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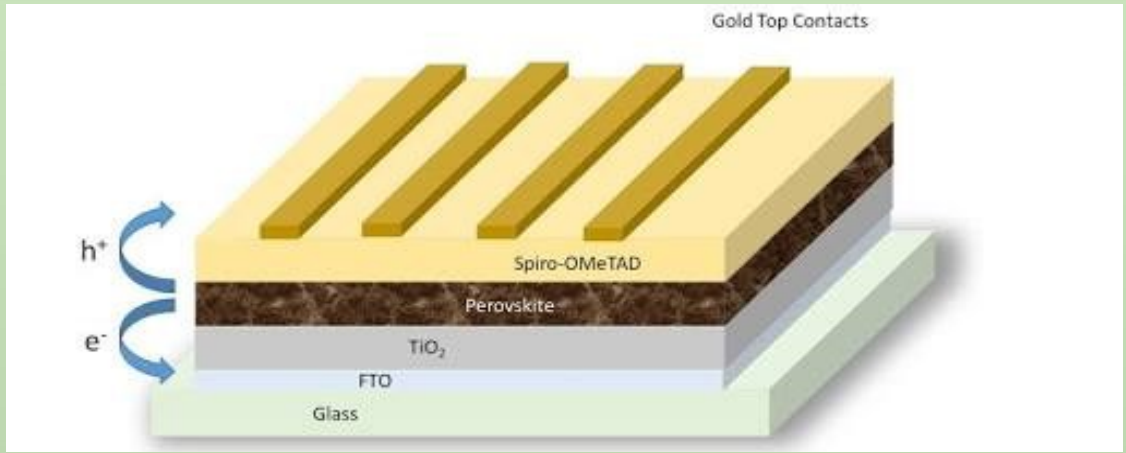
This Issue :

Trending

- The Paris Climate Change Agreement became International law on 4th Nov, after 96 countries formally joined the accord.
- The historical Kigali Amendment to the Montreal Protocol, agreed to by 197 nations at a UN meeting, will avoid global warming by up to 0.5° C by phasing out hydrofluorocarbons (HFCs).
- Adidas released a prototype for a new sneaker composed of ocean plastic waste.

New Perovskite Design rivals Silicon Solar Cell



The material most commonly used for solar cells at present is silicon. However, a major disadvantage of solar cells made of silicon is the laborious and relatively costly production process involved. The most promising alternative is solar cells based on perovskites, a photovoltaic crystalline material which resembles calcium titanium oxide in terms of structure.

A breakthrough research by scientists from Stanford and Oxford resulted in the creation of a robust, all-perovskite device that converts sunlight into electricity with an efficiency of 20.3 percent, a rate comparable to silicon solar cells on the market today. The novel form of perovskite is thinner, more flexible and easier to manufacture than silicon crystals. The newly designed solar cells uses inexpensive, commonly available materials like tin, lead, etc.

A solar cell with a small energy gap can absorb most photons but produces a very low voltage. A cell with a larger energy gap generates a higher voltage, but lower-energy photons pass right through it. Thus, an efficient tandem device consists of two ideally matched cells.

A unique combination of tin, lead, cesium, iodine and organic materials created an efficient cell with a small energy gap. The novel perovskite absorbs lower-energy infrared light and delivers a 14.8 percent conversion efficiency. It was then combined it with a perovskite cell composed of similar materials but with a larger energy gap.

The result: A tandem device consisting of two perovskite cells with a combined efficiency of 20.3 percent.

Solar cells are printed on glass, but the same technology could be used to print the cells on plastic. The cells exhibit excellent thermal and atmospheric stability with high efficiency at low-cost. The versatility of perovskites, the low cost of materials and manufacturing, now coupled with the potential to achieve very high efficiencies, will be transformative to the photovoltaic industry once manufacturability and acceptable stability are also proven.

Source : www.sciencedaily.com

Smog chokes Delhi in Festive Season

The air in several places in the country becomes laden with toxic matter around Diwali, almost as a ritual associated with the festival. The toxic cocktail of particulate matter (PM) from car tailpipes and cracker burning casts a dirty haze that is at its most noxious in Delhi. Data from the central pollution monitoring agency showed that concentrations of Particulate Matter or PM 10 (coarser pollutants) was over 1,600 micrograms per cubic metre compared to a safe level of 100. PM 2.5, a standard measure of air quality, was as much as 14 times the safe limit. Schools have been ordered closed for three days —— an unprecedented measure due to thick smog covering Delhi's sky.

India has the world's highest rate of death from respiratory disease, according to the WHO (World Health Organisation), with 159 deaths per lakh people in 2012, about five times that of the UK and twice that of China. Air quality in the Indian capital is one of the world's most polluted one. The current smog is the most extreme manifestation of Delhi's air pollution.

Air pollution in Delhi's National Capital Region (NCR) is comprised of a complex mix of pollution from human activities (vehicle emissions, industry, construction and residential fuel burning) as well as natural sources like dust and sea salt. The main culprits are rampant and often unregulated construction, the burning of crop stubble in Punjab and Haryana, and the movement of heavy trucks through the city. Emissions from pollutants in the Yamuna and the presence of an industrial belt around the city add to the problem.

Desperate times do call for desperate measures. However, the Delhi government is hoping the pollution will dissipate on its own after the festivities recede. If past years are anything to go by, matters may not improve much. Removing the dirty haze from Delhi's air requires much more than such sporadic efforts. Public health experts, urban planners and policymakers will have to put their heads together to bring up a permanent and promising solution to end Delhi's woes.

Source: The Indian Express

Water Seer: A Sustainable Solution to Clean Water

A new device that relies on simple condensation to collect water from the atmosphere promises to provide up to 11 gallons of safe drinking water without an external power source, greenhouse gas emissions, or adverse environmental impacts. What's more, the innovative Water Seer collection device could potentially run forever, gifting generations of people with access to 'liquid gold' in areas of the world where a harsh climate or lack of infrastructure make access to clean drinking water a major problem. Water Seer is powered by a simple wind turbine, and the device could easily be the first step toward a sustainable, enduring solution to water shortages around the world.

The Water Seer device works based on the principle of condensation using the temperature differences. It is planted six feet below the ground surface, and soil is then packed around its metal neck. The top of the Water Seer holds a vertical wind turbine, which spins internal fan blades to draw air into the subterranean chamber. Because the underground chamber of the Water Seer is cooled by the surrounding earth, water condenses in the reservoir to create sort of an artificial well, from which people can draw clean, safe drinking water around the clock.

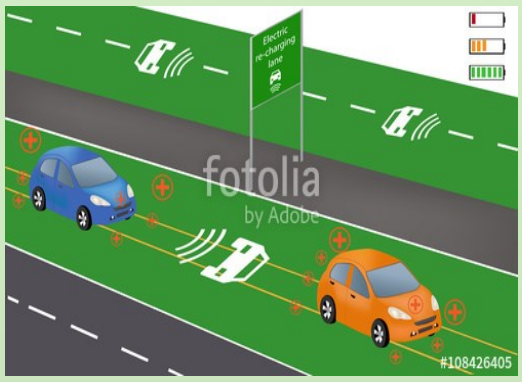
As the sides of the underground chamber are always cooler than the air that enters into the device, Water Seer can collect water both day and night even when there is no wind. It is this feature of Water Seer that distinguishes it from other devices working on similar lines.

The low-cost device was developed by VICI-Labs, in partnership with UC Berkeley and the National Peace Corps Association. The device has already been tested as a prototype, and the latest model was finalized in August 2016 and will soon undergo field tests.

Source : waterseer.org

The Road Ahead: Wireless Charging for Electric Vehicles

Air pollution has always been a major headache of the growing economies, and the motor vehicles play a vital role in enlarging this problem. To overcome this, many countries are banking on electric and hybrid vehicles but their popularity has been restricted by the current charging technology which limits how far one can go in a single charging. The issue of charging has been resolved wonderfully by Highways England (the government owned company that manages England's road network).



England has started testing of a wireless power-transfer technology. The hope is for these advancements to be eventually installed into highways, allowing electric cars to be charged by electromagnetic fields buried below. These new charging roads will have the same mechanism as that of wireless phone chargers, i.e. using magnetic induction technology. Cables buried underneath the roadway would generate electromagnetic fields that could be picked up by a receiver in the vehicle and transformed into electric power. This technology will allow drivers of ultra-low emission vehicles to travel long distances without needing to stop and charge the car's battery.

The off road trials of wireless power technology will help to create a more sustainable road network for England and open up new opportunities for businesses that transport goods across the country as well as investigating the potential to install technology to wirelessly power ultra-low emission vehicles.

Highways England is also committed in the longer term to installing plug-in charging points every 20 miles on the motorway network as part of the government's Road investment strategy.

Other countries are also beginning to examine like-minded ideas. In South Korea, there is a stretch of highway that allows buses to be charged in a similar manner. If the technology becomes full proof then it will certainly add to the popularity of electric and hybrid vehicles in developing countries like India.

Source : altenenergymag.com

Hydrail: The Future of Railway Locomotives

A train running on Hydrogen as a fuel and not producing harmful gases like SO_x, NO_x, Carbon Monoxide or even Carbon Dioxide, seems to be a dream but this has been made possible by Alstom (French Transport Company). Alstom has unveiled the world's first hydrogen-powered passenger train, CoradiaiLint which will be operating in Germany from December 2017.

Hydrogen powered train (Hydrail) is the forms of rail vehicles which use on-board hydrogen as a source of energy to power the traction motors, or the auxiliaries. It converts the chemical energy of hydrogen to mechanical energy, either by burning hydrogen in a hydrogen internal combustion engine or by reacting hydrogen with oxygen in a fuel cell to run electric motors. Unlike the traditional engines which produce harmful gasses, the Hydrail produces only water as a byproduct.

CoradiaiLint is powered by massive lithium ion batteries, which get their energy from a hydrogen fuel tank installed on the roof. On a full tank, which requires about 94 kg, it can operate for an entire full day, or travel up to 800 km. Its top speed is reportedly 140 km/h (87 mph) and will be able to transport 300 passengers at a time. It only emits excess steam into the atmosphere while operating with a low level of noise, and provides an alternative to the country's 4,000 diesel train currently in circulation in Germany, that cause 20% pollution of the state.

Although the Hydrail trains are reportedly more expensive than existing diesel models, officials in other parts of Germany, as well as in the Netherlands, Denmark and Norway, are interested in bringing the clean running trains to their regular rail services as well.

If these Hydrail were to replace Indian diesel and electric locomotive engines on the 115,000 KM long network of Indian Railways, it will certainly help a lot in bringing down the air pollution level.

Source : www.citylab.com

The Goldman Environmental Prize 2016

DESTINY WATFORD

Fought against USA's largest trash-burning incinerator

EDWARD LOURE

Leads an organization which gives land titles to indigenous communities in Tanzania

LENG OUCH

Documented and exposed the illegal logging in Combodia

LUIS JORGE RIVERA HERRERA

Worked for establishment of a nature reserve in Puerto Rico for the endangered leatherback sea turtle

MAXIMA ACUNA

Stood against Conga gold & copper mine for her farming land

ZUZANA CAPUTOVA

Spearheaded a successful campaign to shut down a toxic waste dump

COMIC SENSE

A MOMENT OF PROUD

Energy Club, MNIT Jaipur has been conferred the 9th India Power Awards by the Council of Power Utilities in the category "Establishment of Societies/ Clubs to promote Energy Efficiency and Conservation."

QUIZ

1. Crystal structure of Perovskites resembles to which material?
2. Which firm developed the Water Seer as a solution to provide clean water in water deficient area?
3. Which amendment to the Montreal Protocol, agreed to by 197 nations at a UN meeting, will avoid global warming by up to 0.5° C by phasing out hydrofluorocarbons (HFCs)?

Send your entries to ***energyclub@mnit.ac.in***

Winning entries to get exciting prizes.

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