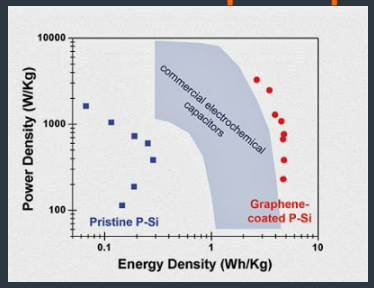
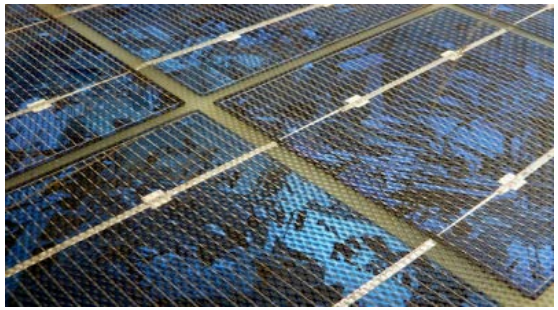
Technology & Commerce!

Silicon SuperCap



In a case of "I wonder what would happen if we did this"; a group from Vanderbilt University attempted to grow graphene from silicon-carbide materials at 600 to 700C. The norm is in excess of 1400C. But at lower temperatures? — "we certainly didn't expect graphene-like material growth".

When the researchers pulled the porous silicon out of the furnace, they found that it had turned from orange to purple or black. Inspection revealed that it looked nearly identical to the original material but it was coated by a layer of graphene a few nanometers thick. The point here is, with a silicon substrate the supercapacitor and its controlling electronics can be formed on the same chip, saving costs/weight and integrating multiple units into the one device.



Graphene-Coated Silicon Supercapacitor could make batteries obsolete

Instead of storing energy in chemical reactions the way batteries do, "supercaps" store electricity by assembling ions on the surface of a porous material (usually activated Carbon). As a result, they can charge and discharge in minutes, instead of hours, and operate for a few million cycles, instead of a few thousand cycles like batteries.

Research to improve the energy density of supercapacitors has focused on carbon-based nanomaterials like graphene and nanotubes. Because these devices store electrical charge on the surface of their electrodes, the way to increase their energy density is to increase the electrodes' surface area, which means making surfaces filled with nanoscale ridges and pores.

Silicon is generally considered unsuitable for use in supercapacitors because it reacts readily with some of chemicals in the electrolytes that provide the ions that store the electrical charge.

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ELECTRIC VEHICLE INTEREST GROUPS
GEELONG & MELBOURNE

Ultra PRT

Milton Keynes; UK will see driverless cars scurrying around their streets from 2015 as part of a five year pilot scheme.

100 Personal Rapid Transport POD devices will run on specifically marked out lanes between Milton Keynes Central train station, the centre:mk shopping centre as well as offices in-between. Initially, they will be on separate lanes but the government may remove these lanes when the autonomous POD's prove themselves as being safe. These pods are big enough to fit two passengers and luggage. Sensors will avoid collisions with pedestrians and parked cars.

The trials will be the first driverless cars in operation on Britain's streets; with a full rollout expected by 2017. The trial will allow customers to hire pods from £2 a ride using smartphone apps to either hail or advance book one of the machines.

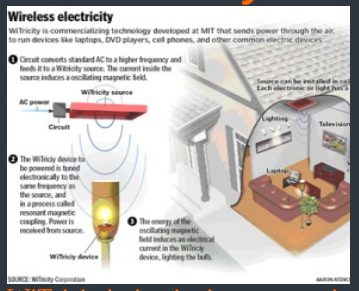
The experiment is expected to cost £65million over the five year trial period.

Heathrow PODS

Ultra Global, from Bristol UK have developed a system of battery electric PODs that have been cruising around London's Heathrow airport terminal 5 since 2011. The PODs have a 7kW synchronous AC drive, powered by 4 X 45Ah 48Volt starved electrolyte lead acid traction batteries. The PODS automatically find a recharge station and park themselves for a full charge cycle when the batteries become depleted.

Each of the 21 units weigh in at 850Kg and can carry another 850Kg of cargo; either 4 Adults in club seating plus their luggage or a cargo module that slides into the floor space through the full height doors. Since inception the average waiting time for a POD at Heathrow is 35 seconds, on the purpose built roadways that the PODs autonomously navigate to get passengers to one of the three stops on the 4km loop. Costs for this type of infrastructure range from $5 to $10 M-US per kilometer. But they are proving themselves to be reliable and convenient, although not fast 12 mph is the maximum speed; but in short haul situations the convenience of getting you and your family with luggage from one point at an airport to another 4km away seems adequate.

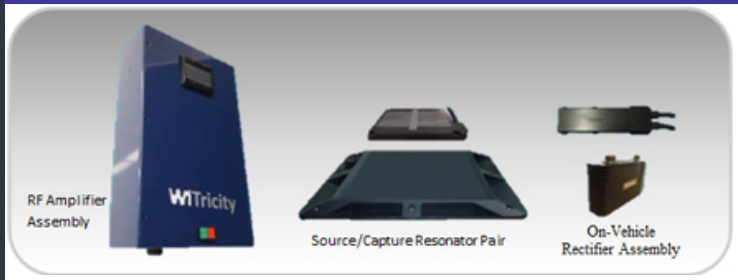
WiTricity



WiTricity's intriguing magnetic coupled charging system isn't just designed for recharging EV's. Indeed, in true Nikola Tesla style of air power transfer, the air cored transformer power transfer mechanism is structured to provide a truly cordless power feed for all of your home products. TV's, Stereos, lighting, DVD players, just about anything can have a WiTricity receiver module attached as its power source and placed independent of cords and limited power outlets. With all this power transmission in your home, is it safe I hear you ask: well yes it is! You see WiTricity doesn't radiate anything, instead it uses magnetic near field coupling to do its thing. Hows that safe? Magnetic energy has a very low reaction with biological organisms (us and animals) much less than your mobile phone. If you want to extend the already impressive range of the WiTricity, you don't have to buy another transmitter; rather a "High Q resonating repeater" can almost double the systems power transfer range.

Transfer frequency for the various home units is achieved by starting with a DC supply and modulating it into a 240kHz AC signal. The capture resonator then converts the received energy into a regulated DC supply to drive the home's appliances.

Resonant Coupled Power



WiTricity Corp. was founded in 2007 to commercialize an exciting new technology for wireless electricity invented two years earlier at the Massachusetts Institute of Technology (MIT). A team of physicists, led by Professor Marin Soljačić, developed the theoretical basis for this novel method for wireless electric power transfer in 2005, and validated their theories experimentally in 2007.

The magnetic fields of two properly designed devices with closely matched resonant frequencies can couple into a single continuous magnetic field. Prof. Soljačić's team showed how to use this phenomenon to enable the transfer of power from one device to the other at high efficiency and over a distance range that is useful for real-world applications. This "strong coupling" enables the devices to exchange energy via magnetism, and avoids the potential safety hazards and inefficiency often associated with radiated electro-magnetic energy. Basically if you don't have the correct resonant circuit receiver nothing happens.

For EV use the system displayed above can be installed in your vehicle and garage to magnetically charge your EV with a transfer efficiency in the order of 90% at 18cm.

Output power is infinitely adjustable from 300W to 3.3kW the nominal voltage is 350 to 450 Volts DC, so good for a 3 phase conversion. Additionally the system does not require precise alignment when parking as it can be offset by 15 to 20cm and still provide maximum charging efficiency from the 145kHz transmitter. Size is another bonus with the TX and RX units between 2 and 4 times smaller than induction chargers.

The Shape Of Things to Come!!

eDams Formula E

Four-times Formula One world champion Alain Prost will be involved with a team competing in the new electric Formula E series due to start next year. Prost has linked up with fellow compatriot Jean-Paul Driot to enter a new e.Dams team. Driot's Le Mans-based DAMS teams have won petrol-engined championships in various junior series, including GP2, A1 GP, Formula Renault 3.5 and International Formula 3000.

Five teams have now been signed up from a planned field of 10 to race in city centers around the world starting in Beijing in September. "Being able to actively participate in the development of this new technology, which is 100 percent electric, is extremely motivating," said Prost.

"As we've seen in other championships, 2014 will see a move towards more sustainable racing, proving more than ever that motorsport is the benchmark for the future."

This Month's Technology Review

Here's a new use for a $42 Raspberry Pi microcomputer, a do it yourself J1772 control system. The add on board allows complete control of the power charging of your EV. Modular EV Power.com has come up with this controller card that simply plugs into your Raspberry-Pi version B even the appropriate software is supplied on an SD card. The system is programmed for monitoring of Watt-hour, Line voltage, current and Power factor data that is viewable on a Pi -LCD display or by internet connection. Soft current startup, based on amps set for pilot signal (from 6 to 80 Amps is also included. With a bit of fiddling you could even send charging data to you smart phone. Still in development but expected soon, see http://modularevpower.com/EVSE_Pi.htm