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Developing, testing and analyzing new Li-Ion battery solutions using an integrated R&D infrastructure

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The work focuses on the development of lithium-ion battery in the new battery R&D production line from Rom-EST Centre of the National R&D Institute for Cryogenics and Isotopic Technologies - ICSI Rm., Valcea, the first and the only facility in Romania, capable of fabricating the industry standard 18650 lithium-ion cells, customized pouch cells and CR2032 coin cells. Among the objectives of this work are the presentations both theoretical and experimental results regarding setting new electrodes recipes, mainly, for LTO and NMC chemistry, the use of different binders, charging and discharging processes testing performances at different current density: 0.1, 0.2, 0.5, 0.8 and 1.0 C, thermal behavior analysis of lithium-ion batteries for EV, a life cycle assessment for the NMC technology and a comparison with other types of technologies available on the market with the main objective in identifying and demonstrating battery chemistry with higher energy densities and improved safety. Technical characteristics of Li-Ion batteries are closely related to the economic ones, and for the final user is less important the cost of a single cell and especially the cost per functional unit (e.g. the cost of storing a kWh of electricity). So in the end beside the development and testing batteries analysis study of the various solutions available in a comparative way, highlighting the evolution of the price of Li-ion battery storage in recent years, as well as the different scenarios of price developments in the coming years will be also presented.

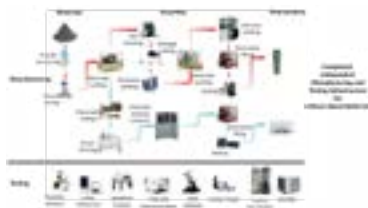


Figure 1: Completely independent manufacturing and testing infrastructure for Lithium based batteries.

Recent Publications

1. Mihaela Buga, Constantin Bubulinca, Silviu Badea, Alexandru Rizoioiu, Enache Stanica, Mihai Balan, Alexandru Ciocan, Mihai Varlam (2018) Study of LiFePO₄ electrode morphology for Li-ion battery performance. *Revista de Chimie* 69(3):549-552
2. Alexandru Ciocan, Ovidiu Mihai Balan, Mihaela Buga, Tudor Prisecaru, Mohand Tazerout (2017) Modeling an energy storage system based on a hybrid renewable energy system in stand-alone applications, *Revista de Chimie* (68), No. 11. ISSN 0034-7752
3. Alexandru Ciocan, Mihai Balan, Mihaela Pislaru, Alexandru Rizoioiu and Andrei Constantin (2017) A hybrid energy storage system and control strategy for stand-alone applications using renewable energy sources, *Progress of Cryogenics and Isotopes Separation* volume 20, ISSN 1582-2575.
4. Mihaela Buga, Radu Ene, Alin Chitu, Alexandru Rizoioiu and Mihai Balan (2017) Behind the practical challenges of lithium-ion cell manufacturing process at ROM-EST. *Progress of Cryogenics and Isotopes Separation* 20(2):87-98.
5. Mihai Balan, Adrian Badea, Mihaela Buga and Alexandru Ciocan (2016) Power-to-Gas: development of analysis framework based on a Romanian case study. *UPB Scientific Bulletin, Series C* ISSN 2286-3540.

Biography

Alexandru Ciocan is a Young Researcher with a Master's degree in Power Engineering that has been part of the National R&D Institute for Cryogenics and Isotopic Technologies - ICSI Rm. Valcea starting with 2012. At the end of 2017 he defended his PhD thesis at IMT-Atlantique, France. His PhD topic and also his research activity are focused on the integration of renewable energy sources with various energy storage technologies, including Li-Ion batteries or hydrogen based technologies.

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