



1st international Conference on Power Electronics Converters for Transportation and Energy Applications (PECTEA-2025)

18th – 21st June 2025, School of Electrical and Computer Sciences, IIT Bhubaneswar, Jatni, Odisha, India



Special Session-1 (SS-1)

Title of the Proposal: Modelling, Analysis and Control of Wide Bandgap Device based Power Electronic Converter systems

Technical Outline of the Session:

Fast-switching power semiconductor devices are crucial for enhancing the efficiency and reducing the size of power electronic systems. Wide Band-Gap (WBG) devices, like Silicon Carbide (SiC) and Gallium Nitride (GaN), offer significant advantages over traditional silicon devices, such as higher efficiency and switching frequencies, lower switching loss, operating at greater power density and temperatures. These benefits make WBG-based converters ideal for applications in transportation, renewable energy integration, aerospace, smart cities and consumer electronics. To fully realize aforesaid advantages, sophisticated gate controller designs, advanced printed circuit boards with reduced parasitic effects, and careful thermal management are necessary to handle WBG devices' unique characteristics. Additionally, novel converter topologies are emerging to leverage the high-frequency and power density capabilities of WBG devices, further improving system performance. Improved pulse width modulation (PWM) is essential for high-frequency converters to mitigate challenges like electromagnetic interference and resonance. Planar inductors and capacitors also play a key role in minimizing parasitic effects and regulating temperature, ensuring reliability in compact systems. This session invites authors to present technological advancements in WBG device-based power electronic converter systems, highlighting innovations in converter topologies.

Topics of Session:

- Advancement in gate drivers for SiC and GaN based devices
- High frequency device based power converter topologies
- Design and development of Planar inductor and capacitor technologies for high-frequency power converters
- Analysis and Control Techniques for WBG based Power Converters
- Trends in thermal management and packaging of high frequency converters

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