MARS-EV Project Newsletter

MARS-EV Project Strategy

Materials for Ageing Resistant High Energy Li-ion Energy Storage for the Electric Vehicle

- Development of materials: High energy electrode materials; Safe electrolyte systems with improved cycle-life; Sustainable scale-up synthesis
- Ageing and life cycle modelling and assessment: Industrial scale prototype cell assembly; Modelling ageing behaviour; Full life cycle assessment

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MARS-EV high energy cell design and production

Design, manufacturing and validation of Li-ion pouch cells. The final objective is to define an ageing-resistant product with increased performance (high energy) in combination with high safety, recyclability and eco-compatibility.

Aims:

• To optimise and scale-up electrode formulation and fabrication for improved cell performance.
• To integrate selected best electrolyte composition (liquid or solid polymer) into the cell assembly process.
• To develop a new generation of cellulose-based packaging with moisture and oxygen barrier properties for Li-ion pouch cells that would overcome the drawbacks of polymer/aluminium foils.
• To develop sustainable Li-ion pouch cells from small (≥500cm²; 1Ah) concept cell up to automotive size cells (≥2000cm²; ≥20Ah) validated with high energy density (≥250Wh/kg), capacity retention ≥ 80% upon 4,000 cycles at 80% DOD.

Cell Target: 250Wh/kg 3000 cycles at 100% DOD

The 228th ECS Meeting (Phoenix, USA, October 11-16, 2015)

The Fall meeting of the Electrochemical Society brings together researchers in several electrochemical fields and applications, with several parallel symposia.

J.R. Nair, researcher at POLITO, presented and Oral Contribution on work performed in MARS-EV on polymer electrolytes.

"Towards aging resistant lithium polymer batteries for wide temperature applications “
J.R. Nair, L. Porcarelli, F. Bella, F. Colò, G. Meligrana, C. Gerbaldi

EEVC-2015, EU Project Day on eMobility (Brussels, December 1, 2015)

Within the EEVC-2015, an EU Projects Day is organised to present outcomes of EU and National funded projects. This year, Oscar Miguel, Business Developer at IK4-CIDETEC, attended the event to present GRENNLION (recently closed) and ongoing results of MARS-EV.

ORAL—Presentation on MARS-EV result at M24

Fall 2015 MRS meeting (Boston, December, 2015)

Professor Emanuel Peled, from Tel-Aviv University, was invited to present a talk on their current work on Silicon-based anodes, partially carried out within MARS-EV.

Oral – invited speaker Emanuel Peled:

“Growth of SEI on High Performance 3D Si Nanoparticles and Si Nanowires Based Anodes During Cycling “
M30 Progress Meeting

Grenoble, France, March 17-18, 2016

The fifth technical progress meeting of MARS-EV took place in Grenoble on March 17-18, hosted by CTP (Centre Technique du Papier).

The first day the partners presented the work carried out on the last semester on the cell materials development, i.e. high voltage cathodes, silicon-based anodes and new stable electrolyte formulations, including solid polymer electrolytes. Scale-up issues on selected cathode material and change of status of Lithops leading to a request of Amendment with new deadlines was discussed.

On the second half day, cell development, modelling and LCA and recycling were reviewed.

Advanced Battery Power Conference 2016 (Muenster, April 26-27, 2016)

This annual conference is focused on battery materials and technologies brings. Thus has gathered the interest of not only German but many European researchers. This year, 3 contributions from MARS-EV partners (KIT, ISE and CIDETEC/JMBS) have been presented:

**Oral:** “Beneficial effect of sulfur and boron-based electrolyte additives on the cycling stability of a lithium-rich cathode material at high potential”, A. Birrozzi (KIT)

**Poster:** “EV battery ageing study employing experiment design methodology and identifying parameter variation”, M. Oyarbide, J. Forgie, I. Meatza, V. Gentili

**Poster:** “Investigation of degradation mechanism of lithium ion batteries and State-of-Charge Estimation using Extended Kalman Filtering”, M. Heck, J. Schmitt, M. Vetter, S. Lux

PUBLISHED ARTICLES

L. Porcarelli, C. Gerbaldi, F. Bella, J. R. Nair “Super Soft All-Ethylene Oxide Polymer Electrolyte for Safe All-Solid Lithium Batteries” Scientific Reports 6 (2016) 19892. DOI: 10.1038/srep19892


During the coming September, a symposium on materials for electrochemical energy storage for electric vehicles will be held under MARS-EV project. Said event will be held within the context of the autumn session of the EMRS, European Materials Research Society, and will take place in Warsaw from 19 to 23 September 2016. Symposium N will focus on materials for lithium ion, modelling, life cycle analysis, recycling and post-lithium ion technologies.

The program will feature invited talks (confirmed speakers): Dr. Robert Dominko (Institute of Chemistry, Ljubljana, Slovenia); Prof. Yair Ein-Eli (Dept. of Material Science, Technion, Haifa, Israel); Prof. Steve Greenbaum (Dept of Physics, Hunter College, CUNY, USA); Prof. Wladek Wieczorek (Faculty of Chemistry, Warsaw University of Technology, Poland); Dr. Margret Wohlfahrt-Mehrens (ZSW, Germany); Dr. Dimitrios Zarvalis (Aerosol & Particle Technology Laboratory, CERTH, Thessaloniki, Greece).

Deadline for abstract submission extended to May 30.