

Call for Papers for the Special Session on

NEXT-GENERATION WIDE-BANDGAP POWER ELECTRONICS: ANALYSIS, DESIGN, AND FAULT MANAGEMENT FOR ELECTRIFIED TRANSPORTATION AND RENEWABLE ENERGY

Organized and co-chaired by

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Technical Outline of the Session and Topics

Next-generation wide-bandgap (WBG) power electronics using SiC and GaN devices are key enablers for efficient, compact, and reliable electrified transportation and renewable energy systems. This theme emphasizes rigorous analysis, advanced design methodologies, and robust fault management strategies for high-power-density converters, fast chargers, energy storage interfaces, and grid-interactive inverters. It highlights how WBG devices, innovative converter topologies, and grid-supporting inverter features collectively enable compliance with emerging grid codes, inertia support requirements, and system interoperability. While several converter concepts are well established, the theme places stronger focus on next-generation challenges, including thermal–electromagnetic co-design, reliability under high-stress operation, and fault diagnosis in complex, interconnected systems. The role of AI and digital control is explored with attention to validation, scalability, and readiness for real-world deployment. By strengthening the link between power electronics and system-level operation, this theme aims to encourage high-quality contributions that address both fundamental advancements and practical implementation issues in future electric mobility and clean energy infrastructures.

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

- Analysis and modeling of SiC and GaN wide-bandgap power devices
- Design of high-efficiency WBG-based power electronic converters
- Power electronics for electric vehicles and fast-charging infrastructure
- High-power fast charging systems and bidirectional V2G technologies
- High-frequency, high-power-density converter topology design
- Multilevel and modular converters for high-power applications
- Power electronics interfaces for battery energy storage systems (BESS)
- Grid-forming and grid-supporting inverter analysis for renewables
- MPPT design and module-level power electronics for solar PV
- Power electronics in AC/DC microgrids and hybrid energy systems
- Digital, AI-based, and predictive control strategies for converters
- Thermal analysis, advanced packaging, and reliability of WBG systems
- Fault detection, protection, and fault-tolerant converter design
- Integration of electrified transportation with smart grids and wind energy
- Emerging applications including hydrogen energy systems and standards

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.

