Conserve™ The Energy

It's Tomorrow™

Limited resources and unlimited usage.
How can we save it?

Newsletter

Conserve the energy, Save our climate!

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October, 2015 **Issue : 16**

INSIDE...

Why ???

We the people on the earth are gifted with wonderful energy sources by the nature, which has made our routine much more smother & easier... However, this gift of the nature is ' limited '. What we have done is, with the growth of science & technology, we have started using it extremely, because of which the energy resources are going to finish in near future. Hence, let us take the pledge to conserve the energy - save the energy!!!

Tips of the Month

Article-1 : ARTIFICIAL LEAF HARNESSES SUNLIGHT FOR EFFICIENT FUEL PRODUCTION

Moore Foundation grantees at Caltech have developed an artificial leaf which mimics photosynthesis in order to create fuels. Research carried out at the Joint Center for Artificial Photosynthesis produced a system that consists of two electrodes and a membrane which work together to oxidize water molecules to generate protons and electrons and oxygen gas. The protons and electrons are then recombined to create hydrogen gas. The hydrogen fuel is then collected for fuel production.

The make or break for any energy production technology is the all-important level of efficiency. If the energy output is too low, then artificial leaves will never stand a chance at replacing our current sources of energy, including things such as fossil fuels and nuclear power. In the past, the highest efficiency achieved in an artificial leaf was 18%. However, the scientists from Melbourne have increased this to an impressive 22%, the highest efficiency ever seen in artificial leaves.

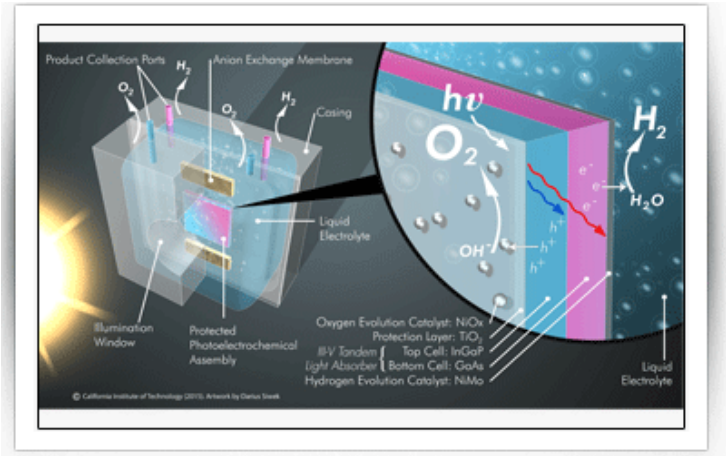
While this level of efficiency is the best yet, it is still not quite good enough to make the process financially viable. However, the researchers note that they are aware of the parameters that need fine-tuning and which components need tweaking for the next generation of tests.

“Electrochemical splitting of water could provide a cheap, clean and renewable source of hydrogen as the ultimately sustainable fuel.

This latest breakthrough is significant in that it takes us one step further towards this becoming a reality”.

If the artificial leaf can be improved to a marketable level, then we could be seeing forests of them powering our houses, cars and maybe even entire cities.

“Hydrogen can be used to generate electricity directly in fuel cells. Cars driven by fuel cell electric engines are becoming available from a number of car manufacturers. Hydrogen could even be used as an inexpensive energy storage technology at the household level to store energy from roof-



top solar cells”.

Source: http://www.iflscience.com/technology/artificial-leaf-reached-best-level-efficiency-yet

**Image source: https://s3-us-west-1.amazonaws.com/www-prod-storage.cloud.caltech.edu/JCAP-Photoanode%20Final%20Image.jpg*

Article - 2 : SOLAR ROOF: NEW HYBRID SOLAR PANEL ROOF

Scientists at Brunel University London have designed a new hybrid roofing system which could halve energy bills in new homes.

Dr Hussam Jouhara of Brunel's Institute of Energy Futures, who led the British team, developed the new system.

“Until now there was no system which fully addressed all the technical and practical issues that face making an entire building’s roofs a solar-powered generator of both heat energy and electrical energy.”

Heat pipes seemed an obvious solution to a major technical issue with solar cell or photovoltaic (PV) panels used to generate electricity.

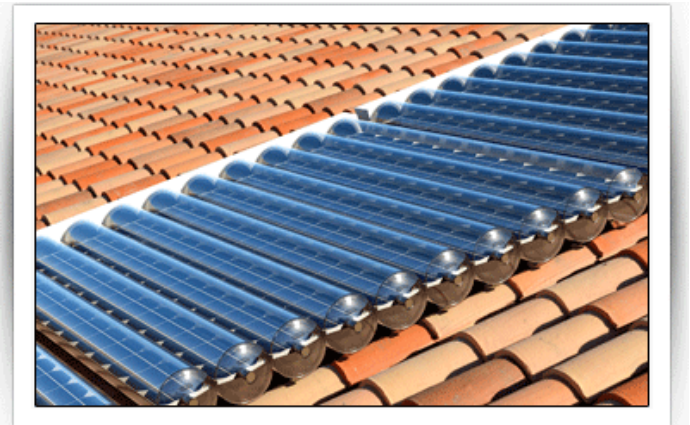


**Image source:http://images.gizmag.com/hero/nanogenerator-rolling-tires@2x.JPG*

In proof of concept tests, PV cells cooled Jouhara’s methods outperformed identical panels by 15 percent. And rather than being wasted, almost the full spectrum of energy from the sun is harnessed. The new system also addresses a wide range of practical issues in installing solar panels in new properties. Attempts to integrate installing solar panels with conventional roofing techniques have a poor track record.

Solar panels are PV coated for the most southerly-facing aspect of the roof and are designed to clip together as a weather-tight roof as simply as clicking together laminate flooring.

The heat pipe technology also turns the biggest downside of integrating solar panels into conventional roofs into a positive.

Currently the panels would get hottest in the summer and roofs need to be designed to dissipate that heat. Simply insulating the house below is not a good solution as that simply traps it driving up the PV panel temperature and further lowering its performance. With our system there is no waste heat.

The solar roof is now undergoing extensive further trials at the Building Research Establishment (BRE) in Watford where a prototype is powering a standard UK three bedroom detached house.

And already there has been one unexpected finding the flat heat pipes are so efficient that they can actually capture the energy from early morning dew evaporating off the trial roof.

*source:http://www.sciencedaily.com/releases/2015/09/150925085759.htm

Article - 3 : THIRD GENERATION SOLAR CELLS

Developing transparent or semitransparent solar cells with high efficiency and low cost to replace the existing opaque and expensive silicon-based solar panels has become increasingly important due to the increasing demands of the building integrated photovoltaics (BIPVs) systems.

The Department of Applied Physics of The Hong Kong Polytechnic University (PolyU) has successfully developed efficient and low-cost semitransparent perovskite solar cells with graphene electrodes. The power conversion efficiencies (PCEs) of this novel invention are around 12% when they are illuminated from Fluorine-doped Tin Oxide bottom electrodes (FTO) or the graphene top electrodes, compared with 7% of conventional semitransparent solar cells. Its potential low cost of less than HK$0.5/Watt, more than 50% reduction compared with the existing cost of Silicon solar cells, will enable it to be widely used in the future.

First generation crystalline silicon solar panels are highly stable and have efficient energy conversion, but are opaque and expensive. The second generation solar cells, namely thin film solar cells, are lightweight and can be made flexible. However, they are made of rare materials with complicated structures and need high temperature treatments.

In recent years, scientists have been investigating third generation solar cells. Perovskite solar cell as a novel third generation solar cell has attracted much attention recently due to its high power conversion efficiency, convenient fabrication process and potentially low cost. With the aim of improving PCEs and reducing costs of semitransparent solar panels, the researchers developed the first-ever made semitransparent perovskite solar cells with graphene as electrode. Graphene is an ideal candidate for transparent electrodes in solar cells with high transparency, good conductivity and potentially low cost.

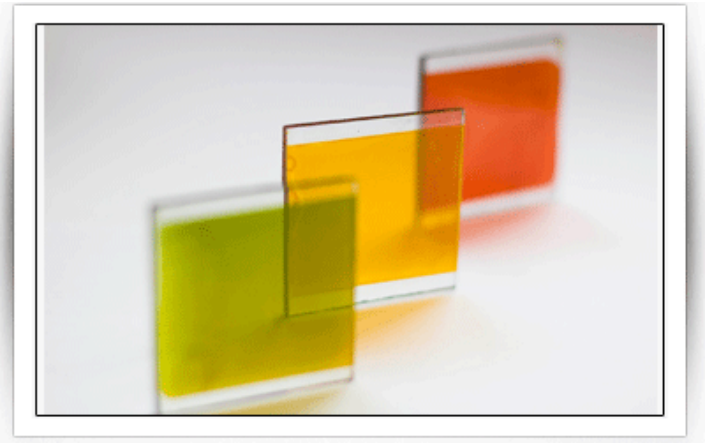


Image source:http://2.bp.blogspot.com/-t7uJF9UMxTI/VWt__BUKO6I/AAAAAAAAA-nY/yjX--W_zWmQ/s1600/Oxford_Photovoltaics_Cells.jpg

Firstly, the conductivity of graphene was dramatically improved by a thin coating of conductive polymer poly-(3, 4-ethylenedioxythiophene): poly(styrenesulfonate) (PEDOT:PSS), that was also used as an adhesion layer to the perovskite active layer during the lamination process.

Secondly, to further improve the efficiency of power conversion, the researchers found that by fabricating the solar cell with multilayer chemical vapor deposition graphene as the top transparent electrodes, the sheet resistance of the electrode could be further reduced while maintaining the high transparency of the electrodes.

Lastly, the performance of the solar cell was further optimized by improving the contact between the top graphene electrodes and the hole transport layer (spiro-OMeTAD) on the perovskite films.

**source:http://www.asianscientist.com/2015/09/in-the-lab/hong-kong-polytechnic-university-semitransparent-solar-cell/*

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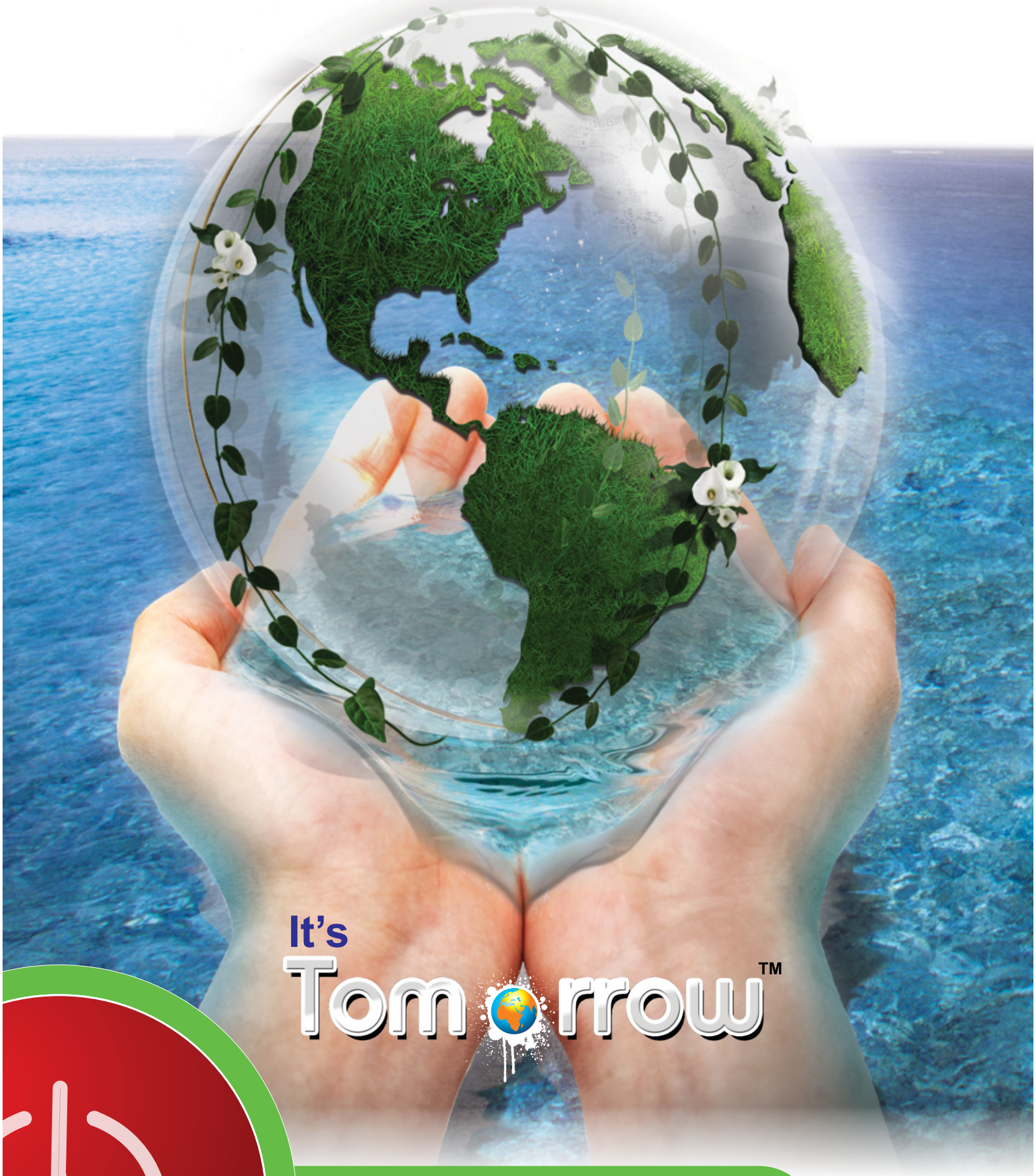

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