A New Generation Dual Electrolyte Multi-Cell Lithium Air Flow Battery For Electric Vehicles

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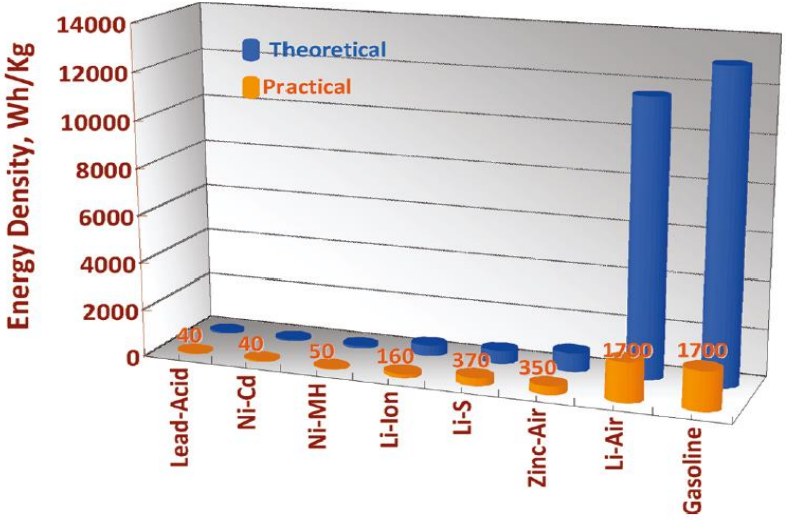
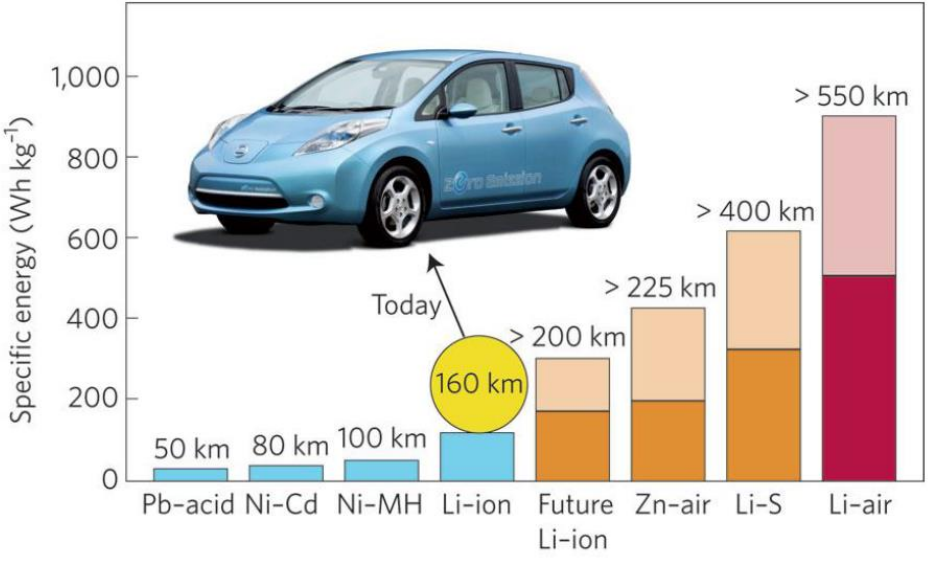
Introduction

To be succeed in the electric vehicles, high energy density batteries need to be produced with low cost and safe. Although lithium ion batteries has been reached a great commercial success to mobile devices, their low energy densities (200 Wh/g) and high cost values are limited them to use in electric vehicles. Even though lithium air batteries have 11.680 Wh/kg theoretical energy density, it can be obtained between 600 Wh/kg-1500Wh/kg energy density in the practical applications





Reasons preventing the use of Li-Air Battery

There are four basic problems encountered in lithium air batteries;

- (1) Li_2O_2 and Li_2O compounds deposited more on the higher oxygen flow places, which cause inhomogeneity distribution of the oxygen and result in clogging of the porous and prevent the passage of oxygen through the cathode. Therefore, the cathode cannot show reaction with its all volume and obtain a low energy density.

- (2) The another reason is that it has not been found an effective catalyst, leading to obtain low energy efficiency and poor cycleability.

- (3) Another problem, since the liquid electrolytes which has low oxygen diffusivity, the lithium air batteries works under low current density cause obtaining low power density
- (4) Li metal anode corrosion

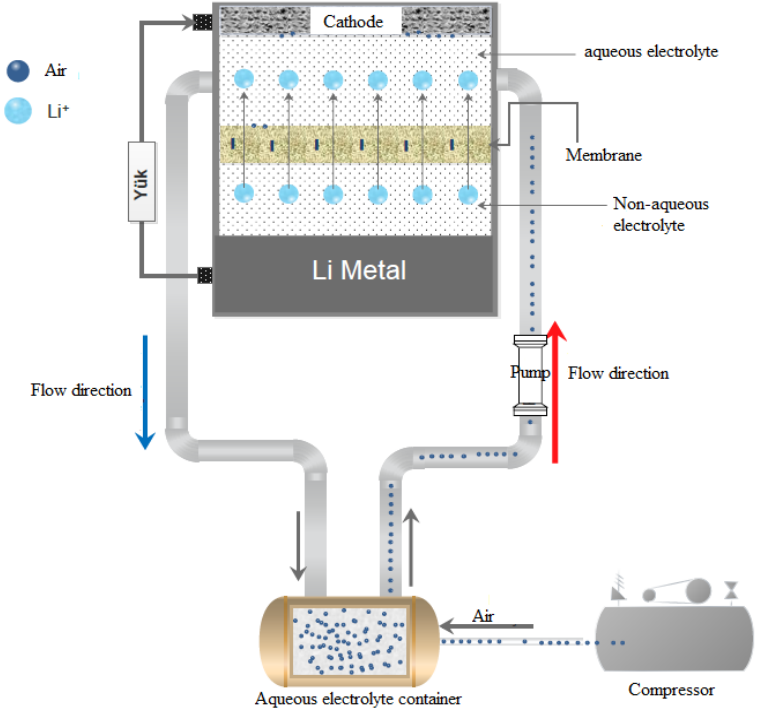
Aim of the Project

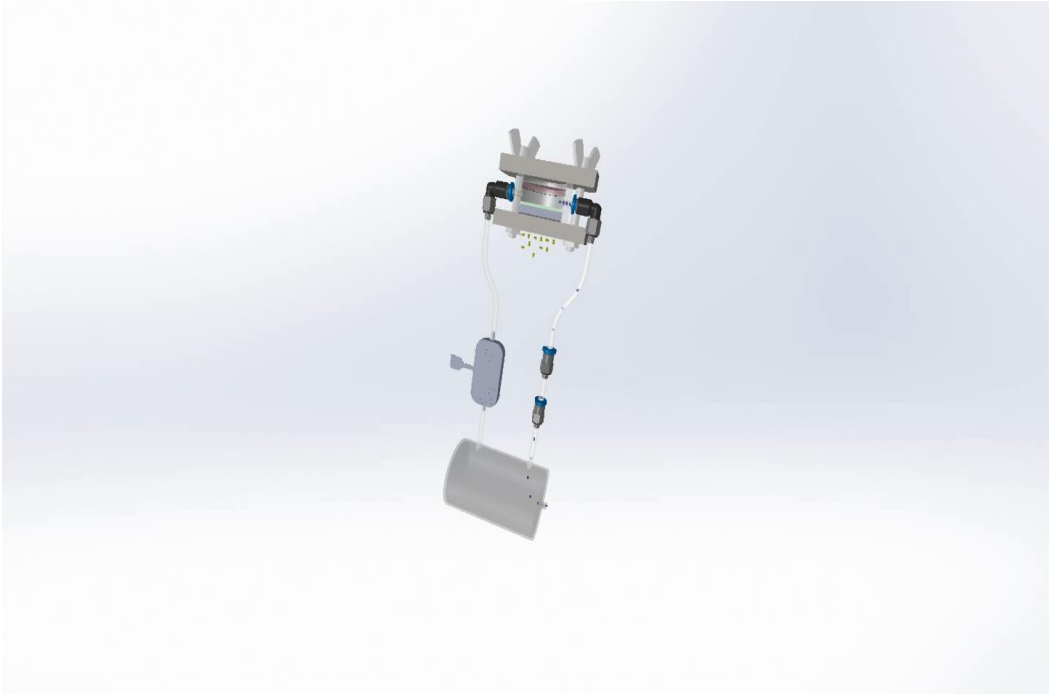
1. Improving cycle life of the Li-air cell
    A. Preventing clogging: Designing air cathode, providing dissolution of reaction products, applying flowing electrolyte.
    B. Protecting Li metal anode with unaqeous electrolytes and developing Li alloys.

2. Designing multi-cells for next generation electrical car battery packs

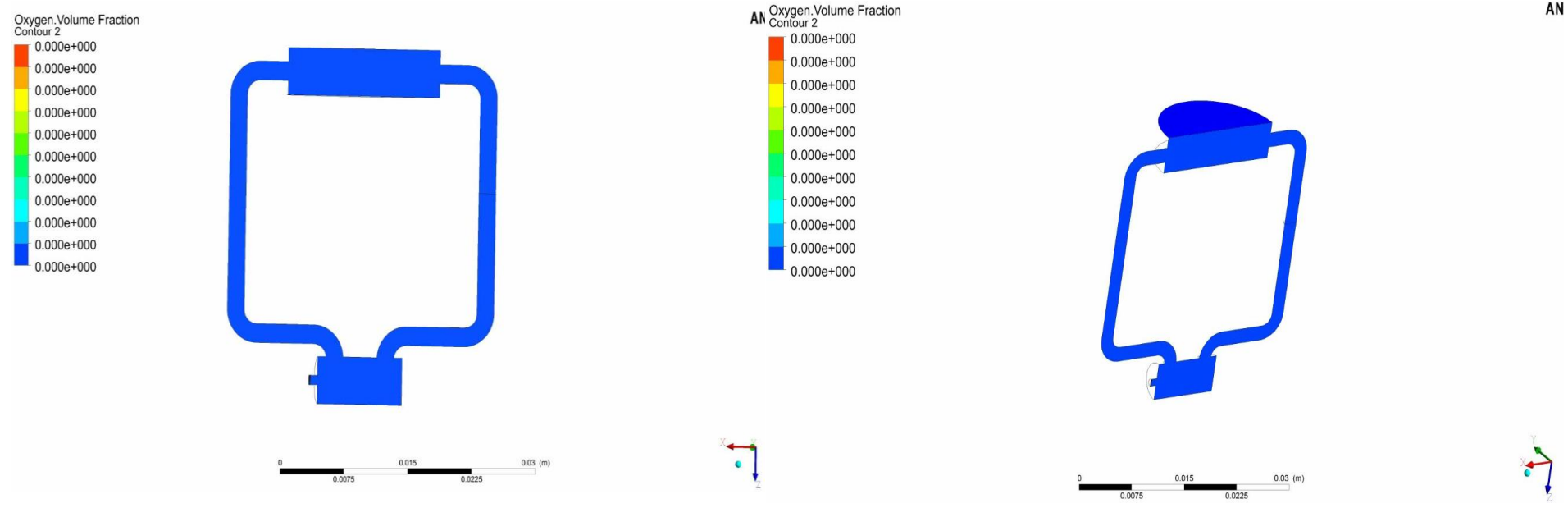
Aim of the Project

Project team will be overcome the mentioned three basic problems by developing a new lithium air flow battery system. It is believed that this battery system will assure higher energy density, higher cycle numbers and a new design lithium air flow battery, which will be able to work under normal air atmosphere.



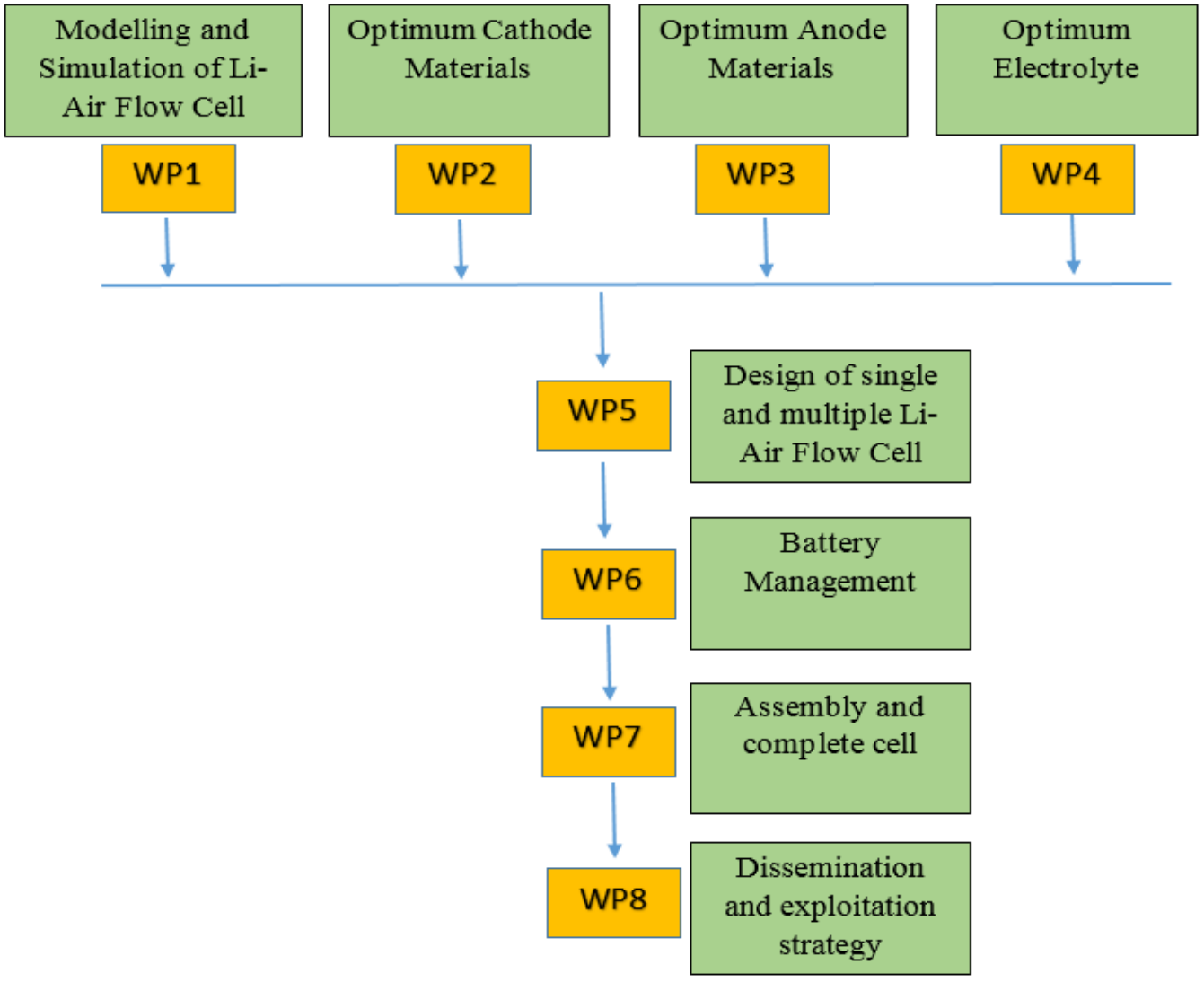


Oxygen Volume Fraction in Li-Air Flow Cell

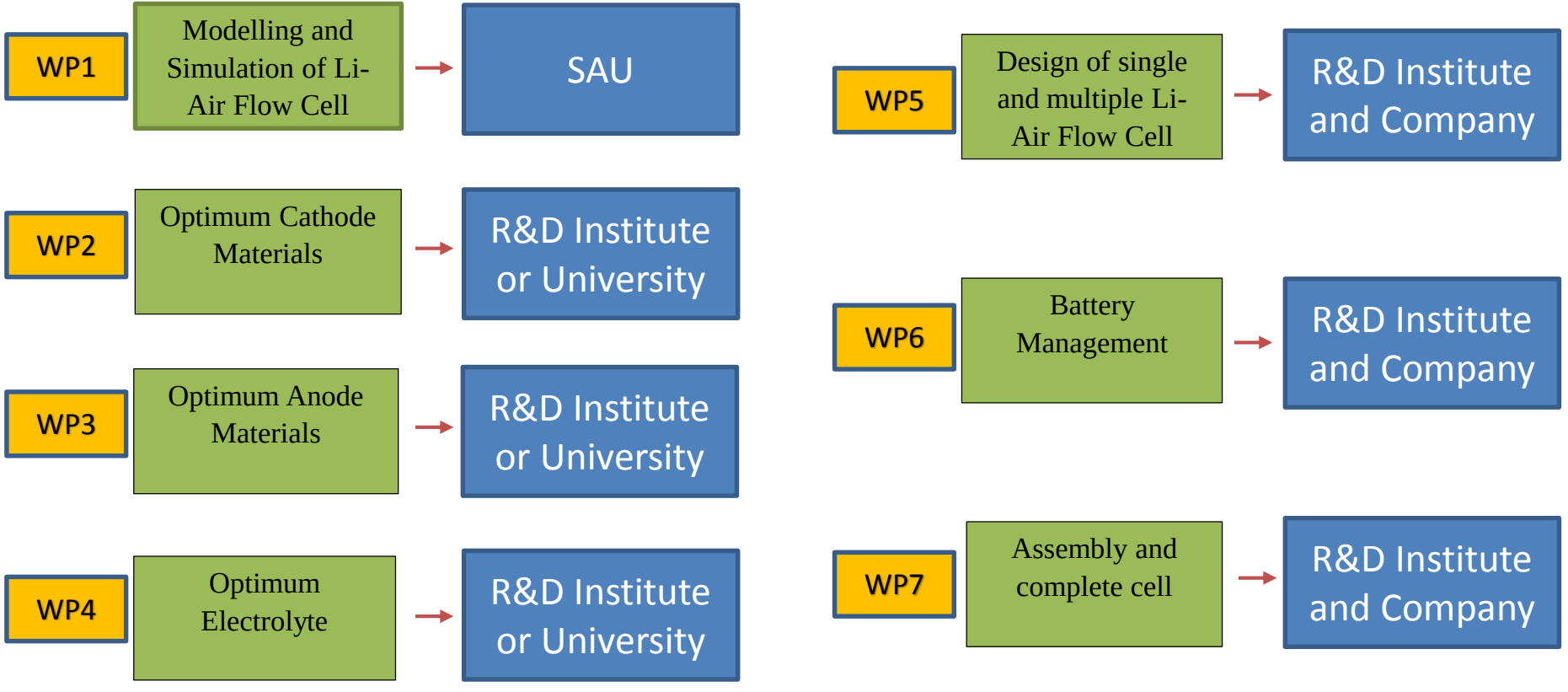


Time (s)	Oxygen Volume Fraction (%)
0	0
5	6.5
10	15.2
20	23.3
30	32.4

Action Plan Of Project



Expected Collaborators



Green Vehicles Project Call

TOPIC : Production of next generation battery cells in Europe for transport applications

Topic identifier:	GV-13-2017		
Publication date:	14 October 2015		
Types of action:	RIA Research and Innovation action		
DeadlineModel:	single-stage		
Planned opening date:	04 October 2016	**Deadline:**	01 February 2017 17:00:00

Time Zone : (Brussels time)