NUSNNI Storage Membrane

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Environmental Membrane Batteries

With support from the Singapore-MIT Alliance for Research & Technology (SMART) and the National Research Foundation, the project took about one and a half years to reach its current state and the team has also successfully filed a US patent for this impressive invention.

Research leader Dr Xie Xian Ning states: "Compared to rechargeable batteries and supercapacitors, the proprietary membrane allows for very simple device configuration and low fabrication cost. Moreover, the performance of the membrane surpasses those of rechargeable batteries, such as lithium ion and lead-acid batteries, and supercapacitors."

Researchers from the National University of Singapore, Nanoscience and Nanotechnology Initiative (NUSNNI) have developed the world's first energy-storage membrane, using a polystyrene-based polymer to deposit a soft, foldable membrane converted from organic waste sandwiched between, and charged by two graphite plates.

The amazing thing is that the membrane can store charge at 0.2 farads per square centimeter, far greater than the charge carrying capability of super capacitors at 1 microfarad per square centimeter.

The cost involved for this innovative energy storage system is also reduced from about US$7 to store each farad using existing based on liquid electrolyte technologies to about US$0.62 per farad with the membrane.

The system makes use of organic waste materials such as plastic bags that undergo a two day conversion process to form the storage membrane. It is believed that a ton of plastic bags can produce a ton of membrane, depending on the polymer functionalisation process.

Initial testing has revealed that the system can be fast charged; and recharging can be accomplished between 5,000 to 6,000 times. These figures place the energy membrane fair and square at the Lithium battery market and with costing at one tenth the price, could quite easily become the EV battery of choice in the coming years.

This invention answers the need for cost-effective and environmentally friendly energy storage and delivery solutions.

Fluence Z. E.

It is reported that the Better Place membership also covers the cost of the car's battery, *(maybe you buy the car dry – ie. no battery).* Renault Australia is yet to reveal costs, although overseas pricing comes in similar to petrol versions at, approx. $30,000.

Front wheel drive comes from the brushless motor with 70kW output (at 11,000rpm) and 226Nm of torque, transferred through a single speed transaxle. An unknown sized lithium-ion battery is mounted behind the rear seats to supply the energy. Accelerating from 0-100km/h takes around nine seconds while the top speed is limited to 135km/h.

The tachometer is replaced with a colour-coded 'econo-meter' providing information about the remaining charge and range. "OSCAR" a Better Place navigation system, directs you to the nearest charge location.

Renault Fluence Z-E & Better Place

2012 will see Renault Australia delivering the Fluence Z.E., the first electric vehicle in Australia that allows you to swap the battery via Better Place Battery Switch Stations and continue your journey in less time than a refuelling stop.

It is planned that the Fluence Z.E. (zero emission) compact sedan will be launched in Canberra during the second quarter of next year; with availability for the rest of Australia happening towards the end of 2012.

The Fluence has a range of 185km, with a full recharge taking between six and eight hours. Alternatively, a complete battery exchange will take less than four minutes.

The idea is that owners of the electric Renaults will sign up for a Better Place membership package(?) tailored to their driving needs. The subscription will provide unlimited access to batteries, the network of public charge spot and battery switch stations, along with personal charge spots at home or work. Better Place says it will be supplying 100 percent renewable electricity.

Electric Blue

Brigham Young University (BYU) of Provo, Utah had a student team design and build the Electric Blue 'E1' for the Bonneville Salt Flats speed week. Students are justly celebrating after setting a new land speed record for an electric car in the (under 1,100 lbs/499 kg) class.

At the end of a seven year quest to capture an EV land speed record, Perry Carter who, has just retired as an associate professor with the university hit pay dirt with the 2011 vehicle. "Electric Blue" set a record of 155.8 mph (250.7 km/h) averaged over the two required qualifying runs. One of which saw the car reach a speed of 175 mph (281.6 km/h). Its long, slender shape and enclosed wheels reduce wind resistance, by definition Electric Blue falls into the category of a streamliner. The students modelled the body using a wind tunnel program on a computer and custom built it using carbon fiber. The team states that an aerodynamic body, in combination with the vehicle's lithium iron phosphate batteries *(TS maybe)* helped the car reach its record-setting speeds.

Universal Charging

In order to nullify the potential of excessive EV connector types a system has been developed by Germany's Audi, BMW, Daimler, Porsche, and Volkswagen, working in partnership with America's Ford and General Motors.

The system consists of a single connector on the vehicle, which is compatible with all methods of charging including single-phase AC-charging, fast three-phase AC-charging, DC-charging at home and ultra-fast DC-charging at public stations. The idea is to make EV development a less complex process, as vehicles won't need to incorporate multiple sockets, nor will their owners need to seek out proprietary charging stations. Instead, all electric vehicles will be able to pull into and recharge at any charging station available.

Although a daunting thought, the building of a worldwide infrastructure of charging stations for electric vehicles would be far easier than the original rollout of petrol stations. All you need is to get a consensus among the big players as to what's needed to get the power in. Obviously obtaining that agreement would require some negotiation. With such major contenders agreeing, it tells me that the big boys are taking plug in electric vehicles as a serious option for the near future.

If you want to incorporate this universal charging system to your conversion, it is reported that the system will be available from early 2012.

No pricing as yet.

The Shape of Things to Come??

TeeWave AR 1

Now here's something to do with your unexciting new i-MiEV, throw the running gear into a neat looking sports coupe.

Gordon Murray Design, the company behind the original McLaren F1 road car, has come up with a new roadster called the TEEWAVE AR.1, in conjunction with Toray Industries. It features the fully electric power train from the i-MiEV inside a sporty open-top roadster layout.

The package consists of a 16kWh lithium-ion battery pack powering a 47kW/180Nm motor driving the rear wheels. The system provides a full-charge range of around 186km, and can be recharged in six hours.

You couldn't really call it a supercar in the usual sense of the term, but the TEEWAVE AR.1 is constructed with all the latest materials. It's designed around a lightweight carbon fibre monocoque chassis which helps to keep overall weight down to a miserly 850kg in full running trim. Despite this the i-MiEV power plant still takes a while to get it to 100kmh – 11.4 seconds to be precise, but it is faster than the donor cars 12.1 top speed is 147kmh.

By using extreme lightweight materials to centralize the EV equipments mass and placing the battery bank at the bottom of the car to lower the center of gravity, plus well controlled and modern suspension geometry, the AR.1 has a considerable edge in i-MiEV road holding. According to those who have driven it, the AR.1 has "excellent ride and handling balance".

The TEEWAVE AR.1 is just a prototype at this stage and will be used for evaluation purposes. But if you ding up your i-MiEV's body there is an alternative chassis that you can plug the running gear into for a more exciting drive; *(a little bit anyway)*.

This Month's Q&A Technology Tip

Q: I need to connect by battery pack together, what options are there for interconnects?

A: Our good friends at EVWorks have a range of braided copper high current cell connectors, designed for the ThunderSky cell range – but would work well on any cell they can fit. To see if they will work for your application, just measure the distance between terminals to see if they will work.

see http://www.evworks.com.au/index.php?search=braid