis, optimization, statistical analysis; Application of artificial intelligence on modeling, characterization, digital twin; Credible simulations for virtual pre-qualification; CFD simulation including underfilling/molding process simulation.

Interactive Presentations: Highly encouraged at ECTC, presenters and attendees often communicate more efficiently here than in oral presentations. Abstracts can relate to any electronics packaging topic. Papers successfully presented in the interactive presentation sessions are published and archived in equal merit with the other ECTC papers.

Visit the ECTC website (www.ectc.net) for additional conference information.

Abstract and Manuscript Submission

As the Program Chair of the 74th ECTC, I extend a warm invitation for you to electronically submit your abstract at www.ectc.net, utilizing the "Author Info" tab. Your abstract should provide comprehensive details of your proposed technical paper, including findings and results, within a maximum limit of 700 words. Additionally, please include a concise paragraph, not exceeding 50 words, highlighting the novelty of your work. You also have the option to submit a supporting figure or table if desired. The deadline for abstract submission is October 09, 2023.

During the submission process, please ensure to provide the affiliation, contact telephone number, and e-mail address for all co-authors in the desired order. Additionally, include the mailing address of the contact author and specify the name of the presenting author. Please note that only co-authors are permitted to serve as presenters at ECTC. Submitted abstracts become the property of ECTC, and ECTC reserves the right to publish the abstracts accepted for the conference. ECTC also reserves the right to prohibit, limit, or decline any editing of submitted abstracts.

Prior to all submissions, please ensure that you have received the necessary clearance from management and co-authors, where applicable. By December 15, 2023, authors are notified of abstract acceptance along with instructions for manuscript preparation and paper presentation. Contact authors of accepted abstracts are kindly requested to confirm the acceptance, which signifies the commitment to submit the manuscript within the specified timeframe and present the paper in-person as an author on-site at the conference. The Program Committee may, at their discretion, consider submitted abstracts for inclusion in the Interactive Presentation sessions.

Upon acceptance of your abstract, please submit your manuscript (4-8 full pages) for review by February 23, 2024. **Failure to meet this deadline may result in the removal of your manuscript from the ECTC technical program.** To be included in the Conference Proceedings, your abstract must be accepted and your manuscript must fulfill all requirements, including timely response to reviewer requests following the manuscript submission deadline. Our Technical Committee members conduct a thorough review process to ensure content quality and scientific accuracy for all accepted manuscripts.

All abstracts and manuscripts must be original, previously unpublished, devoid of commercial content, and non-confidential. It is essential that your manuscript adheres to the specified ECTC format and upholds the principles of academic integrity by avoiding any instances of plagiarism including uncredited self-duplication of previously published work. All submitted manuscripts are checked for such plagiarism utilizing the IEEE CrossCheck service.

While authors are welcome to contribute multiple papers, we kindly request to limit active presentation roles to a maximum of three per person (oral or interactive). In an effort to foster inclusivity and diverse participation, this approach can lead to the distribution of presentation opportunities among co-authors, enriching the overall conference experience.

Similar to last year, first-time leading authors of successfully presented papers have the opportunity to participate in a special raffle prize drawing during the conference. Furthermore, following the conference, a collection of outstanding papers may be invited (with appropriate revisions) for peer-reviewed publication in special sections of the prestigious IEEE Transactions on Components, Packaging, and Manufacturing Technology.

Let me know if you have any questions regarding abstract and paper submission.

Michael Mayer, 74th ECTC Program Chair
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Special Paper Recognition

Best Paper Award: Each year the ECTC selects the best paper whose first author receives an ECTC personalized certificate and a check for \$3,000.

Best Interactive Presentation Award: Each year the ECTC selects the best Interactive Presentation paper whose first author receives an ECTC personalized certificate and a check for \$2,000.

Outstanding Paper Award: An outstanding conference paper is also selected for special recognition by the ECTC. The first author receives a personalized certificate and a check for \$2,000.

Outstanding Interactive Presentation Award: An outstanding Interactive Presentation paper is also selected for special recognition by the ECTC. The first author receives a personalized certificate and a check for \$1,500.

Intel Best Student Paper Awards: Intel Corporation is sponsoring awards for the best papers submitted and presented by a student at ECTC. The winning students will be presented with a certificate and a check for up to \$2,500.

Texas Instruments Outstanding Student Interactive Presentation Award: Texas Instruments is sponsoring an award for the best student Interactive Presentation at ECTC. The winning student will be presented with a certificate and a check for \$1,500.

Sponsorship Opportunities to Enhance Your Presence at ECTC

ECTC also offers excellent opportunities for promotion and visibility through sponsorships at Platinum, Gold and Silver levels as well as media, refreshment breaks, program, special sessions, and other unique opportunities to provide exposure for your company. Additional information is available at www.ectc.net under "Sponsors". Please contact:

Alan Huffman, ECTC Sponsorship Chair
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Technology Corner Exhibits

ECTC invites you to be part of the Technology Corner Exhibits and showcase your products and services to engineers and managers from all areas of the microelectronics packaging industry. Over 1,500 attendees are expected for the 74th ECTC, representing companies from around the world.

Exhibit Dates: May 29 and 30, 2024

For more information, contact:
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The 2024 exhibit electronic application form link and exhibit information brochure will be posted online at www.ectc.net under the "Exhibits" section in August 2023. Prospective exhibitors should fill out an application via the form link to start the process of reserving an exhibit space for 2024. ECTC exhibit booth allocation is first based on consecutive years of exhibit participation and/or Gold or Platinum Sponsorship. Please contact Sam Karikalan at samkarikalan@ieee.org for more information or with any questions.

Call for Professional Development Courses

Proposals are solicited from individuals interested in teaching educational, four-hour long Professional Development Courses (PDCs) on topics described on the previous page. From the proposals received, up to 16 PDCs will be selected for offering at the 74th ECTC on Tuesday, May 27, 2024. Each selected course will be given a minimum honorarium of \$1,500. In addition, instructors of the selected courses will be offered the speaker discount rate for the conference. Attendees of the PDCs will be offered Continuing Education Units (CEUs) or Professional Development Hours (PDHs). These CEUs and PDHs are recognized by employers as a formal measure of participation and attendance in "noncredit" self-study courses, tutorials, symposia, and workshops.

Using the format "Course Objectives/Course Outline/Who Should Attend," 200-word proposals must be submitted via the ECTC website at www.ectc.net by October 27, 2023. Authors will be notified of course acceptance with instructions by December 22, 2023. If you have any questions, contact:

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IEEE EPS Society Travel Grant Program

IEEE EPS is pleased to continue the IEEE EPS Travel Grant Program for the 74th ECTC. The goals of this award are to foster maximum student participation in ECTC and to recognize students with superior ECTC papers. We encourage all student authors to apply for this prestigious grant that will allow you to participate fully in the premier conference for electronic packaging.

Description: Grants are available to apply towards actual travel expenses, including airfare, hotel, and meals. Grants will be awarded competitively, based on abstracts submitted by student authors. The student who is named as the primary author of each winning abstract will receive a travel grant.

Eligibility: The competition is open to all full-time graduate students enrolled at an accredited institution in a program of study within the scope of ECTC. The student must be listed as the primary author on the abstract. A maximum of two authors (one per paper) from any one institution will receive a travel grant.

Application Process: To apply, check the "IEEE EPS Society Travel Grant" box in the "Awards" section of the online abstract submission form. Pre-selected abstracts based on technical committee scores will be requested to submit an extended abstract.

Intel Student Paper Awards

Intel Corporation is sponsoring awards for the best papers submitted, first authored, and presented by a student at the ECTC. The winning students will be presented with a certificate and a check for up to \$2,500.

Eligibility: To be considered for the award, the student must be a full-time student for at least one semester after the conference conclusion. The student must be the lead author (contact author and first author) and present the paper at the upcoming conference. Finalists will be determined by a review of the completed manuscripts by the judging committee. Manuscripts will be reviewed for relevance to the competition topics, technical content, and originality. The author of the best student paper will be notified after the conference and must submit an affidavit from the student's faculty advisor certifying that the student meets the eligibility requirements.

Application Process: To enter the Intel Student Paper Award competition, please check the "Intel Best Student Paper Award" box in the "Awards" section of the online abstract submission form.

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