Materials for Ageing Resistant lithium ion energy Storage for the Electric Vehicle

“Overcoming the ageing phenomenon in Li-ion batteries”

**PROJECT OUTLINE**

**CATHODE**
- Synthesis routes for new nanosized materials
- Development of new carbon coatings to enable the application of aqueous binders
- Investigation of physico-chemical processes & interfacial phenomena
- Up-scale most promising materials → verifying feasibility of the application of developed product/process

**ANODE**
- Low-cost, high-capacity nanosized silicon-based and metal ferrite anode materials
- Anode protecting coating for long-cycle-life Li-ion battery
- Investigation of ageing mechanisms. Interfacial phenomena and cycle life of cells optimization.
- Scaling-up of candidate anode materials
  Target: 1000 mA/g, 1000 cycles

**ELECTROLYTE**
- Selection of commercial and new additives to enhance the anodic stability of electrolytes
- Synthesis of high purity, anhydrous ionic liquids
- Preparation of solid polymer electrolytes with no-flammability
- Up-scale of most promising materials
  Target: Thermal stability ≥ 150°C
  Ionic conductivity > 10⁻³ S cm⁻¹ (20°C)
  ESW ≥ 4.5 V (vs. Li/Li⁺)

**MODELLING of AGEING**
- Development of a cell model including electrical, thermal and ageing characteristics
- Development of methods for SOH and SOC estimation
- Development of a battery pack model including thermal issues
- Development of a model based control strategy for increasing life time

**LCA & RECYCLE/REUSE**
- Regulatory assessment on Reach and CLP (GHS) aspects.
- Technical/economical/environmental optimization of the product.
- Industrially optimized cells recycling process
- To evaluate the reutilization of different battery components for further uses

**APPROACH**

**FICHE**

**Total budget:** €9.2 M
**EC contribution:** €6.6M

**MARS-EV** is a 4-year Large Scale Collaborative Project within the FP7 leading to the development of high energy electrode materials and safe electrolyte systems with improved cycle-life, sustainable scale-up synthesis, industrial scale prototype cell assembly, modelling ageing behavior and full life cycle assessment.

Call: FP7-2013-GC-MATERIALS

**Topic:** Improved materials for innovative ageing resistant batteries
- Total budget: 9.2 M€
- EC contribution: 6.6M€
- Duration: 01/10/2013 – 01/10/2017

16 partners from 5 member states:
- 7 industries, 4 research centres, 5 universities

**CELL DESIGN & PRODUCTION**
- Optimize/Scaling-up electrode formulation
- Integration of best electrolyte composition into the cell assembly process
- Developing new generation cellulose-based packaging for Li-ion pouch cells
- Developing Li-ion pouch cells from small (>500cm²; 1Ah) cell up to automotive size (20000cm²; >20Ah)

**TARGET**
- 900 Wh/kg
- 3000 cycles at 100% DOD

**1st GEN MATERIALS**
- Life Cycle Assessment & Recycling
- > 10⁶ cycles
- ESW > 4.5 V

**2nd GEN MATERIALS**
- New ageing resistant cells

**NEW AGING RESISTANT CELLS**

**COORDINATOR**
Dr. Oscar Miguel - omiguel@cidetec.es

IK4-CIDETEC - Parque Científico y Tecnológico de Gipuzkoa. Paseo de Miramón 196 - 20009 Donostia - San Sebastián, Spain

**The 27th International Battery, Hybrid and Fuel Cell Electric Vehicle Symposium**
**Barcelona, Spain, November 17-20, 2013**