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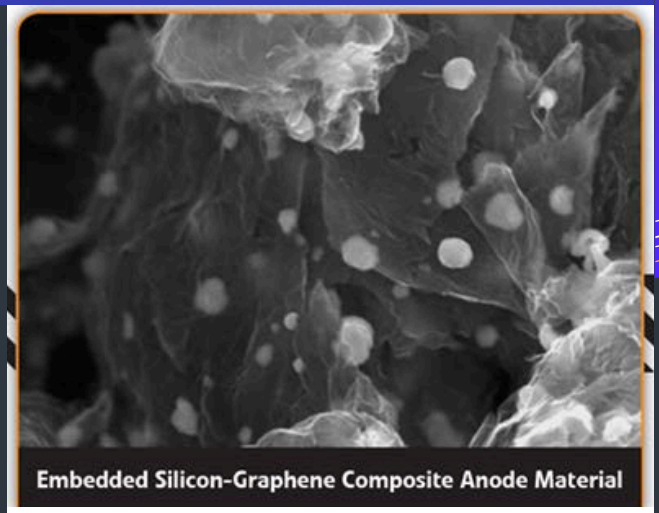
Silicon-Graphene Anode

For nearly 20 years, manufacturers and research institutions around the globe have been attempting to produce a high energy density, safe, affordable LIB with a long cycle life and rapid charging rates. The joint venture will combine the best LIB materials developed by both Calbattery and CALEB over the past 5 years. The first run of these new cells (Calbattery/CALEB LIB) will utilise a novel high voltage lithium cobalt oxide cathode, high voltage dual phase electrolyte, and conventional anode materials. The second generation will also include the CalBattery (Argonne National Laboratory) silicon-graphene (SiGr) composite anode material that triples the anode's specific capacity.

These cells are reputed to be a superior "drop- in" replacement for graphite-based anode material cells, offering significant benefits in battery performance especially in energy density and capacity, thus reducing future Li-ion battery cost per kWhr by up to **70%.**



Embedded Silicon-Graphene Composite Anode Material

CALEB and CalBattery

In a first up announcement regarding the newest lithium battery chemistries, CALEB Technology and California Lithium Battery (CalBattery) have agreed to establish a joint venture to produce a new line of high-performance lithium-ion batteries, which will be manufactured in the Los Angeles area starting in 2016. It is planned that the first generation of batteries will be aimed at the consumer electronics market, but the second generation will also be suitable for EV and energy storage applications. These new cells will incorporate CalBattery's novel silicon-graphene (SiGr) composite anode material that triples the anode's specific capacity as well as a dual-phase polymer electrolyte material and process developed by CALEB, which allows an increase in safety as well as improved energy density.

Aluminium / Air Range Extender

The challenge in making Phinergy's catalyst material was to maintain the highest possible surface density. Researchers found that pushing the nano-particles together would provide a high surface area, because the particles had the tendency to center. So, they monitored the distance between the particles and created a sponge-shaped structure with a surface area spacing of 1-2 nm.

In operation for every 1 kg of aluminum, you need 1 liter of water and 1 kg of oxygen from ambient air, the reaction creates a waste product of approximately 3 kg of aluminum hydroxide, which later can be reused or recycled back into aluminum. If you plug in the car to recharge the Li-ion battery, the electricity can also replenish some of the aluminum-air battery's electrolyte (water). However, after driving long distances on aluminum-air, the electrolyte will be soaked with dissolved aluminum, and you will need to swap it out, this could be achieved at your average service station.

Phinergy

This month's run through is chiefly looking at EV Power sources.

Out of Israel comes news of an EV range extender that is using a high powered Aluminium/Air cell.

Phinergy represents the brave new world of 21st-century nanotechnology, in which old limitations are smash up against a wall of new-fangled materials. Phinergy's first patent was for what it calls a nano-porous silver-based catalyst, which lets oxygen into the electrode and the cell while effectively blocking CO2. Phinergy's invention has enabled its metal-air cathode to demonstrate an ongoing 25,000 working hours. Previous versions of Al/O^2 cells operate for about 100 hours so this is a massive increase. The theoretical specific energy of Phinergy's aluminum-air as 8.1 kWh per kilogram of aluminum, a battery with 100 kg of aluminum would provide around 2,000 miles of driving; as the battery is not working constantly, – this is a range extender, – therefore 20,000km per year of operation before replenishment is possible.

BMW fast Charge

BMW of North America has launched its own DC fast charger. A joint development between BMW and Bosch, the BMW i DC Fast Charger can charge an i3 to 80 percent in 30 minutes. It's about half the size of most DC chargers (31x19x12 inches), weighs around 100 pounds, and can be mounted on a wall, a first for DC fast chargers.

Beemer's box also has a comparatively low price tag – US$6,548 for authorized BMW partners.

The company decided to go with a 24 kW charging rate because it's easier to install, it's lighter and when charging an i3 it doesn't make much of a difference time wise. To charge on a 50 kW charger to 80 percent is less than 20 minutes. On the 24 kW chargers it's less than 30 minutes. However, with a 50 kW charger, you risk going into degradation with the smaller batteries sooner. So the advantages of having a smaller charger outweigh the time benefit of the larger unit. BMW i DC Fast Chargers use the SAE Combo 1 connector and are ChargePoint network-enabled.

OLEV

Nickola Tesla is alive and well, at least his much maligned high power transmission concept is! Seems someone at the Korean Advanced Institute of Science and Technology (KAIST) took his idea seriously. First tested in 2009 KAIST's On-line Electric Vehicle (OLEV) system inductively charges vehicles using a technology called Shaped Magnetic Field in Resonance (SMFIR), which places lengths of cable beneath the street surface and allows compatible vehicles to receive a charge automatically while still in motion. The pickup system is about 180Kg so is aimed at heavy transport systems where the advantage of instantaneous charging allows for smaller onboard battery installations.

Last August, OLEV Korea set up its system for two buses in Gumi, South Korea, each running a continuous 24 km inner-city route. As an example of a typical application of the OLEV charging system, charging apparatuses are installed beneath the street in strips of concrete-encased wires 5 m at a time. The wires create the inductive charge, and when needed are placed in series, as in the case of "take-off segments" – 20 m strips that provide an extra lift for accelerating up hills. To be efficient and cost effective only a 5m segment is on at any given time. Each 5m segment runs off of the same inductive inverter, so if you have five segments of charging strip, you don't need five different electronic control units.

The SHAPE of Things to Come??

Just when you thought it was safe to tell people that you drive an EV, along comes Top Gear's (or in this case "Toy Story's") James May. "James May's Toy Story" construction crew built a full size motorbike (and Sidecar) out of Meccano pieces to drive around the Isle on Man's TT track. In fact 15,000 pieces were used with each wheel containing an impressive 600 nuts and bolts each. The 9 week build was quite ingenious, not only was the frame and wheels all Meccano, so was the primary drive system. Dozens of tiny Meccano electric motors were linked in pods and connected by chain drive to the final motorcycle style chain and sprocket on the rear wheel. However an Agni motors model 143 was used as a backup for the uphill sections. After some initial teething problems – like the front wheel/forks collapsing when they tested the brakes. The thing actually made it around the 37.8mile (60.5km) in about 2 days (not a startling speed, but suitable for the design!) – top speed about 25mph on the downhill sections.

This Month's Technology Review

Echo Automotive's EchoDrive system allows small to medium size delivery van fleet owners to convert their vehicles to hybrid technology using bolt on packages. As you can see at left, a small AC motor is attached directly to the transmission output shaft. A reduced tail shaft then transfers power to the existing differential. Additionally a 9.4kWh battery pack is mounted into the spare tyre carrier at the rear of the vehicle with associated charging and control gear. Full EV operation is not available but the ICE side of things thinks it's going downhill all the time so efficiency is up by as much as 50%. Regen breaking comes as standard and is claimed to increase break servicing markedly. http://www.echoautomotive.com