



This Issue :

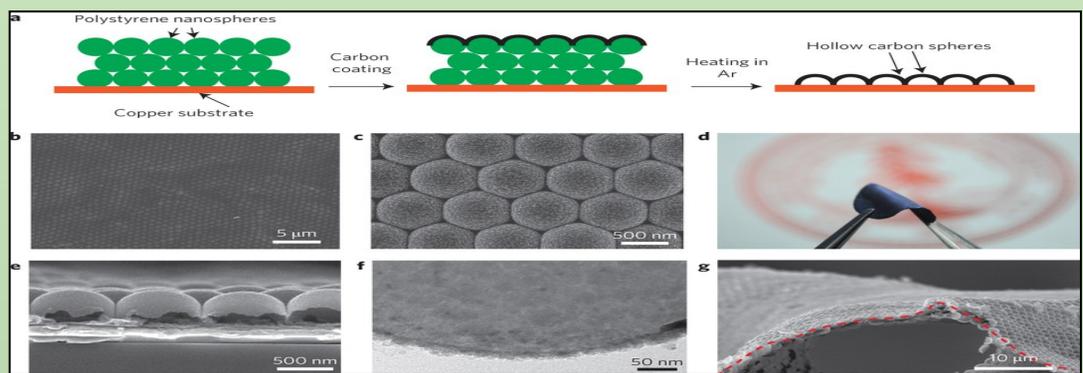
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Amazing Nuclear Waste Facts

- It still contains 95% of its energy
 - It can be recycled, and actually produces energy while being recycled, instead of requiring energy to recycle! This can be accomplished with a Molten Salt Reactor.
 - If recycled, the waste lifetime is reduced to around 300 years.
 - You can easily detect even a single atom of radioactive material. You cannot detect arguably more dangerous pollutants such as mercury, lead, NOx or SO2 with near that kind of accuracy or ease
- Source : energyfromthorium.com



‘Holy grail’ of battery design achieved: Stable lithium anode



Fabrication of hollow carbon nanosphere-coated electrode

Stanford University researchers claim to have created the first stable pure lithium anode in a working battery by using carbon nanospheres as a protective sheath to guard against degradation. As a result, the researchers predict that commercial developments may eventually result in anything up to a tripling of battery life in the not-too-distant future. At a basic level, a battery is composed of three main elements: the anode, the cathode, and the electrolyte which fills the battery between these two terminals. In ordinary Lithium-ion batteries, it is an all too common problem that the lithium in the battery can crystallize into dendrites – microscopic fibers that expand into the electrolyte, and can eventually short-circuit the battery, significantly reduce battery life or, worse, causing the battery to catch fire. However, lithium is also one of the most conductive and efficient metals to use as a battery anode and for many years scientists and other researchers have been

trying to find a way to utilize this metal while avoiding the problems inherent in its use. This is where the Stanford team's carbon nanospheres have been put to good use; by coating the lithium so that it does not degrade within the electrolyte. The Stanford researchers expect that battery technology will get a boost in terms of power, capacity, and longevity. Of all the materials that one might use in an anode, lithium has the greatest potential. Some call it the Holy Grail. It is very lightweight and it has the highest energy density. It generates more power per volume and weight, leading to lighter, smaller batteries with more power. The team has managed to achieve a Coulombic efficiency (the efficacy with which an electron flow or charge is transferred in an electrochemical reaction) of approximately 99 percent after 150 cycles. For a battery to be useful and usable in the real world, it must have a Coulombic efficiency of 99.9 percent or better. Source : www.gizmag.com

A new plant species helping soil depollution identified

Researchers at UPM have studied the arsenic and heavy metal levels in plants from an old mine of Madrid. They identified a species that can help in phytoremediation works. The analysis of native terrestrial plants collected in the vicinity of the old mine of Madrid showed high levels of cadmium, copper, lead and zinc and very high levels of arsenic concentrations, mainly found in the roots. Over the centuries, the relevance of arsenic has been based on its poisonous nature. However, its toxicity depends on the shape or the chemical species where is found (organic or inorganic species). Furthermore, some heavy metals are considered essential or toxics depending on its concentration level. Toxic heavy metals can affect nervous system and vital organs. Certain soils are a natural source of



arsenic and heavy metal due to the mining activity. These soils contribute to increase the toxic levels in surface layers of soil and are able to persist even during centuries after cessation of the activity.

The main problem of heavy metal pollution is that cannot be degraded. The toxic metal accumulation needs control and removal in order to avoid its incorporation into the food chain. The high concentrations of arsenic

found by researchers of UPM in plants from the mine led to a research to identify and quantify the arsenic species in these plants. Researchers used an analytical method that allowed them to identify up to eleven species of arsenic. The goal of this analysis was to define the content of toxic species and to understand how plants with high concentration of arsenic can survive in these environments without showing toxicity symptoms.

The results showed a high degree of arsenic biotransformation (between 70 and 89% of total arsenic in plants). All this gives evidence of the plant capacity to transform inorganic arsenic into other less toxic chemical forms.

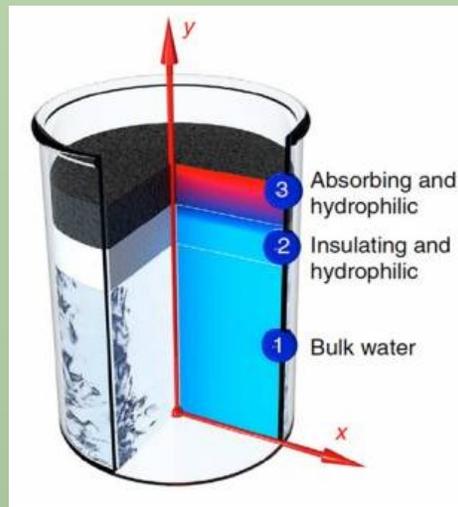
Source : <http://www.upm.es>

Steam energy from the sun : A New Innovation

A new material structure developed at MIT generates steam by soaking up the sun.

The structure - a layer of graphite flakes and an underlying carbon foam is a porous, insulating material structure that floats on water. When sunlight hits the structure's surface, it creates a hotspot in the graphite, drawing water up through the material's pores, where it evaporates as steam.

The new material is able to convert 85 percent of incoming solar energy into steam — a significant improvement over recent approaches to solar-powered steam generation. What's more, the setup loses very little heat in the process, and can produce steam at relatively low solar intensity.



Recently, scientists have explored ways to improve the efficiency of solar-thermal harvesting by developing new solar receivers and by working with nanofluids. The latter approach involves mixing water with nanoparticles that heat up quickly when exposed to sunlight, vaporizing

the surrounding water molecules as steam. But initiating this reaction requires very intense solar energy — about 1,000 times that of an average sunny day.

By contrast, the MIT approach generates steam at a solar intensity about 10 times that of a sunny day — the lowest optical concentration reported thus far.

The researchers tested the structure by placing it in a chamber of water and exposing it to a solar simulator — a light source that simulates various intensities of solar radiation. They found they were able to convert 85 percent of solar energy into steam at a solar intensity 10 times that of a typical sunny day.

Source : newsoffice.mit.edu

First Fully Solar-Powered Village in India: Dharnai's Story Begins after 33 Years of Darkness

Even as more than 300 million people wait for electricity in India, Dharnai in Bihar unshackled from darkness and declared itself as an energy-independent village on 20 July. With the launch of Greenpeace's solar-powered 100 kilowatt micro grid, quality electricity is being provided to more than 2,400 people living in this village in Jehanabad district.

The people of Dharnai village used to have a facility supplied by the state Government, which provided electricity, but this hasn't been available for the last 33 years and diesel generators were the only source of electricity.

"While India was growing leaps and bounds, we were stuck here for the



last 30 years, trying everything in the book to get electricity. We were forced to struggle with kerosene lamps and expensive diesel generators," said Kamal Kishore, a resident of Dharnai.

Built within three months and on a test-run since March, the quick-to-install micro grid launched by Greenpeace India with the help of NGOs BASIX and CEED takes care

of 60 street lights, energy requirements of two schools, one health centre, one Kisan Training Centre (Farmer Training Centre) and 50 commercial establishments.

It required a heterogeneous village for this project where agriculture was the main occupation along with basic social infrastructure like a school, healthcare facility, an anganwadi (communal childcare centre), a commercial zone and around 400 households, according to Greenpeace. The Dharnai solar-powered micro-grid could be a game-changer, a model for bringing clean, reliable energy to the energy-starved millions.

Source : <http://www.ibtimes.co.in>

Massive Flying Wind Turbine Could Offer A New Path To Clean Energy

As oil companies drill ever deeper to meet the world's thirst for fuel, a new wave of clean energy entrepreneurs are also searching far and wide for sources—but in the opposite direction.

That's because as you go higher, ground friction diminishes, giving way to increasingly stronger winds; at extreme elevations, ranging between 20,000 and 50,000 feet depending on your location, you enter what's called the jet stream, a swirling mass of air with winds upward of 100 miles per hour. As wind speeds double, the potential supply of energy grows eight-fold, so these air currents along the outer reaches of the earth's atmosphere can be thought of as a kind of vast treasure trove of renewable power. In fact, an analysis published



in the journal *Energies* concluded that "the total wind energy in the jet streams is roughly 100 times the global energy demand."

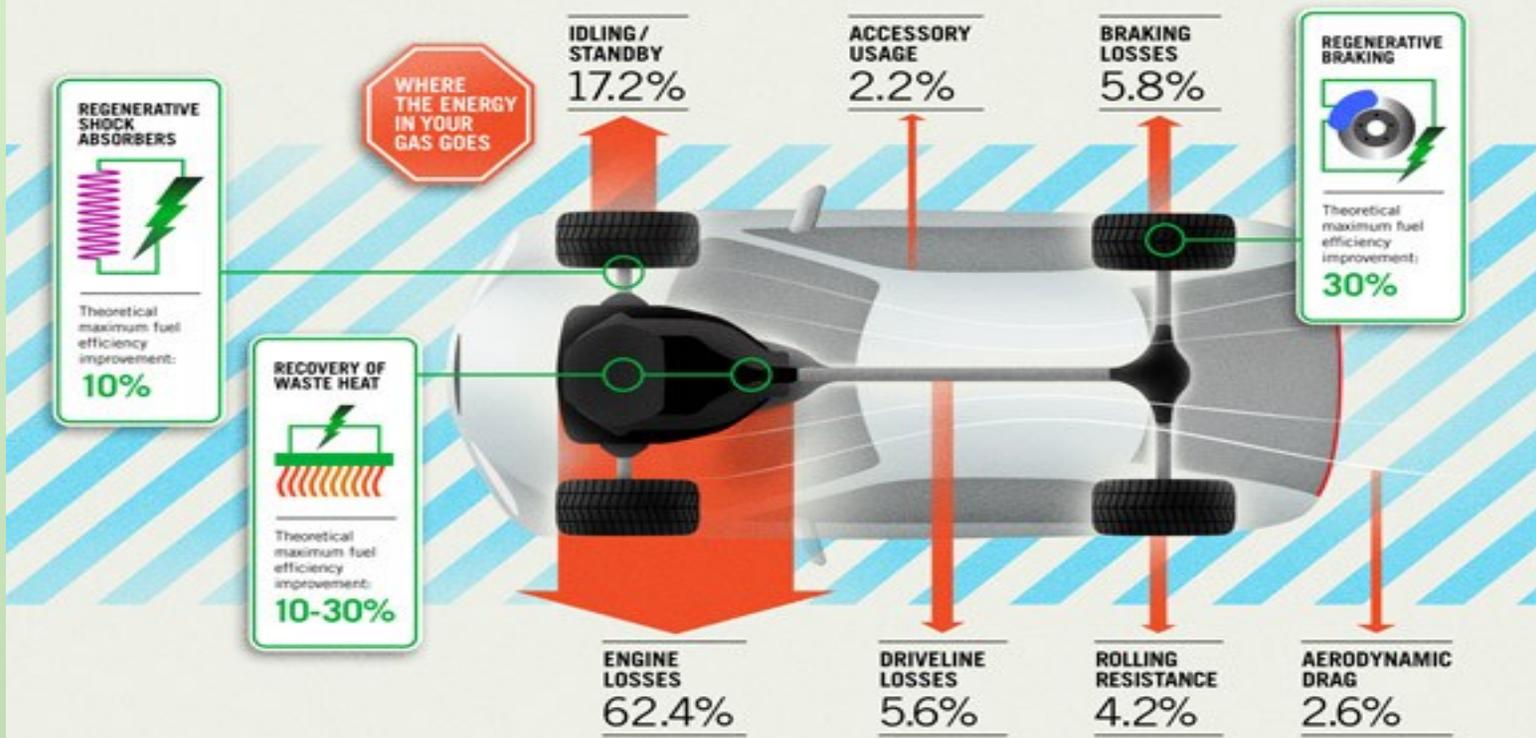
While the idea to create air-lifted power generators has been floated for some time now, it's only recently that firms have assembled prototypes with the goal of producing something commercially viable.

Once the Buoyant Airborne Turbine (BAT) is suspended, an onboard

sensor system enables the turbine to operate autonomously, even changing its position to harvest more wind energy or dock whenever it detects a severe thunderstorm. Energy is transferred to a power station on the ground, where an interface distributes power to a microgrid or grid connection. Lest it sound too good to be true, there is still the issue of cost. At 18 cents per kilowatt-hour, annual energy costs of the BAT are still too high for most major markets in America, where the average consumer pays about 13.4 cents per kilowatt-hour. But for communities located off the main power grid, airborne wind turbines offer an attractive alternative, albeit an extreme one.

Source : www.smithsonianmag.com

RECOVERING ENERGY FROM A CAR'S WASTE



COMIC SENSE



CONFERENCE ALERT

- **International Conference on Substantial Environmental Engineering (ICSEE 2014)**
Date: 26th August 2014
Location: Taipei, Taiwan
- **The 5th IASTED African Conference on Power and Energy Systems**
Date: 1st September 2014
Location: Gaborone, Botswana

QUIZ

1. When was World Wildlife Fund founded?
2. Which component of Sun's energy is responsible for drying clothes?
3. Name the two elements which are used to fabricate solar cells.

Send your entries to
mnit.energyheadlines@gmail.com

Winning entries to win exciting prizes.

CREDITS

- **Amit Kumar Aman** (III Year, Civil Engg.)
- **Bhupendra Pratap Singh** (III Year, Mechanical Engg.)
- **Kundan Kumar Gupta** (III Year, ECE)
- **Mayank Singhvi** (III Year, ECE)
- **Rupesh Kumar** (III Year, Metallurgical & Materials Engg.)
- **Dr. -Ing Jyotirmay Mathur**

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