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Call for Papers for the Special Session on

Confluence of AI, UWBG Semiconductors, Photonics, and Information Security in Next-Gen Power Electronics

Organized and co-chaired by

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Technical Outline of the Session and Topics

The next generation of power electronics is being shaped by the convergence of artificial intelligence (AI), ultra-wide bandgap (UWBG) semiconductors, photonics, and information security. This special session explores how these domains jointly enable intelligent, efficient, and secure power electronic systems for future energy, transportation, and industrial infrastructures.

UWBG materials (e.g., Ga_2O_3, diamond) are pushing performance beyond Si, SiC, and GaN, enabling higher voltage, frequency, and temperature operation. At the same time, AI-driven methods are accelerating design, control, monitoring, and reliability assessment.

Photonics introduces high-speed, EMI-immune sensing and communication, enabling advanced diagnostics and distributed control. Meanwhile, increasing connectivity brings new vulnerabilities, making cybersecurity and resilience critical design requirements.

This session focuses on integrated, cross-disciplinary solutions spanning materials, devices, control, and system-level security.

Topics of the session include, but are not limited to:

- AI-assisted design and control of UWBG power devices and converters
- Advanced UWBG materials (Ga_2O_3, diamond) and thermal management
- AI-based health monitoring and lifetime prediction
- Photonic sensing, isolation, and communication for power electronics
- Optically coupled gate drivers and high-bandwidth feedback systems
- Cyber-physical security of intelligent and networked converters
- Secure-by-design architectures (hardware roots of trust, encryption, AI robustness)
- Blockchain and distributed energy security at the converter/system level
- Co-design of materials, devices, circuits, control, and security
- Applications: smart grids, data centers, transportation, aerospace

Timeline for Authors

All the instructions for paper submission are available on the conference website. Please visit www.iecon2026.org or scan the QR code for the timeline.