



EARTH DAS
A GRAPHENE COMPANY



**Electric vehicles are the future
... if you are patient enough to
charge them.**

Tesla Model S — 482 Km

Charging time: 1h 15m (best)
Battery weight: 560Kg

**Equivalent
combustion vehicle — 900 Km**

Tanking time: 5 minutes
Fuel weight: 56Kg

I want to be **green** ... and save money **without changing** mobility my habits.

Pros of Tesla Model S


eco-friendly

26.53\$ saved per “tank”

(according to Tesla)

Pros of standard car

Tanking time: less than 10 minutes



I want a car, that saves me 26\$ of fuel after 400 Km and charges in 6 minutes

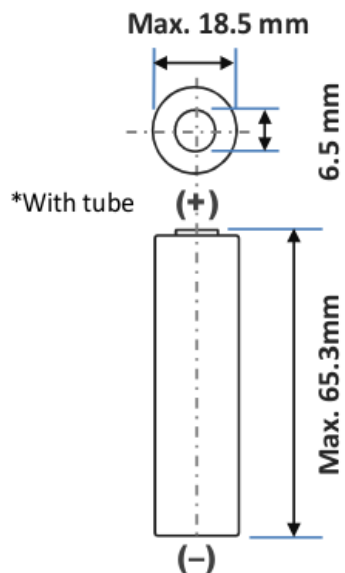


Existing lithium based batteries

18650 typical battery:

Material weight approx. 34g
Energy density: 86 mAh/g

Dimensions



Specifications

Rated capacity ⁽¹⁾	Min. 2700mAh
Capacity ⁽²⁾	Min. 2750mAh Typ. 2900mAh
Nominal voltage	3.6V
Charging	CC-CV, Std. 1375mA, 4.20V, 4.0 hrs
Weight (max.)	48.0 g
Temperature	Charge*: 0 to +45°C Discharge: -20 to +60°C Storage: -20 to +50°C
Energy density ⁽³⁾	Volumetric: 577 Wh/l Gravimetric: 207 Wh/kg

For Reference Only

⁽¹⁾ At 20°C ⁽²⁾ At 25°C ⁽³⁾ Energy density based on bare cell dimensions



**Graphene is a solution...
as soon as its cost is reduced.**



1350 times faster

Charges up to 1350 times faster than the lithium based technologies.



60% more capacity

Theoretical capacity for graphene is 60% bigger than for lithium



Contained costs

Protected research from partners reduces costs of graphene to 1/3.

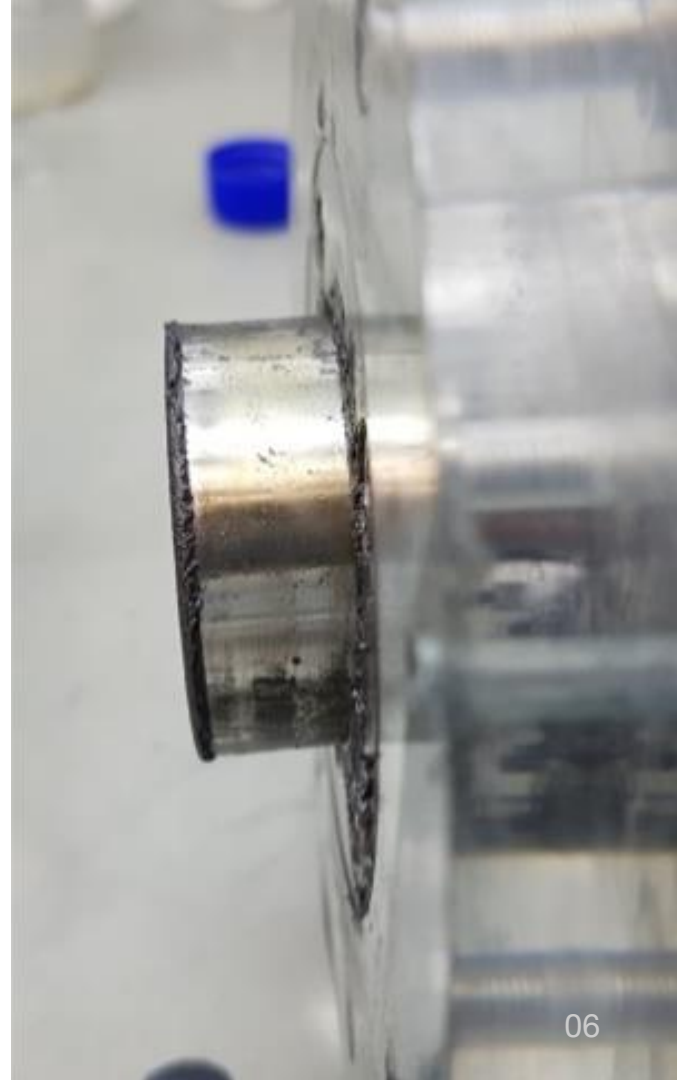
Laboratory results

More than 11 different prototypes and technologies have been evaluated.

Graphene results varying from 36 mAh/g to 90 mAh/g charging at 10C.

Existing **lithium** batteries offer 90 mAh/g charging at 0.2C.

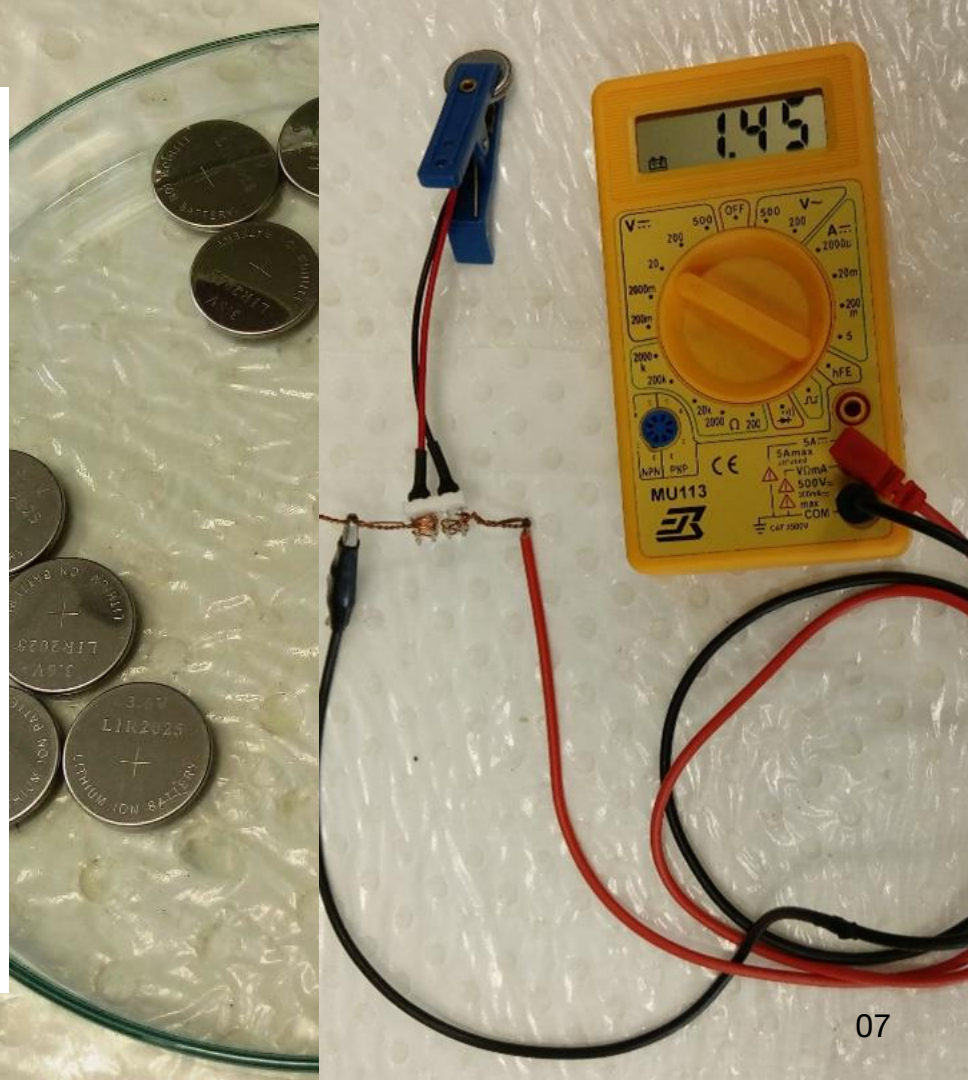
Ideal maximum for graphene of 540 mAh/g against 340 mAh/g for lithium



Graphene equivalent cost

- 1Kg of graphene costs 318€
- 60 mAh/g average capacity for graphene
- The reference lithium cell weights 48g (guess 30% for the case)
- The lithium battery costs 3,15€ each

Graphene equivalent would need 34g of graphene compound which would give 2040 mAh and the graphene would cost 10,81€





SCiB by Toshiba

Uses lithium titanium oxide (LTO) which provides 19 mAh/g can charge in 6 minutes under specific conditions



Zinc-air batteries

Provides 150 to 320 mAh/g however zinc corrosion can produce potentially explosive hydrogen.



Solid-state batteries

Safe solution but with higher cost and bad performance on low temperatures.



Other technology challengers



Graphene batteries are our target, but graphene manufacturing is interesting.

The production of graphene batteries for EVs is the main target of our company.

However if the investment needed is too high, licensing such technology is an option.

Graphene flow cells

Liquid electrolyte based graphene can be a future allowing recharge of the battery as we currently tank the car.





The core team



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President
Serial Entrepreneur



Eduard Alarcón

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Jordi Aibar

CTO & Founder
Technology passionate



Pedro Gómez-Romero

Research professor & Founder
CSIC, Earthdas



Range

600 km for a standard electric motor driven Euro NCAP small family car

-
25% more than a Tesla means 112 mAh/g



Re-charging

Battery re-energizing time should be less than 5 minutes

-
Charge at 12C or more



Re-fuelling

Replacement of the spent battery with a fully charged one at a re-charging station

-
Tanking equivalent operations are allowed

EU Battery Prize conditions





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