Special Issue

Recent Advances in Battery Measurement and Management Systems

Message from the Guest Editors

Rechargeable batteries are now ubiquitous in advanced technological applications, ranging from grid energy storage and electric vehicles, wireless sensor networks, and the Internet of Things to portable electronics, particularly smartphones and laptops. In this context, internal state measurement and analysis, as well as automated battery management, are critical tools used for the proper operation of various applications. Of particular use is the capability to estimate the state of charge (SOC), state of health (SOH), and remaining useful life (RUL) of batteries in run time. Electrochemical methods are paradigmatically used for the purpose, while a variety of machine learning techniques have also been applied in recent years. Battery modeling using equivalent circuits also provides useful information in simulation and testing, as well as for internal state analysis and fault detection. These information sources converge in the recently defined concept of battery passports, intended to be a standard and complete digital representation of the battery during its whole lifecycle, in turn providing comprehensive knowledge for effective management and maintenance.

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