Conserve™ The Energy

It's Tomorrow™

December - 2019 | Archeology special | Issue : 35

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

Turn off the oven 10-15 minutes before

Turn off the oven 10-15 minutes before cooking time runs out. Your food will continue to cook without using the extra electricity.

Conserve™ The Energy

Article - 1 : Potential new source of rare earth elements

Researchers have found a possible new source of rare earth elements phosphate rock waste and an environmentally friendly way to get them out, according to a study published in the Journal of Chemical Thermodynamics. The approach could benefit clean energy technology, according to researchers at Rutgers University-New Brunswick and other members of the Critical Materials Institute, a U.S. Department of Energy effort aimed at bolstering U.S. supply chains for materials important to clean energy. Rare earth elements like neodymium and dysprosium are essential for technologies such as solar and wind energy and advanced vehicles, along with modern electronics like smart phones. But a shortage of rare earth element production in the United States puts our energy security at risk. China produces roughly 90 percent of all such elements.

Recovering them from phosphogypsum -- waste from phosphoric acid production -- is a potential solution. Each year, an estimated 250 million tons of phosphate rock are mined to produce phosphoric acid for fertilizers. The U.S. mined approximately 28 million metric tons in 2017. Rare earth elements generally amount to less than 0.1 percent in phosphate rock. But worldwide, about 100,000 tons of these elements per year end up in phosphogypsum waste. That's almost as much as the approximately 126,000 tons of rare earth oxides produced worldwide each year.

Conventional methods to extract rare earth elements from ores generate millions of tons of toxic and acidic pollutants. But instead of using harsh chemicals to extract the elements. The research team explored using mineral and organic acids, including a bio-acid mixture, to extract six rare earth elements (yttrium, cerium, neodymium, samarium, europium and ytterbium) from synthetic phosphogypsum.

Scientists led by David Reed at Idaho National Laboratory produced the bio-acid mixture -- consisting primarily of gluconic acid, found naturally in fruits and honey -- by growing the bacteria Gluconobacter oxydans on glucose. The results suggest that the bio-acid did a better job extracting rare earth elements than pure gluconic acid at the same pH (2.1), or

Image Source: https://phys.org/news/2019-03-potential-source-rare-earth-elements.html

degree of acidity. The mineral acids (sulfuric and phosphoric) failed to extract any rare earth elements in that scenario. When the four acids were tested at the same concentration, only sulfuric acid was more effective than the bio-acid.

**Source: https://www.sciencedaily.com/releases/2019/03/190304095907.htm*

Article - 2 : 'Goldilocks' thinking to cut cost of fuel cells in electric vehicles

The 2019 Toyota Mirai electric vehicle touts zero emissions, thanks to a fuel cell that runs on hydrogen instead of gasoline. But the Mirai has barely left California, partly because today's fuel cell electrodes are made of super expensive platinum. Cutting down on the platinum would also cut costs, allowing more electric cars to hit the market. A new method borrows some thinking from "Goldilocks" -- just the right amount -- for evaluating how much metal would be required for fuel cell electrodes. The technique uses the forces on a metal's surface to identify the ideal electrode thickness. Fuel cells convert hydrogen, combined with some oxygen, into electricity through a so-called oxygen-reduction reaction that an electrocatalyst starts. Finding exactly the right thickness stresses the surface of the electrocatalyst and enhances how well it performs this reaction.

Experiments in Chao Wang's lab at Johns Hopkins confirmed the simulation predictions, finding that the method can increase catalyst activity by 10 to 50 times, using 90 percent less of the metal than what is currently used in fuel cell electrodes. This is because the surface force on the atomically thin electrodes tunes the strain, or distance between atoms, of the metal sheets, altering their catalytic properties. "By tuning the material's thickness, we

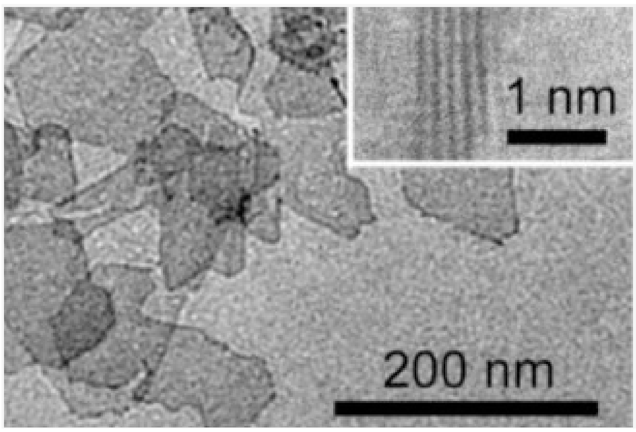

*Image Source: https://www.sciencedaily.com/releases/2019/02/190221141337.htm

were able to create more strain. This means you have more freedom to accelerate the reaction you want on the material's surface," Wang said.

**Source: https://www.sciencedaily.com/releases/2019/02/190221141337.htm*

Article - 3 : Powering a pacemaker with a patient's heartbeat

Implantable pacemakers have without doubt altered modern medicine, saving countless lives by regulating heart rhythm. But they have one serious shortcoming: Their batteries last only five to 12 years, at which point they have to be replaced surgically. Now, researchers have surmounted this issue by designing a pacemaker powered by the energy of heartbeats, according to a report in ACS Nano. The device was successfully tested in pigs, which have a similar physiology to humans.

A conventional pacemaker is implanted just under the skin near the collarbone. Its battery and circuitry generate electrical signals that are delivered to the heart via implanted electrodes. Because surgery to replace the battery can lead to complications, including infection and bleeding, various researchers have tried to build pacemakers that use the natural energy of heartbeats as an alternative energy source. However, these experimental devices aren't powerful enough because of their rigid structure, difficulties with miniaturization and other drawbacks, so Hao Zhang, Bin Yang and colleagues searched for ways to improve the technology.

First, they designed a small, flexible plastic frame. Next they bonded the frame to piezoelectric layers, which generate energy when bent. They implanted the device in pigs and showed that a beating heart could in fact alter the frame's shape, generating enough power to match the

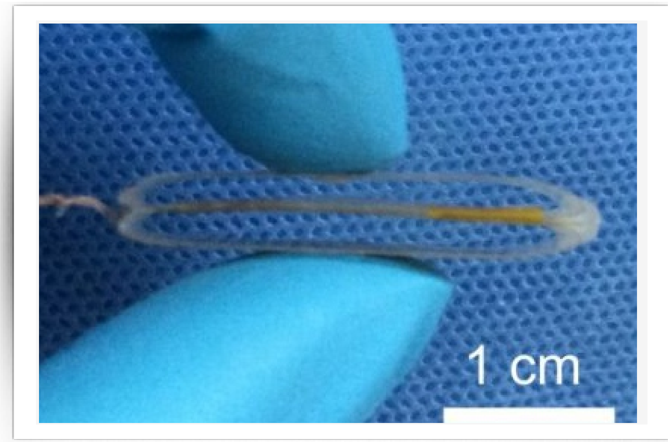

Image Source: https://www.sciencedaily.com/releases/2019/02/190220082602.htm

performance of a battery-powered pacemaker. The study is a step toward making a self-powered cardiac pacemaker, the researchers say.

Source: https://www.sciencedaily.com/releases/2019/02/190220082602.htm

Article - 4 : Layering titanium oxide's different mineral forms for better solar cells

Researchers have layered different mineral forms of titanium oxide on top of one another to improve perovskite-type solar cell efficiency by one-sixth. The layered titanium oxide layer was better able to transport electrons from the center of the cell to its electrodes. This novel approach could be used to fabricate even more efficient perovskite-type solar cells in future. While most solar cells are made of silicon, such cells are difficult to manufacture, requiring vacuum chambers and temperatures above 1000 °C. Research efforts have therefore recently focused on a new type of solar cell, based on metal halide perovskites. Perovskite solutions can be inexpensively printed to create more efficient, inexpensive solar cells.

In solar cells perovskites can turn light into electricity but they have to be sandwiched between a negative and positive electrode. One of these electrodes has to be transparent, however, to allow the sun's light to reach the perovskites. Not only that, any other materials used to help charges flow from the perovskites to the electrode must also be transparent. Researchers have previously found that thin layers of titanium oxide are both transparent and able to transport electrons to the electrode. Now, a Japan-based research team centered at Kanazawa University has carried out a more detailed study into perovskite solar cells using electron transport layers made of anatase and brookite, which are different mineral forms of titanium oxide. Now, a Japan-based research team centered at Kanazawa University has carried out a more detailed study into perovskite solar cells using electron transport layers made of anatase and brookite, which are different mineral forms of titanium oxide. "By layering brookite on top of anatase we were able to improve solar cell efficiency by up to 16.82%." Using different mineral phases and combinations of these phases allows for better control of the electron transport out of

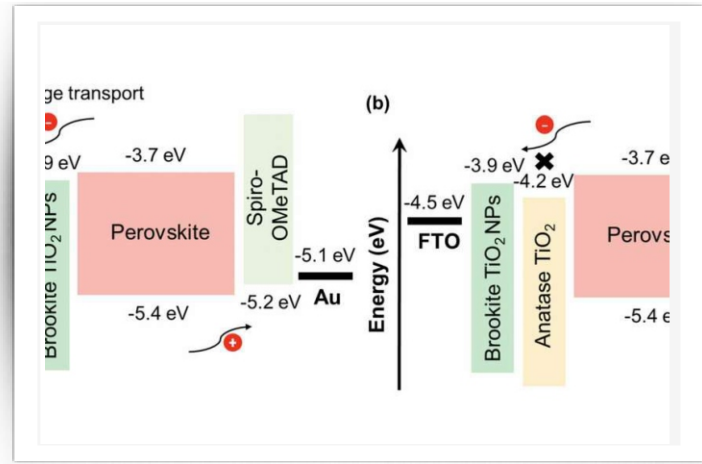

Image Source: https://phys.org/news/2019-03-layering-titanium-oxide-mineral-solar.html

the perovskite layer and also stops charges from recombining at the border between the perovskite material and the electron transport layer.

Source: https://www.sciencedaily.com/releases/2019/02/190228093607.htm

Conserve the Energy,

Save our Climate!

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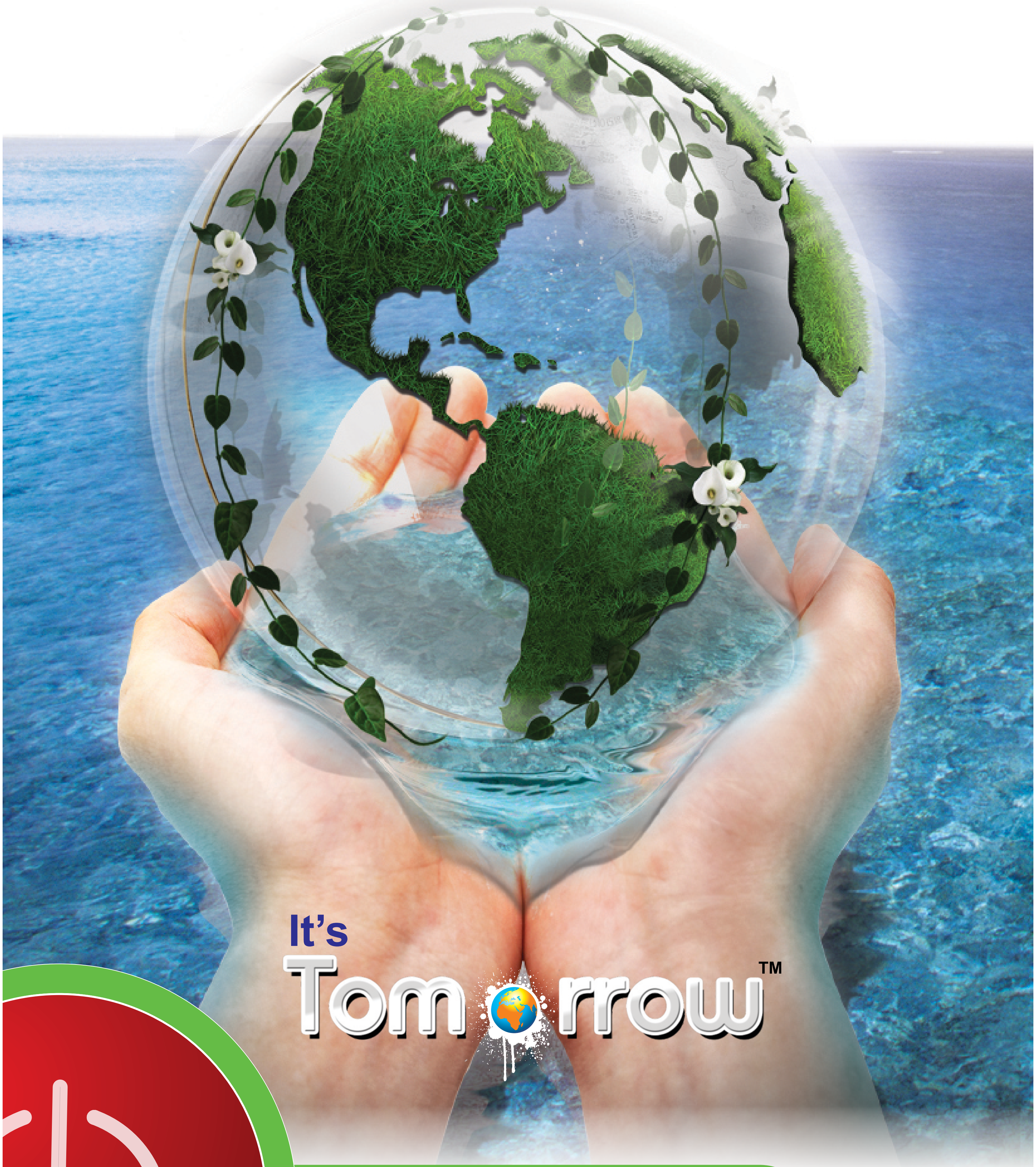

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