Call for Papers
IEEE Journal of Emerging and Selected Topics in Power Electronics

Special Issue on: Failure Mechanisms, Fault Characterization and Condition Monitoring of Power Electronics Components and Systems

In today's world, power electronics and energy conversion systems play a crucial role in enabling electrification of transportation, modern integrated grid and renewable energy systems to name a few. These systems are often subjected to mechanical and electrical stresses, temperature swings, and vibration that contribute to increased equipment failures, where failed components cause unexpected interruptions, serious safety issues, or significant operational losses. In order to overcome these issues, active fault prognostics and health management techniques have been gaining interest lately. These techniques involve comprehensive understanding of failure mechanisms/modes obtained by accelerated aging tests, multi-physics modelling and physics-of-failure analyses. Based on the identified failure precursors from these analyses, online/in-situ condition monitoring and early warning tools are developed for various components and systems. Data sets obtained by monitoring tools can be used to update the lifetime prediction algorithms and actively predict failures. Moreover, these steps are essential for training and data processing in AI and ML techniques which can potentially leverage PHM solutions. Finally, research in various active life extension and health management techniques is of particular interest for power converters.

This Special Issue aims to integrate the knowledge base on failure mechanisms, fault characterization and condition monitoring of power electronics components (such as WBG and Si devices, passive / magnetic components, batteries, sensors etc.) and converters. Prospective authors are invited to submit experimentally justified original contributions, survey papers, or tutorials for review for publication in this Special Issue. Topics of interest include, but are not limited to:

- Physics-of-failure, failure mechanism and failure modes
- Advancements in semiconductor and packaging reliability
- Accelerated aging techniques and setup architectures
- Identification and characterization of fault precursors
- Component degradation modelling – FEM, TCAD tools
- Smart gate drivers/plug-in circuits for condition monitoring
- System level condition monitoring solutions

- Fault diagnosis and failure prognosis tools
- Lifetime modelling and RUL estimation tools
- Data analytics and information fusion for condition monitoring
- Artificial intelligence and machine learning assisted solutions for fault detection, diagnosis and prognosis
- Data-light and computationally light machine learning tools
- Life extension techniques

All manuscripts must be submitted through http://mc.manuscriptcentral.com/jestpe-ieee. Submissions must be clearly marked "Special Issue on Failure Mechanisms, Fault Characterization and Condition Monitoring of Power Electronics Components and Systems" on the cover page in the "Special Issue" list. Refer to http://www.pels.org for general information about submission through Manuscript Central. Manuscripts submitted for the special issue will be reviewed separately and handled by the guest editorial board noted below.

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Proposed Timeline:

- November 1, 2020 — Call for Papers to IEEE JESTPE Editorial Office and Newsletter
- April 30, 2021 — Manuscripts Submission Deadline
- August 30, 2021 — Final Acceptance Notification
- September 30, 2021 — Manuscripts Forwarded to IEEE for Publication
- October 2021 — Special Issue Appears in IEEE JESTPE