First call for special session papers

Special Session on

Safety of Li-ion batteries: thermal runaway, risk mitigation, fault detection and predictive diagnostics

SS10 at ELECTRIMACS 2019

Special session organizers

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Special session theme

Li-ion batteries (LIBs) technology is widely adopted, from large-scale applications (e.g. utility use case, e-mobility) to small-scale applications (e.g. portable devices, mobile phones, and e-cigarettes). Passing from single cells to modules and packs, failure modes become increasingly complex, and their potential damage can be huge (e.g. vehicle burn down) and difficult to address. Thermal, mechanical or electrical abuse may develop into thermal runaway, which is the most safety-critical failure mode of battery cells. There are many causes that can trigger battery thermal runaway: overcharge, overheat, short circuit. Failures that can lead to thermal runaway can be classified into external to the cell (e.g. external short circuit, external fire, overcharge, crush) or internal to the cell (e.g. dendrites, manufacturing defects). Of all the possible scenarios, the presence of manufacturing defects is by far the most worrying. In fact, they cannot be predicted, nor intercepted by current battery management systems (BMS). Therefore, the identification and adoption of innovative procedures and technologies to predict and mitigate this type of phenomena is essential for large utilities in order to reduce the operation and maintenance costs of assets such as BESSs (Battery Energy Storage Systems).

This special session is aimed at presenting the latest advances and developments in fields such as: data-driven and rule-based algorithms for real-time predictive diagnostics, anomaly/fault detection, capacity degradation estimation, thermal runaway characterization, prediction and detection, techniques for risk mitigation and increased safety of LIBs.

Topics of interest

Topics of interests include, but are not limited to:

- Innovative control systems for large scale BESSs based on statistical and AI techniques applied to detect potential critical events (thermal runaway)
- Machine learning data analytics to enable storage plant predictive maintenance capabilities
- Predictive diagnostic algorithms for evaluation of critical scenarios precursors (predictive diagnostic, anomaly/fault detection)
- Characterization of thermal runaway and related triggers; techniques to mitigate the risk of thermal runaway and thermal propagation
- Data-driven and rule-based algorithms for the estimation of capacity derating of large scale BESSs
- Non-intrusive external or internal sensors and measurement devices for real-time State of Health estimation for large scale BESSs

IMPORTANT DATES (see updates on ELECTRIMACS 2019 website)

The submission system is open!

Deadline for special session papers	**see ELECTRIMACS 2019 website**
Notification of acceptance	1st March 2019
Final paper submission and registration	1st April 2019

ELECTRIMACS 2019 PUBLICATIONS (see updates on ELECTRIMACS 2019 website)

• a **special issue of MATCOM**–Transactions of IMACS Mathematics and Computers in Simulation (Elsevier journal, SCOPUS and WOS indexed);

• a **Springer book in the series *Lecture Notes in Electrical Engineering***. Each paper, appearing as a book chapter, will be also online available (with DOI). The book will be sent for indexing to the major scientific databases, such as Scopus and WoS.