2025 IWIPP

Tuscaloosa, AL | April 8-10

International Workshop on Integrated Power Packaging 2025

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- IEEE DIELECTRIC & ELECTRICAL INSULATION SOCIETY
- IEEE POWER ELECTRONICS SOCIETY
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Welcome from the General Chair

Dear IWIPP Attendees:

It is a great privilege to welcome you to the seventh offering of the International Workshop on Integrated Power Packaging. Many believe that there must be a revolution in device packaging before it will be possible to fully leverage the advancements in semiconductor technology that have been brought about in the last two decades. Indeed, the power semiconductor industry has been completely revolutionized since the early 2000's when the first Silicon Carbide diodes were released.

Most of the community now recognizes the need for a similar revolution in power device packaging. It is for this reason that IWIPP exists. Since its first offering in 1998, IWIPP has been dedicated to bringing together a multidisciplinary group of engineers, researchers, and scholars to pioneer advances in packaging technology. I am indebted to the early founders of IWIPP, who recognized the need for this packaging revolution even prior to the mass success of wide band-gap semiconductors. Their early insight and prescience established a course of inquiry that has led to where we are today. We all stand on the shoulders of giants, don't we?

Now, on to today! The technical program for this cycle of IWIPP is truly remarkable. I will not take the time to enumerate the talks that I am excited about hearing, but I will note that the program clearly reflects the multidisciplinary nature of the packaging field. IWIPP 2025 continues the tradition of anchoring each technical session with high-quality invited presentations. This gives each session a rich foundation that the contributed papers build upon. This approach is tried-and-true.

In addition to the incredible technical program that we have assembled, there will also be plenty of opportunities for networking and socializing, including — a first for IWIPP — a PELS-sponsored networking and engagement event that features a curated art experience for our attendees. This is sure to be a memorable event, especially as it is scheduled directly after our cocktail reception. I am also excited to have the opportunity to show you the awesome laboratory facilities and the exciting power electronics research that we have here at the University of Alabama (Roll Tide!).

As a final note, I would like to say that I am very grateful to the outstanding organizing committee members who have worked tirelessly to prepare what I believe will be the best IWIPP yet. From the partnership recruiting efforts, through reviewing technical digests, to scrutinizing budgets and setting up catering, these individuals have done an outstanding job. It has been a privilege to work with this talented group of professionals, and I couldn't be more proud to be part of this team.

Let's keep the flux cancelling and the fields gradated,

Andy Lemmon

IWIPP 2025 General Chair

We are excited to present the IWIPP 2025 program on behalf of the IWIPP 2025 technical program committee.

According to the current megatrends, power converters such as the ones enabling electric vehicles, electric aircraft, rail, smart grid, and renewable energy require new solutions for higher performance and reliability. New-concept power electronic modules are by nature the core part of such solutions. However, they bring along several challenges in terms of low-inductance and heterogeneous packaging, and new insulating and interconnection materials. All the above topics as well as reliability issues are the traditional focus of the IWIPP workshop. In addition, the design and manufacture of passive components is becoming an increasingly pertinent topic. Finally, environmentally, and economically sustainable production of all power electronic systems and components is coming to the forefront. IWIPP will contain keynote speakers and presentations covering all the above.

IWIPP is unique from other conferences and workshops in the sense that it demands expertise from electrical engineering, mechanical engineering, thermal engineering, physics, and material science to address the large variety of multi-disciplinary challenges in power packaging. This diversity is reflected in the composition of the technical societies sponsoring the event (IEEE DEIS, EPS, and PELS, PSMA, and ECPE.

Overall, we believe that the breadth and depth of the content in the technical program makes IWIPP an unmissable event for experts active in the power packaging field. We are all looking forward to sharing this unique experience with you in Tuscaloosa.

Best Regards,

Nicholas (Nick) Baker and Arthur Boutry

Technical Program Co-Chairs

IWIPP Schedule at a Glance

TUESDAY APRIL 8, 2025	
08:30 – 08:45	Welcome Comments: Andy Lemmon
08:45 – 09:35	**Keynote 1: Rolando Burgos, Virginia Tech**
09:35 – 10:35	**System Packaging** *Session 1*
10:35 – 11:00	**Coffee Break**
11:00 – 12:00	**System Packaging** *Session 1, Continued*
12:00 – 13:00	**Lunch**
13:00 – 13:50	**Keynote 2: Thomas Guillemet, Mitsubishi Electric**
13:50 – 14:50	**Eco-Friendly Packaging** *Session 2*
14:50 – 15:20	**Coffee Break**
15:20 – 15:50	**Eco-Friendly Packaging** *Session 2, Continued*
15:50 – 17:00	**Poster Session and Welcome Reception**
17:00 – 18:00	**PELS Networking & Engagement Event**

REGISTRATION IS OPEN DAILY FROM 7:30 AM TO THE END OF THE TECHNICAL SESSIONS.

EVENT LOCATIONS:

Technical Sessions (Keynotes, Presentations): Hotel Capstone Main Ballroom

Coffee Breaks, Lunch and Poster Session: Hotel Capstone Foyer

Networking: Hotel Capstone Breakout Room

Dinner: Tuscaloosa River Market

WEDNESDAY APRIL 9, 2025	
08:30 – 08:45	Welcome Comments: Andy Lemmon
08:45 – 09:35	**Keynote 3: Ty McNutt, Wolfspeed**
09:35 – 10:35	**Power Module Packaging** *Session 3*
10:35 – 11:00	**Coffee Break**
11:00 – 12:00	**Power Module Packaging** *Session 3, Continued*
12:00 – 13:00	**Lunch**
13:00 – 13:50	**Keynote 4: Stephanie Butler, WattsButler LLC**
13:50 – 14:50	**Trends in Power Packaging** *Session 4*
14:50 – 16:00	**Break**
16:00 – 16:15	**Bus Transportation to Univ. Alabama Engineering**
16:15 – 18:00	**Univ. Alabama Laboratory Tours**
18:00 – 20:00	**Dinner and Plenary: Alan Mantooth, University of Arkansas**

THURSDAY, APRIL 10, 2025	
8:30 – 8:45	Welcome Comments: Andy Lemmon
08:45 – 09:35	**Keynote 5: Francesco Iannuzzo, University of Turin**
09:35 – 10:35	**Processes and Materials** *Session 5*
10:35 – 11:00	**Coffee Break**
11:00 – 12:00	**Processes and Materials** *Session 5, Continued*
12:00 – 13:00	**Lunch**
13:00 – 13:50	**Keynote 6: Thomas Ebel, Univ. Southern Denmark [Virtual]**
13:50 – 15:20	**Insulation and Dielectrics** *Session 6*
15:20 – 15:30	Closing Remarks: Andy Lemmon
15:30	**End of Workshop**

KEYNOTE 1

INTEGRATION OF 7-LEVEL 'MULTI-CELL' 13.8 KV AC, 22 KV DC, 1 MW THREE-PHASE AC-TO-AC POWER CONVERTER FOR GRID -INTERFACE APPLICATIONS

Prof. Rolando Burgos
Center for Power Electronics Systems,
Virginia Tech

KEYNOTE 2

HOW LIFE-CYCLE ASSESSMENT CONTRIBUTES TO SUSTAINABLE POWER ELECTRONICS?

Dr. Thomas Guillemet, Mitsubishi Electric

KEYNOTE 3

DRIVING SYSTEM EFFICIENCIES WITH APPLICATION DEFINED PRODUCTS

Dr. Ty McNutt, Wolfspeed

KEYNOTE 4

RELIABILITY NEEDS: IS IT A SEMICONDUCTOR PRODUCT OR A POWER SUPPLY?

Dr. Stephanie Butler,
WattsButler, LLC

KEYNOTE 5

LARGE-SCALE ADOPTION OF SILICON CARBIDE IN THE AUTOMOTIVE SECTOR: WHAT IS MISSING?

Prof. Francesco Iannuzzo
University of Turin

KEYNOTE 6

HIGH VOLTAGE POLYMER ALUMINIUM ELECTROLYTIC CAPACITORS – A NEW GAMECHANGER IN POWER ELECTRONICS

Prof. Thomas Ebel
University of Southern Denmark

SYSTEM PACKAGING

Tuesday, April 8

Session Chair: Arthur Boutry (Univ., Alabama, USA)

08:45	**Rolando Burgos: Integration of 7-Level 'Multi-Cell' 13.8 kV AC, 22 kV dc, 1 MW Three-Phase AC-to-AC Power Converter for Grid-Interface Applications**
09:35	Christina DiMarino: Coaxial Power Converter Packaging for Medium-Voltage Power Electronics Systems
10:05	Sourish Sinha: Design, Fabrication, and Operation Challenges of Advanced Power Packaging Technology for EV Power Modules
10:35	COFFEE BREAK
11:00	Jannick Koch: Miniaturized 3D Glass Package for High-Efficiency and High-Power Density 48V DC-DC Converters
11:30	Xianchao Liu: Packaging a 650V/400A GaN Half-Bridge Power Module with Ultra-Low Parasitics for Electric Vehicle Drive Applications
12:00	LUNCH

Eco-Friendly Packaging

Tuesday, April 8

Session Chair: Nick Baker (Univ. of Alabama, USA)

13:00	**Thomas Guillemet: How Life-Cycle Assessment Contributes to Sustainable Power Electronics?"**
13:50	Kurukuru Varaha Satya Bharath: Health-Monitoring for Lifecycle Improvement
14:20	Baptiste Arati: Vitrimers for Power Electronics
14:50	COFFEE BREAK
15:20	Paul Bruyere: Electrical Characterization of Solderless Interconnections Dedicated to Pressure Assembly Power Modules
15:50	POSTER SESSION & WELCOME RECEPTION
17:00	PELS NETWORKING AND ENGAGEMENT EVENT

POSTER SESSION and WELCOME RECEPTION

Tuesday, April 8

Ella Hart, University of Alabama
SiC MOSFET Parameter Tolerance – a Comparison Between 3 Manufacturers

Rowan Aldridge, University of Alabama
Impact of Voltage Class on SiC MOSFET Paralleled Chip Temperature Imbalance

Arthur Boutry, University of Alabama
A 6.5kV Full-Bridge SiC MOSFET Module Design

Sourish Sinha, North Carolina State University
Innovative Packaging Strategy for MLCCs for High Current AC Applications Aimed at Reducing Parasitic Inductance

Shahid Aziz Khan, University of Michigan
GaN Based High Power Density PCB Design for Aerial Vehicles Motor Drive Applications

Sourish Sinha, North Carolina State University
Novel Integrated Ferromagnetic-Conductor (IFC) Multilayered Shield Layer for Parasitic Reduction in Power Modules

Nathan Carlson, University of Alabama
Solder Void Impact on Power Module Thermal Resistance Using Transient Thermal Analysis

POSTER PRESENTERES SHOULD HANG POSTERS DURING THE MORNING BREAK ON TUESDAY.

POWER MODULE PACKAGING

Wednesday, April 9

Session Chair: Xiaoling Li (NREL, USA)

08:45	**Ty McNutt: Driving System Efficiencies with Application Defined Products**
09:35	Paul Paret: Silver vs. Copper Sintering
10:05	Jun Wang: Press Pack SiC MOSFETs
10:35	COFFEE BREAK
11:00	Fang Luo: Fuzz Button Pressure Contacts for SiC
11:30	Andy Lemmon: Advanced Conduction Analysis of SiC MOSFETs
12:00	LUNCH

TRENDS IN POWER PACKAGING

Wednesday, April 9

Session Chair: Brian Narveson (PSMA, USA)

13:00	**Stephanie Butler: Reliability Needs: Is it a Semiconductor Product or a Power Supply?**
13:50	Victor Veliadis: Overcoming Barriers to WBG Power Electronics Commercialization
14:20	Arthur Boutry: A Polyvalent Self-Sustained Oscillations Test Platform for SiC Multi-Chip Power Modules
14:50	BREAK
16:00	BUS TRANSPORT TO UNIVERSITY OF ALABAMA ENGINEERING
16:15	UNIVERSITY OF ALABAMA LABORATORY TOURS
18:00	DINNER AND PLENARY: ALAN MANTOOTH, UNIVERSITY OF ARKANSAS

PROCESSES AND MATERIALS

Thursday, April 10

Session Chair: Andy Lemmon (Univ, Alabama, USA)

08:45	**Francesco Iannuzzo: Large-Scale Adoption of Silicon Carbide in the Automotive Sector: What is Missing?**
09:35	Riadh Al-Haidari: Power Module Packaging Using Direct Write Technology
10:05	Nick Baker: Liquid Metal based Power Semiconductor Module
10:35	COFFEE BREAK
11:00	Shiori Idaka: Comprehensive approach to enhancing the reliability of power modules against humidity
11:30	Mana Oki: Evaluation of Space Charge Accumulation in Epoxy Resin Under High Temperature and High Electric Stress
12:00	LUNCH

INSULATION AND DIELECTRICS

Thursday, April 10

Session Chair: Jim Gafford (Univ. North Carolina Charlotte, USA)

13:00	**Thomas Ebel: High Voltage Polymer Aluminium Electrolytic Capacitors – a New Gamechanger in Power Electronics**
13:50	Eric Vagnon: Real World Insulation Testing
14:20	Geraldo Nojima: Design of a PD-Free 10 kV SiC MOSFET module
14:50	Matthew Pompa: Partial Discharge in High Voltage PCBs
15:20	CLOSING REMARKS
15:30	END OF WORKSHOP

IEEE POWER ELECTRONICS SOCIETY

Artistic Networking at IWIPP 2025

IWIPP is excited to announce a fun and engaging networking event at IWIPP 2025.

The IEEE Power Electronics Society is hosting an interactive art event where participants work together to craft small art projects. Each attendee will be able to take one home. Led by local artist Joanna (Mobile Art Garage), this inclusive and creative event will make it easier to network with other IWIPP attendees. No artistic skills are required – only the desire to engage with other IWIPP attendees and grow your network. All are invited to participate.

Date & Time:

Tuesday, April 8 from 5 pm – 6pm (at end of Poster Session/Welcome Reception)

European Center for Power Electronics (ECPE)

Landgrabenstrasse 94
D-90443 Nuremberg, Germany
www.ecpe.org
+49 (0)911 81 02 88-0

Contact: Thomas Harder
thomas.harder@ecpe.org

ECPE, the Industry-driven Power Electronics Research Network in Europe with more than 170 member organizations is promoting research, expert workshops and advanced training as well as public relations in power electronics. The ECPE Network covering the value chain from the materials and components to the systems and applications strengthens the cooperation between Power Electronics industry and university & research institutes on a European level. As a European Technology and Innovation Platform ECPE is driving precompetitive joint research and sets up research & technology roadmaps for a strategic research agenda with future research directions according to the demands of European power electronics industry.

IEEE Electronics Packaging Society (EPS)

445 Hoes Lane
Piscataway, NJ 08854, USA
www.eps.ieee.org
+1.732.562.3855

Contact: Avram Bar-Cohen
avram.bar-cohen@raytheon.com

The IEEE Electronics Packaging Society is the leading international forum for scientists and engineers engaged in the research, design and development of revolutionary advances in microsystems packaging and manufacturing. Its objectives are scientific, literary, and educational in character. The Society strives for the advancement of the theory and practice of electrical and electronics engineering and of the allied arts and sciences, and the maintenance of a high professional standing among its members and others and with special attention of such aims within the field of interest of the Society.

IEEE Dielectric & Electrical Insulation Society (DEIS)

445 Hoes Lane
Piscataway, NJ 08854, USA
www.ieeedeis.org

Contact: Davide Fabiani
davide.fabiani@unibo.it

DEIS' interests lie in materials, measurements, numerical modelling, components, applications and systems pertinent to dielectrics and electrical insulation. These include solids, liquids and gases; small-scale systems such as nano-dielectrics and bio-dielectrics; high-voltage and high-field phenomena; and large-scale systems such as high-power insulation applied to electricity generation, transmission, and distribution. DEIS supports the basic science of dielectrics and electrical insulation through practical applications and the development of relevant standards.

IEEE Power Electronics Society (PELS)

445 Hoes Lane
Piscataway, NJ 08854, USA
www.ieee-pels.org
pels-staff@ieee.org

Contact: Hanh-Phuc Le
hanhphuc@ucsd.edu

The Power Electronics Society is one of the fastest growing technical societies of IEEE. For over 20 years, PELS has facilitated and guided the development and innovation in power electronics technology. This technology encompasses the effective use of electronic components, the application of circuit theory and design techniques, and the development of analytical tools toward efficient conversion, control and condition of electric power. The Power Electronics Society's goal is to keep members current and competitive in the workplace, and provide them with the tools necessary to help them grow both personally and professionally.

Power Sources Manufacturers Association (PSMA)

P.O. Box 418
Mendham, NJ 07945-0418
https://www.psma.com/
+1-973-543-9660
power@PSMA.com

Contact: John Horzepa
john@psma.com

The purpose of PSMA is to enhance the stature and reputation of its members and their products, improve their knowledge of technological and other developments related to power sources, and educate the entire electronics industry, plus academia, as well as government and industry agencies as to the importance of, and relevant applications for, all types of power sources and conversion devices.

REGISTRATION & HELP DESK

The full-conference registration admits one individual to all technical sessions including keynotes and the poster session, the exhibition atrium, and all social / networking events.

Throughout the duration of the conference, the registration desk will remain staffed for the convenience of the participants. Any conference or program questions may be directed to this help desk; when the conference is not in session, please contact a member of the organizing committee with questions.

BADGES

Badges should be worn at all official functions of the meeting. Badge checkers will be stationed throughout the meeting areas. Only those with technical registrations will be allowed into sessions. If you forget or lose your badge, you may obtain a second badge at the registration desk with proof of registration.

RECEIPTS

All participants who register online will receive a receipt/confirmation via email. If you need additional paperwork, please contact the event staff, located at the registration desk.

CONSENT TO USE OF IMAGES

Registration and attendance / participation in IWIPP constitutes an agreement by the registrant for IWIPP's use and distribution (both now and in the future) of the registrant or attendee's image or voice in photographs, videotapes, electronic reproductions and audiotapes of such events and activities. The use of cameras and/or recorders is strictly prohibited during the oral and poster sessions. Limited use is allowed for Exhibitors in their own booth area. Personal photography is allowed at social functions.

LOST & FOUND

Any lost & found item should be returned to the registration desk, and will be held by the hosting institution if unclaimed before the end of the event.

INTERNET ACCESS

Complimentary WiFi is available throughout the conference facilities. The Wi-Fi login and password will be provided when you will register. Please notify the registration desk if there are any internet issues.

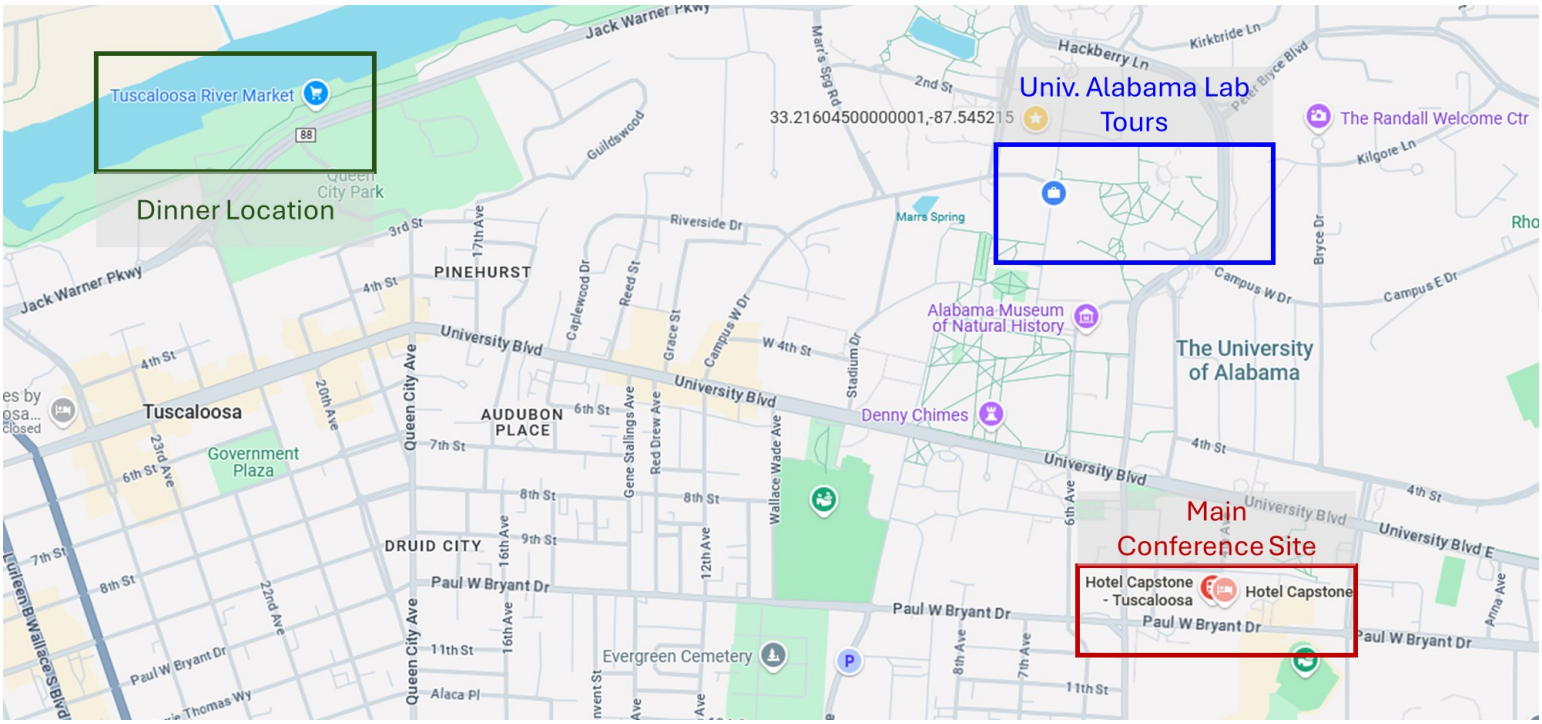
DISTRIBUTING COMMERCIAL MATERIAL

Distribution of commercial material in the IWIPP meeting and exhibition spaces by people or organizations not sanctioned as a Partner, Sponsor, or Exhibitor is prohibited. IWIPP reserves the right to remove without notice any materials not in compliance with this policy.

ACCESSIBILITY FOR REGISTRANTS

The meeting staff will work with attendees to provide reasonable accommodations for those who require special needs. To request assistance on-site, please check in at the Registration & Help Desk.

Also, for local recommendations and additional transportation instructions, please refer to the Conference Location & Local Accommodations pages on the conference website at www.iwipp.org.



CONFERENCE LOCATIONS

There are three locations for the events associated with IWIPP 2025:

Main Conference Site: Hotel Capstone

320 Paul Bryant Dr.

Tuscaloosa, AL 35401

Free Parking is Available in the hotel parking lot for conference attendees.

Lab Tours: University of Alabama Engineering

255 7th Avenue

South Engineering Research Center

Tuscaloosa, AL 35401

Paid Parking is Available in the parking lot adjacent to SERC building. Bus transportation from the hotel will also be provided.

Gala Dinner: Tuscaloosa River Market

1900 Jack Warner Pkwy

Tuscaloosa, AL 35401

Free Parking is Available at the venue lot for conference attendees. Bus transportation from the hotel will also be provided.