Guidelines for the characterization of the internal impedance of lithium-ion batteries in PHM algorithms

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© 2018, Prognostics and Health Management Society. All rights reserved. This article aims to describe the most important aspects to consider when using the concept of internal impedance in algorithms that focus on characterizing the degradation of lithium-ion (Li-ion) batteries. The first part of the article provides a literature review that will help the reader understand the concept of electrochemical impedance spectroscopy (EIS) and how Li-ion batteries can be represented through electrochemical or empirical models, in order to interpret the outcome of typical discharge and/or degradation tests on Li-ion batteries. The second part of the manuscript shows the obtained results of an accelerated degradation experiment performed under controlled conditions on a Li-ion cell. Results show that changes observed on the EIS test can be linked to battery degradation. This knowledge may be of great value when implementing algorithms aimed to predict the End-of-Life (EoL) of the battery in term