

STable high-capacity lithium-Air Batteries with Long cycle life for Electric Cars

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Project number : 314508

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MISSION

Electric car is considered as the most promising technical solution for automotive industries in 21st century since the use of electric energy not only slows down the petrol consumption but also contribute to reduce the CO₂ emission and toxic air pollutants.

Due to its good performance, Li-ion battery is generally studied to meet the above demands. However, it is still not satisfactory for long distance use because of its limited energy density. Therefore Li-air batteries have attracted worldwide attentions as an ideal alternative, because their outstanding energy density is extremely high compared to other rechargeable batteries.

In this project, a **multidisciplinary work team in materials** synthesis and characterization, **cell assembly** and test will cooperate to perform a joint research to deliver a **Li-air battery cell for EVs** with high capacity and long cycle life in laboratory scale.

This project focuses on **innovations of battery anode, cathode, electrolyte** materials and technologies, as well as assembly of batteries cells which are crucial on battery performance, cost and environmental impact.

Improvement of lifetime and cyclability of Li-air batteries through finding highly active bifunctional catalysts to effectively regenerate batteries, protecting the Li anode from dendrites formation using suitable membranes and obtaining stable electrolyte with additives to render solubility of Li₂O₂ that cause cathode clogging on cathode will be studied.

Activities will focus especially on 1) optimization of cathode structures; 2) the selection of active catalysts and dehydration membranes; 3) modification of anode structure with necessary protecting layers, additives or surfactants; 4) modification of electrolyte properties. The final aim is to obtain Li-air battery cells with **specific capacity of >2000mAh/g** and an improvement of **cycle life to 100-150 cycles**.

METHODS AND EXPECTED RESULTS

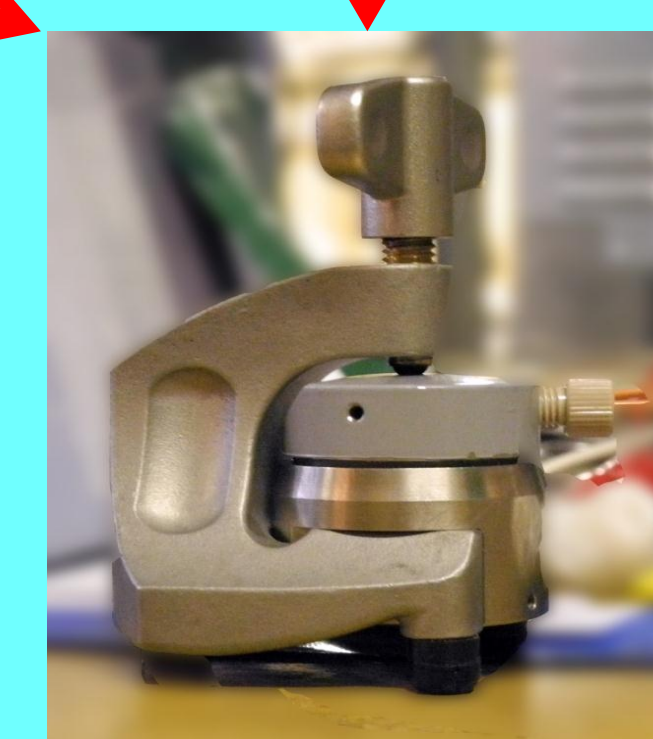
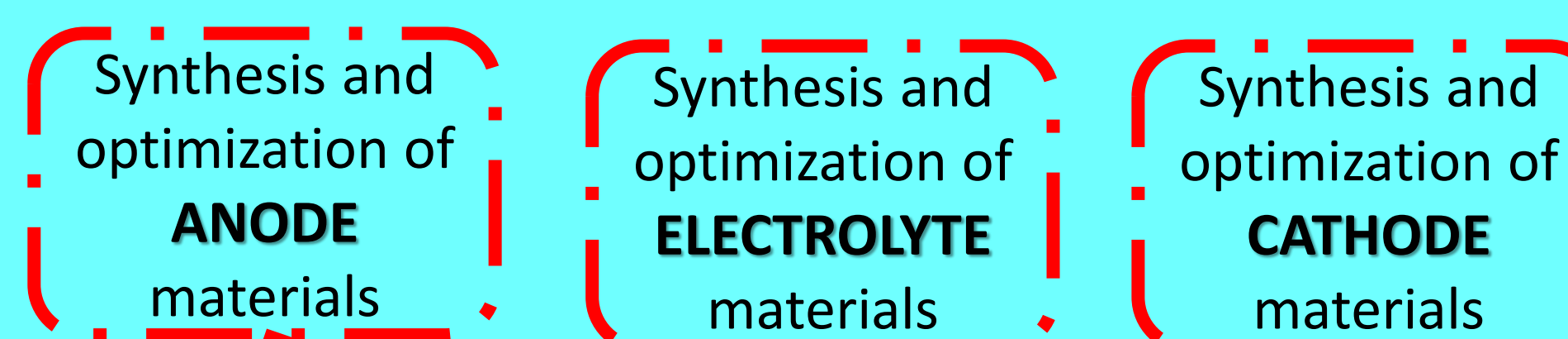
The project will focus on the development of innovative materials and technologies for Li air batteries:

Innovations of battery anode, cathode, electrolyte materials and technologies through: 1) optimization of cathode structures; 2) the selection of active catalysts and dehydration membranes; 3) modification of anode structure with necessary protecting layers, additives or surfactants; 4) optimization of RTIL containing novel electrolyte.

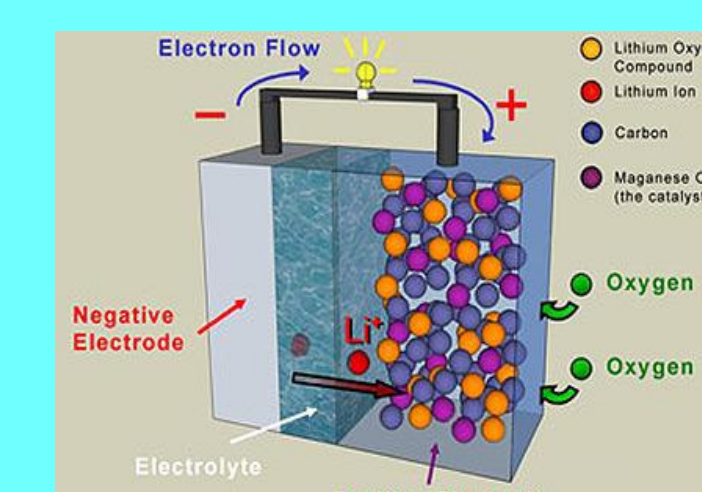
Outcomes from simulation, complete cell assembly and lifetime assessment provide constructive support and feedbacks to the materials and technology studied.

The overall expected outcomes for STABLE is to obtain Li-air battery cells with specific capacity of >2000mAh/g and an improvement of cycle life to 100-150 cycles.

OBJECTIVES AND GENERAL ORGANIZATION











Assembly and optimization of **complete Li-air cell**



Simulation and modeling of Li-air battery, LCA

PARTNERS

Beneficiary	Expertise and roles in the project
POLITECNICO DI TORINO (POLITO) - ITALY 	materials synthesis and characterization, lithium air battery electrochemical measurement, project coordination and management.
ACONDICIONAMIENTO TARRASENSE ASSOCIACION (LEITAT) - SPAIN 	nanomaterials synthesis, surface treatment and cell simulations.
L'UREDERRA, FUNDACION PARA EL DESARROLLO TECNOLÓGICO Y SOCIAL (LUREDERRA) - SPAIN 	nanomaterials synthesis and characterization and fine chemistry.
SWEREA IVF AB (IVF) - SWEDEN 	nanomaterials properties and applications, industry manufacturing: cell assembly and life cycle assessment
UNIVERSITY COLLEGE CORK, NATIONAL UNIVERSITY OF IRELAND, CORK (UCC) - IRELAND 	advanced lithium nanotechnology, cell simulations and assembly.
SAKARYA UNIVERSITESI (SAU) - TURKEY 	nanomaterials development, electrolytic deposition
CELAYA, EMPARANZA Y GALDOS INTERNACIONAL, S.A. (CEG) - SPAIN 	battery manufacturing, technique requirements from market.
ELAPHE, PODJETJE ZA RAZVOJ IN PRODAJO ELEKTRICNIH VOZIL TER ENERGIJSKIH VIROV D.O.O (Elaphe) - SLOVENIA 	prototype production and technique supports.

Coordinator: **Politecnico di Torino**, Italy

Project number: 314508

Start date: 01/09/2012

End date: 31/08/2015

Duration: 36 months

Budget: 3,100,856.60€

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Funding scheme: Collaborative project



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