

PROJECT

SMART-LIC

Smart and Compact Battery Management System Module for Integration into Lithium-Ion Cell for Fully Electric Vehicles

Funding: European (7th RTD Framework Programme)

Duration: May 2011 - Oct 2014

Status: Complete with results

Total project cost: €5,834,680

EU contribution: €3,474,316



Call for proposal: FP7-2011-ICT-GC

[CORDIS RCN : 99513](#)

Background & policy context:

The project has officially started during the May 1st 2012 and has an intensive communication with regular meetings.

The SMART-LIC project has very ambitious targets like integrating the battery management system (BMS) in a single battery cell (or module) as well as develop accurate state of health (SoH) indicator based on an integrated electrochemical impedance spectroscopy (EIS) and this with a “radical overall cost reduction”. This should increase precision, lower system complexity (reduced wiring), increase reliability and result in radical total cost of ownership (TCO) reduction.

Impedance measurements is highlighted as it will be implemented on a vehicle. It will be a breakthrough if the validity of the SoH measurements is confirmed. There are currently no large deviations against the workplan.

The project is making good progress. The intermediate results presented during the review meeting clearly demonstrated the level of activities performed in the first year of the project.

Objectives:

Smart & Compact Battery Management System Module for Integration into Lithium-Ion Cell for Fully Electric Vehicles SMART-LIC addresses the development of a new Battery Management System concept aiming at:

- Lower system complexity by a radical reduction of wiring and connectors cause of EMF emissions and major source of malfunctions - Higher efficiency of the battery packs because of the local control
- Increased overall reliability and safety such that early determination of irregularities and failures of the actual battery cells is possible and not impaired by defects in wiring connectors and remote electronics
- Increased flexibility of the overall energy-power routing such to assure that all cells could perform at their maximum rating independently from the rating of the others.
- Radical overall cost reduction of the overall BMS because of reduced cabling and connectors as well as simplification of the electronics
- Increased precision in determining the states of charge, of health, and of function of the individual cells and of the entire battery by applying a new battery model based on electrochemical impedance spectroscopy (EIS)
- Reduced maintenance of the battery packs assured by the monitoring of the single cell (macrocell) with the possibility to switch it off from the rest of the pack.
- Reduced cost of ownership for the end user due a significant increase in battery lifetime caused by the

improved management on cell level.

Methodology:

The ambitious objectives are obtained by realizing the BMS module as a system-in-package (SiP) directly integrated into the lithium-ion cell for fully electric vehicles by using advanced packaging technologies. Early demonstration of the technology will be made by preparing specific battery packs to be installed both on a commercially electrified vehicle and on a FEV of new concepts.

Parent Programmes:

[FP7-ICT - Information and Communication Technologies](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Stmicroelectronics S.a.

Address:

BOULEVARD ROMAIN ROLLAND 29
92120 MONTRouGE
France

Organisation Website:

<http://www.st.com>

EU Contribution: €346,194

Partner Organisations:

Arcotronics

Address:

VIA SAN LORENZO 19
40037 SASSO MARCONI
Italy

Organisation Website:

<http://www.arcotronics.com>

EU Contribution: €235,691

Conti Temic Microelectronic GmbH

Address:

Sieboldstrasse 19
90411 NUERRNBERG
Germany

Organisation Website:

<http://www.continental-corporation.com>

EU Contribution: €470,000

Centro Ricerche Fiat - Societa Consortile Per Azioni

Address:

Strada Torino, 50
10043 ORBASSANO (TO)
Italy

Organisation Website:

<http://www.crf.it>

EU Contribution: €310,127

Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.v.

Address:

Hansastrasse 27C
80686 MUNCHEN
Germany

Organisation Website:

<http://www.fhg.de>

EU Contribution: €580,351

Micro-Vett Spa

Address:

Via Gambellara
40026 Imola
Italy

Organisation Website:

<http://www.micro-vett.it>

EU Contribution: €69,890

Technische Universitaet Chemnitz

Address:

STRASSE DER NATIONEN 62
09111 CHEMNITZ
Germany

Organisation Website:

<http://www.tu-chemnitz.de>

EU Contribution: €250,002

Berliner Nanotest Und Design Gmbh

Address:

Volmerstrasse 7 B
12489 Berlin
Germany

Organisation Website:

<http://www.nanotest.eu>

EU Contribution: €138,150

Stmicroelectronics Srl

Address:

VIA C.OLIVETTI 2
20864 AGRATE BRIANZA
Italy

Organisation Website:

<http://www.st.com>

EU Contribution: €606,711

Manz Italy Srl**Address:**

Via San Lorenzo 19
40037 Sasso Marconi
Italy

EU Contribution: €117,774

Stmicroelectronics Application Gmbh**Address:**

Werner Von Siemens Ring 3-5
85630 Grasbrunn
Germany

EU Contribution: €349,426

Technologies:

Electric vehicle batteries (and energy management)
Battery management system module

Development phase: Research/Invention

Key Results:

Work progress and achievements

- Achievement of the deliverable 1.1 "Report detailing system specification and requirements" related to Work Package 1 (WP1).
- Identification of the state of the art and suitable actions especially for the BMS
- Identification of the potential sources of failure
- Consortium about the wireless technology to adopt for the communication
- Integration of the standard automotive concerning safety requirements
- First phase of R&D work dissemination of the project Smart-LIC in the context of the standardization by STMicroelectronics.
- A website for the promotion of Smart-LIC and exchange of information within the consortium is available at www.smart-lic.com. The theme of the website is reflected in a printed folder and a PowerPoint slide show.
- Consortium Agreement signed
- Project communication set up
- Web-Site(s) done / progressing
- Several presentations to public done
- Project progress and expenses in line with initial plan

Plus/minus points:

- No significant changes in planning/results
- Communication very well in the consortium
- High motivation of partners
- Smart-LIC electronics still expensive - optimization ongoing
- Added values of new technologies integration

Expected final results

- Reduced cost of ownership of traction batteries in e-mobility usage

Documents:

 [SMART-LIC Deliverable 1.1 \(Other project deliverable\)](#)

Transport

STRIA Roadmaps: electrification

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Environmental/Emissions aspects

Geo-spatial type: Other