9th International Conference on Clean Electrical Power

Special Session on

Exploring Wide Bandgap Solutions in Power Electronics Applications for Renewable Energy Systems

The integration of Wide Bandgap semiconductors, specifically Gallium Nitride (GaN) and Silicon Carbide (SiC), is poised to redefine the landscape of future power converters. These materials exhibit exceptional electrical and thermal properties, allowing for higher switching frequencies, reduced energy losses, and improved thermal management compared to conventional silicon devices. Key advantages such as higher breakdown voltages, lower on-resistances, and the ability to operate at elevated temperatures enable more compact and lightweight designs, thus promoting energy efficiency and reducing system costs. Despite these advantages, challenges such as manufacturing complexities, reliability concerns, and cost factors must be addressed to accelerate the widespread adoption of these materials in power converter applications.

In this context, this Special Session focuses on innovative contributions related to the design of power converters, control strategies, and thermal management techniques that enhance performance. Furthermore, the session will also explore the role of GaN and SiC in facilitating sustainable energy solutions and their potential impact on the future architectures of power grids.

Topics of interest for publication include, but are not limited to:

- Power Converters and Wide-Bandgap Devices for Renewable Energy Applications and Storage Systems.
- DC-DC Converters for Photovoltaic System.
- DC-AC and AC-DC Power Converters for Renewable Energy Systems.
- Matrix Converters for Grid Connection.
- Multilevel Power Converters for Wind Turbines and Photovoltaic Systems.
- Control Strategies for Power Converters.
- Thermal Management Analysis of Power Converters.
- Reliability Enhancements and Diagnostic Analysis of Wide-Bandgap Converters.
- Electromagnetic Compatibility of Integrating Wide-Bandgap Device.
- Economic and Environmental Impact of Wide-Bandgap Devices.

This special session is organized by:

Salvatore Foti, University of Messina, Italy – sfoti@unime.it
Luca Vancini, University of Bologna, Italy – luca.vancini4@unibo.it
Maurice Apap, University of Malta, Malta – maurice.apap@um.edu.mt
Luigi Danilo Tornello, University of Catania, Italy – luigi.tornello@unict.it