



The Energy Headlines

THE ENERGY NEWSLETTER OF MNIT JAIPUR



"You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make"
 - Jane Goodall

Eco-Warrior



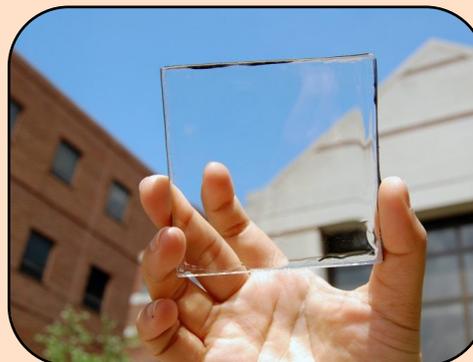
Radhakrishnan Nair, a Gujarati businessman has planted around 40 forests, totalling an amount of 6 lakh trees, all by himself in various states of the country.

Mind Blown!

- The Amazon rain forests account for 20 percent of the world's fresh water and 10 percent of the world's known species.
- At least 50 million acres of rainforest are lost every year, totalling an area the size of England, Wales and Scotland combined.

TRANSPARENT SOLAR PANELS

In the modern age of mass energy consumption, there is a continuous rising demand for the same. To cater these, energy is being produced from renewable sources,



one of which is the **solar energy**. But the cost of setting up the panels is too high. Also, a large amount of area is required to set up the solar panels for large amount of energy production.

Now, researchers at the Department Of Chemical Engineering & Material Science, Michigan State University, USA have developed a prototype of **transparent solar panels** which are not only cost efficient, but also can be put along the standard windows saving much of the setup space. The model that they have developed contains a **Transparent Solar Luminescent Solar Concentrator (TSLC)** which can be placed on any clear solid surface like a glass window and can harvest solar energy without affecting the transmittance of light.

The developed technology uses organic molecules which have this property to absorb light wavelengths such as UV rays and Infrared waves which are not visible to the naked eye. Then the absorbed wavelengths are "glowed" into another wavelength and

then the captured light is transported to the contour of the panel where they are converted to electricity with the help of photo-voltaic solar cells.

These panels have been made long lasting, so they can be fitted into the window panes very cheaply as most of the cost of conventional photovoltaics does not come from the solar cell itself but the materials mounted on it. The energy generated from the solar panels is not enough to power the whole building but it could generate enough to run many of the electrical equipment and other appliances. Another advantage of using transparent solar panels is that it can be cleaned easily, and are easy to handle, just like ordinary glass.

These panels can make the most of the energy from the building windows. Hence, it will represent a far more efficient technology. These can be used in other applications as well such as architecture, mobile and automotive industry. In the next century, these panels if planted on most of the world's buildings could power around 70% of the requirements of the planet.

HYDROGEN FROM WATER USING PLANT MEMBRANE

One of the most common elements on earth, hydrogen is now finding its ways in various applications including its use as fuel. But extraction of this fuel is a very costly job.

However, researchers at the US Department Of Energy have created a plant membrane that can split hydrogen from water using energy from the sun. They have combined two membrane bound protein complexes to perform a complete conversion of water molecules to hydrogen and oxygen. This involves the use of two previously developed membrane proteins, *Photosystem I & Photosystem II*.

Photosystem I is a membrane protein that can use energy from light to feed



electrons to an inorganic catalyst that makes hydrogen. Photosystem II is a second protein complex that uses energy from light to split water and take electrons from it. Using photosystem II, electrons were taken and introduced into Photosystem I as feed. To structurally support them, both the protein complexes are embedded in natural thylakoid membranes and thereby providing a direct pathway for inter protein

electron transfer. This chain pathway has been named as **Z- Scheme**.

The catalysts used in the experiment contain Cobalt/Nickel instead of earlier used Platinum which was very expensive, thus dramatically reducing costs. The next step for the research involves incorporating the membrane-bound Z-Scheme into a living system and using to separate hydrogen from water. Although this is a time consuming process, but the amount of hydrogen generated from plants using this technique is immense and can be heavily relied upon to produce hydrogen fuel in the next 15-20 years. Who knows by that time its applications in daily life may exponentially increase.

SOURCE: ECONOMIC TIMES

CAMPUS INSIDE: SHAPING THE FUTURE OF SOLAR POWER

India's current substantial & sustained economic growth is placing enormous demand on its energy resources which is mainly fulfilled by fossil fuel based energy system, but the ever increasing demand causes a threat, creating serious problems for India's energy security. As an emerging global superpower, India's Socio-economic growth is increasing. Further increase in **urbanization, rise in per capita income and consumption, and providing energy access to maximum population** are the key factors that will substantially increase the total demand of energy thereby creating an emerging energy supply-demand imbalance.

In this present scenario, **Solar Energy** as a Renewable Energy source can make a substantial contribution in each of the above

By: SHARDUL KOTHARI
ID: 2017PCV5408
M. Tech, Renewable Energy,
Centre For Energy & Environment

mentioned areas and be a key part of the solution to the nation's energy needs. **Sun is undoubtedly the greatest sustainable energy source.** Meanwhile, India is world's one of the most enriching countries in terms of having a lofty solar energy generation potential. But it is more important as how we can optimize that generated solar power and extract the maximum of it.

For that, a lot of techniques are in recent trends. We as a responsible institution (MNIT) are also playing a vital role in shaping the sustainable future of solar power. And thus, we are engaging ourselves in how we can optimize some of the best

techniques of the Photo Voltaic system. We have some of the completed and ongoing research in the area of **concentrated solar PV, efficiency enhancement of PV system through mirror reflection, optimizing the tilt angle, Building Integrated PV System (BIPV) and use of single and double screen façade in it, radiative cooling and performance enhancement of solar cell, grid-integrated PV system and its challenges, solar inverters,** etc.

Out of this research we have made some positive and sustainable results for shaping the future of solar power. Some other future areas of research are **Bio solar cell, reshaping solar spectrum to turn light into electricity, floating solar panels, solar energy harvesting trees, solar pathways,** etc.

GARBAGE DUMP TURNED INTO INDIA'S LARGEST ARTIFICIAL ISLAND



The Hebbagodi Lake in Bengaluru has been turned into an artificial island from a garbage dump. All this was achieved using two techniques, one being **Mechanical Aeration** where water was sent up in fountains to increase oxygenation. The other was **Artificial Floating Wetlands** which are structures floating on the water bodies on which plants are grown. These plants absorb pollutants as nutrients from treated sewage water. Now, after continuous efforts for its restoration, the artificial island has made it to the **Limca Book Of Records**, setting up an example for the community to join hands together to keep the area clean.

UNITED AIRLINES & WORLD ENERGY LAUNCH LONGEST BIOFUEL FLIGHT



World Energy & United Airlines have collectively launched the **longest Trans-Atlantic biofuel flight** from San Francisco, USA to Zurich, Switzerland on 13th September, 2018. The flight, UA 44, flown by a Boeing 787 (the most efficient aircraft of its fleet) is fuelled by World Energy's **low aviation carbon fuel via a blend of sustainable aviation fuel**. The flight is part of an ongoing commitment in the Global Climate Action Summit 2018 to address climate change.

VIETNAMESE MAN DEVELOPS BIODEGRADABLE STRAWS FROM WILD GRASS



An innovation made by a Vietnamese man named Tran Minh Tien has shown how a certain type of grass named *Lepironia Articulata* found in Mekong Delta in Vietnam is converted into **biodegradable drinking straws**. First, they collect the hollow stems of grass, which are washed and then cut into 20-centimeter lengths. The tubes are then cleaned on the inside using a metal rod. After another round of washing, the straws are bundled together and finally wrapped in banana leaves. This simple procedure can also be followed in homes and juice centres and could prevent tonnes of plastic pollution annually.

SPECIAL FEATURE: ACACIA INNOVATIONS, KENYA

Acacia Innovations is a start-up launched in the African country of Kenya by Elana Laichena in August 2016. It aims to make and bring innovations to the general households and public at a cheap cost. It makes modern clean cooking affordable for schools in Kenya, through an innovative subscription model which allows schools to get a highly discounted affordable clean cook stove if they sign a contract to purchase **Kuni Safi** biomass briquettes (an alternative to firewood made of sugarcane waste).

Since there is more production capacity than demand for briquettes in Kenya, Acacia Innovations decided to focus on sales and distribution, rather than building yet another briquetting plant. They have a partnership with Transmara Sugar Company, which manufactures

briquettes from its own sugarcane waste and sells them only to local tea factories which can collect them in bulk.



They have been buying and packaging these briquettes under the brand Kuni Safi (clean firewood). Then these are repackaged and distributed to schools and other small businesses. They supply to schools, hotels, restaurants and other small businesses in Kenya and have sold to over 160 schools and a handful of restaurants and hotels, all of whom order at least 1 ton of briquettes at a time. As of now, the startup has employed around 100-150 people working in different parts of the

country with an annual turnover of 1.3 million US Dollars. They have also won numerous awards including the coveted **Small & Medium Enterprise Award & Startup Energy Transition Award 2018**.

IIT GUWAHATI DEVELOPS BIODEGRADABLE PLASTIC



Plates made from biodegradable plastic

Researchers at IIT Guwahati's Centre of Excellence Sustainable Polymers (CoE-SusPol) have developed biodegradable plastic using home-grown technology. They had earlier developed various household items such as kitchen cutlery, household furniture and decorative items from non-biodegradable plastic. But now, according to sources, a pilot project with production of biodegradable plastic would reduce plastic pollution the world is facing

today. The biodegradable plastic comes from bio-base instead of petroleum thus making it environmentally friendly. The biodegradable plastic when dumped would degrade easily and get absorbed by the soil. Till now, IITG has been producing 7-8 kilograms of plastic at one go. But from now, according to sources, a pilot project with capacity of 100 tonnes per year will go on till September 2019.

SOURCE: IITG.AC.IN

INNOVATION CORNER

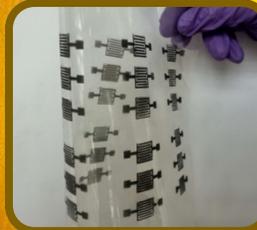
Self Cleaning Solar Panels

Self-cleaning solar panels developed by ARCI Technologies, Hyderabad which uses nanotechnology to detect dust on the solar panels and is completely waterproof.



IISc Supercapacitor

Compact, efficient and superlight supercapacitor developed by Researchers at IISc Bangalore which could replace batteries used in cars, watches, etc.



Smartflower Pop



It is the world's first flower shaped solar panel and is 40% more efficient than standard rooftop panels. It employs a smart system which directs the panels in the sun's direction all day long.

Tertill Robot

Tertill Robot, a weather proof, Bluetooth operated solar powered robot removes the unwanted plants shorter than the crop using its sensors. It has been developed by Franklin Robotics.



CREDITS

Abhigyan Biswas (II Year Chemical Engg)

- Prof. Ing. Jyotirmay Mathur
- Dr. Kapil Pareek (Faculty Co-ordinators)

Disclaimer:

This newsletter is for internal circulation within MNIT. All information/articles have been compiled from newspapers, technical magazines and other sources. For suggestions, feedback, and any other article you want to read on some particular topic or want us to publish in our reader's column then mail us to energyclub@mnit.ac.in or reach out to us on our Facebook Page <https://www.facebook.com/EC.MNITJaipur>