TOPICS OF INTEREST

1. Power Semiconductors
1.1 Si IGBTs, High-Power Bipolar Semiconductors
1.2 Si MOSFETs
1.3 Smart Power ICs
1.4 SiC Devices
1.5 GaN Devices
1.6 Hybrid Switches
1.7 Novel and Advanced Semiconductor Devices

2. Thermal Management
2.1 Novel Materials for Thermal Management
2.2 Thermal Management Performance Verification and Measurements
2.3 Advanced Cooling Systems
2.4 Thermal Modelling and Simulations

3. Packaging and Interconnection Materials
3.1 Encapsulation Material
3.2 High Temperature Materials
3.3 Die Attach Materials
3.4 Active Area Interconnection Materials
3.5 Substrate Materials
3.6 Heat Spreaders
3.7 Material Characterization and Modelling
3.8 Heterogeneous Integration
3.9 Advanced Flip-chip Copper Pillar Packaging
3.10 3D Packaging Technologies

4. Packaging Reliability
4.1 High Power Density Designs
4.2 Integration Technologies
4.3 Power Electronic Components Reliability
4.4 Stress Monitoring
4.5 Lifetime Predictions
4.6 Advanced PCB Design for High-Density High-Performance Converters

5. Design and Control of Power Converters
5.1 Control Methods for Power Electronic Converters
5.2 Advanced Digital Control Algorithms
5.3 Pulse Width Modulation Methods
5.4 Intelligent Gate Drive Units
5.5 Intelligent Power Modules
5.6 Control ICs, FPGAs, ASICs and their Applications
5.7 Micro Controllers, DSPs and their Applications

6. Low Power Electronics Convertors

6.1 Switched Mode Power Supplies
6.2 DC-DC Hard- and Soft-Switched Converters
6.3 AC-DC and DC-AC Converters
6.4 EMI/EMC in Power Electronics
6.5 Lighting Systems
6.6 Power Electronics for Physics and Accelerators
6.7 Wireless Charging and Wireless Power Transfer
6.8 Powering AI Data Centres – Challenges & Opportunities

7. High Power Electronic Converters

7.1 Solid State Transformers
7.2 DC-DC Hard- and Soft-Switched Converters
7.3 AC-DC and DC-AC Converters
7.4 AC-AC, Cyclo- and Matrix Converters
7.5 Medium Voltage Converters
7.6 HVDC Systems
7.7 FACTS
7.8 Solid State Breakers

8. High Frequency Power Electronic Converters and Inverters

8.1 Power Electronics for E-Mobility
8.2 EV Trends (2/3/4 Wheelers and Commercial Vehicles)
8.3 Power Electronics for Railway Applications
8.4 Power Electronics for Aerospace Applications
8.5 Power Electronics for Marine Applications
8.6 Transportation Infrastructure Related Solutions
8.7 Charging Stations Technologies
8.8 Drives for Hybrid and Electric Cars

9. Motors and Actuators

9.1 Design Optimization
9.2 High Performance Motors
9.3 Advanced Actuator Technologies and Principles
9.4 FEM Modelling and Simulations
9.5 Novel Materials for Actuators
9.6 Special Magnetic Devices

10. Control Techniques in Electrical Drives

10.1 System Modelling and Simulations
10.2 Estimation and Identification Techniques
10.3 New Control Methods
10.4 Servo and Step Positioning Systems
10.5 High Performance Intelligent Drives
10.6 Sensorless Drives
10.7 Actuator Specific Control Techniques

11. Motion Control and Drives in Automation

11.1 Mechatronic systems
11.2 Servo and Variable Speed Drives Applications
11.3 Embedded Control and Integration
11.4 Drives and Motion Control for Specific Applications
11.5 Control of Multi-Axis Decentralized Drive Systems
11.6 Functional Safety

12. Motion Control and Drives in Automation

12.1 Home Appliances
12.2 Small Power Motor “General Purpose Drive” with Highly Sophisticated
12.3 Control Strategies and Low-Cost Solutions
12.4 New Converter/Inverter Types for Single- and Three Phase Systems
12.5 Advanced Motor Concepts for Industrial Application and Traction Drives
12.6 New Control Architectures DSP, Microcontroller or FPGA
12.7 Advanced Sensor Concepts for Motor Drives
12.8 Intelligent Motion Control and Architecture

13. New and Renewable Energy Systems

13.1 Wind Energy Systems
13.2 Solar and Photovoltaic Energy Systems
13.3 Hydro and Wave Power Plants
13.4 Hydrogen Energy Systems
13.5 Geothermal Energy Systems
13.6 Heat Pumps
13.7 Sustainable Energy Systems and Sector Coupling
13.8 Emerging Energy Landscape: DC Generation, Distribution, and Utilization

14. Energy Storage Systems

14.1 Battery and Storage Technologies
14.2 Battery Management Systems
14.3 Safety Solutions
14.4 Mechatronic Design and Cooling Concepts
14.5 Charging Strategies
14.6 Battery Characterization

15. Smart Grid Technologies

15.1 Smart Grids
15.2 Cybersecurity Technologies in Power Electronics Systems
15.3 Cognitive and Smart Drives
15.4 IIoT
15.5 Micro Grids, E-LANs (Energy networks) and IoE (Internet of Energy)
15.6 Communication and Cybersecurity for Electric Cars

15.7 DC Grids
15.8 Grid Stability and Resilience

16. Power Quality and EMC
16.1 Power Quality Problems and Mitigation Techniques
16.2 Power Quality Standards
16.3 Power Factor Correction Methods and Technologies
16.4 UPS and Active Filters
16.5 Smart Metering, Diagnostics and Condition Monitoring
16.6 Power Quality Indices
16.7 Measurement Techniques, Methods and Equipment
16.8 Electromagnetic Compatibility and Immunity

17. Design Tools Including ML & AI
17.1 Modelling and Simulation of Power Electronic Components and Systems
17.2 Design Optimization Methods and Tools
17.3 Virtual Prototyping
17.4 Rapid Prototyping Tool and Methods
17.5 Digital Twinning
17.6 Design Automation
17.7: AI Supported Design

18. Transducers and Sensors
18.1 Voltage and Current Sensors
18.2 Motion and Actuation Sensors
18.3 Thermal Measurement Devices
18.4 Measurement Techniques and Methods
18.5 Renewable Energy System Sensors
18.6 High Frequency Measurement Techniques and Sensors
18.7: Embedded Digital Signal Processing for Sensors

19. Passive Components
19.1 Capacitors and Supercapacitors
19.2 Inductors and Transformers
19.3 Magnetic Materials
19.4 Resistors, Varistors, Thermistors
19.5 Fuses
19.6 Dielectric and Insulation Materials
19.7 Connectors and Interface Technologies

20. System Reliability
20.1 Reliability and Availability of Power Electronics Systems
20.2 Fail-Safe and Fault-Tolerant Applications
20.3 Redundancy Concepts in Power Electronics
20.4 Life Cycle Cost Analysis
20.5 Condition and Health Monitoring

21. Resources Availability and Sustainability
21.1 Design for Circular Economy
21.2 Reuse, Repair, Refurbishment and Recycling
21.3 Second Life Applications
21.4 Design for Environmental Compatibility
21.5 Investment by Industry in R&D Centres

22. Power Electronics in Transmission Systems
22.1FACTS
22.2 Converters for Offshore/Onshore HVDC Links
22.3 Power Generation, Transmission and Distribution
22.4 DC Grids
22.5 HVDC Systems
22.6 Digital Twin for Transmission Equipment

23. AI in Power, Energy, and Renewable Systems
23.1 Smart Grid Management and Load Balancing using AI
23.2 Intelligent Fault Detection, Diagnostics, and Predictive Maintenance of Electrical Infrastructure
23.3 Intelligent control of battery energy storage systems in Renewable Energy
23.4 AI for classification of power failure probability in Quality Monitoring

24. AI in Machines, Drives, Power Electronics, and EV Systems
24.1 Machine Learning and AI for fault diagnosis & predictive maintenance in Electrical Machines and Drives
24.2 AI-based control of DC-DC and AC-AC Converters and Inverter design
24.3 Fault detection and predictive thermal management in power electronic circuits and modules
24.4 AI-optimized switching strategies to reduce harmonics
24.5 Smart charging infrastructure and load management for EV systems using AI
24.6 Battery State of Health (SoH) and State of Charge (SoC) prediction and powertrain optimization

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