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NEWS ALERT

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GLOBAL

[CRISPRoff technology offers unrivaled control of epigenetic inheritance](#)

Researchers at UC San Francisco and the Whitehead Institute have found a mechanism to modify CRISPR's basic architecture to extend its reach beyond the genome and into what's known as the epigenome - proteins and small molecules that latch onto DNA and control when and where genes are switched on or off. A novel CRISPR-based tool called 'CRISPRoff', allows scientists to switch off almost any gene in human cells without making a single edit to the genetic code. The research also shows that once a gene is switched off, it remains inert in the cell's descendants for hundreds of generations, unless it is switched back on with a complementary tool called CRISPR on. The epigenome plays a central role in many diseases, from viral infections to cancer, CRISPRoff technology may in future lead to powerful epigenetic therapies. This approach doesn't involve any DNA edits, it's likely to be safer than conventional

CRISPR therapeutics, which have been known to cause unwanted and potentially harmful changes to the genome.

Novel process breaks down biodegradable plastic faster

Scientists at University of California, Berkeley and the University of Massachusetts have invented a way to make compostable plastics breakdown within a few weeks with just heat and water. Plastics are designed not to break down during normal use, but that also means they don't break down after they're discarded. Compostable plastics can take years to break down, often lasting as long as traditional plastics. The process involves embedding polyester-eating enzymes in the plastic. When exposed to heat and water, the enzyme shrugs off its polymer shroud and starts breaking up the plastic polymer into its building blocks. It eliminates microplastics, a byproduct of many chemical degradation processes and a pollutant in its own right.

Experimental drug shows potential against Alzheimer's disease

Researchers at the Albert Einstein College of Medicine have designed an experimental drug that shows potential for treating Alzheimer's. The novel drug reversed key symptoms of Alzheimer's disease in mice. The drug works by reinvigorating a cellular cleaning mechanism that gets rid of unwanted proteins by digesting and recycling them. The new drug, called CA, was tested in two different mouse models of Alzheimer's disease. In both disease mouse models, oral doses of CA administered over 4 to 6 months led to improvements in memory, depression, and anxiety that made the treated animals resemble or closely resemble healthy, control mice. Walking ability significantly improved in the animal model in which it was a problem. In brain neurons of both animal models, the drug significantly reduced levels of tau protein and protein clumps when compared with untreated animals.

Process simultaneously removes toxic metals and salt to produce clean water

University of California, Berkeley chemists have discovered a way to simplify the removal of toxic metals, like mercury and boron during desalination to produce clean water, while at the same time potentially capturing valuable metals, such as gold. The new technique, which can easily be added to current membrane-based electro-dialysis desalination processes, removes nearly 100% of these toxic metals, producing pure brine, pure water and isolating the valuable metals for later use or disposal. It uses flexible polymer membranes, with embedded nanoparticles about 200 nanometers in diameter, that can be designed to absorb specific metal ions, for example gold or uranium ions. The polymer membrane laced with nanoparticles is very stable in water and at high heat. The new process, which they call ion-capture electro-dialysis, also could potentially remove radioactive isotopes from nuclear power plant effluent. The nanoparticles used in these polymer membranes are called porous aromatic frameworks, or PAFs, which are three-dimensional networks of carbon atoms linked by compounds made up of multiple ring-shaped molecules to capture specific chemicals. The method could enable extraction of valuable substances such as Uranium from seawater.

New nanotech coating destroys bacteria and fungal cells

Researchers from RMIT University in Melbourne, Australia have developed a new nano-thin antimicrobial coating using black phosphorus (BP), which is effective against a broad range of drug-resistant bacteria and fungal cells, while leaving human cells unharmed. The team found that BP is effective at killing microbes when spread in nano-thin layers on surfaces like titanium and cotton, used to make implants and wound dressings. As BP breaks down, it oxidises the surface of bacteria and fungal cells, and ultimately works to rip them apart. The nano-thin layers of BP were tested against five common bacteria strains, including E. coli and drug-resistant MRSA, as well as five types of fungus, including Candida auris. In just two hours, up to 99% of bacterial and fungal cells were destroyed. The BP also self-degrades in 24 hours and would not

accumulate in the body. The team identified the optimum levels of BP that have a deadly antimicrobial effect while leaving human cells healthy and whole, and is testing different formulations and medically-relevant surfaces. The team has filed a provisional patent application and is seeking commercial partners.

[Hydrocracking to recycle plastic waste](#)

Researchers from the University of Delaware have developed a direct method to convert single-use plastic waste like, plastic bags, yogurt containers, plastic bottles and bottle caps, packaging and more to ready-to-use molecules for jet fuels, diesel and lubricants. They used a novel catalyst and unique process called hydrocracking to quickly break down these hardest-to-recycle plastics, known as polyolefins. The process requires approximately 50% less energy than other technologies, and it doesn't involve adding carbon dioxide to the atmosphere and can be done in just a couple hours at low temperature, around 250 degrees Celsius. The method can treat a variety of plastics, even when they are mixed together. It also converts the material into branched molecules that allow them to be more directly translated into an end product. The catalyst itself is actually a hybrid material, a combination of zeolites and mixed metal oxides. The catalyst materials are commonly used and fairly inexpensive and abundant.

[New process to use sunlight to solve world's clean water crisis](#)

Researchers at University of South Australia's Future Industries Institute have developed a promising, cost-effective technique that could deliver safe drinking water to millions of vulnerable and disadvantaged communities. The new process could eliminate water stress for millions of people by using cheap, sustainable material and sunlight. In recent years, there has been a lot of attention on using solar evaporation to create fresh drinking water. But, previous techniques were too inefficient to be practically useful. The new process overcomes those inefficiencies, and can deliver enough fresh water to support many practical needs at a fraction of the cost of existing technologies like reverse osmosis. The technique allows to derive freshwater from seawater, brackish water, or contaminated water, through highly efficient solar evaporation, delivering enough daily fresh drinking water for a family of four from just one square metre of source water. At the heart of the system is a highly efficient photo-thermal structure that sits on the surface of a water source and converts sunlight to heat, focusing energy precisely on the surface to rapidly evaporate the uppermost portion of the liquid.

COVID-19

COVID-19 (WORLD)

[Airborne transmission of coronavirus dominates](#)

There is consistent, strong evidence that the SARS-CoV-2 virus, which causes COVID-19, is predominantly transmitted through the air, according to a new assessment published in the medical journal Lancet. Therefore, public health measures must target airborne transmission, according to experts from the UK, USA and Canada. They found that transmission rates of SARS-CoV-2 are much higher indoors than outdoors, and transmission is greatly reduced by indoor ventilation. Silent (asymptomatic or pre-symptomatic) transmission of SARS-CoV-2 from people who are not coughing or sneezing accounts for at least 40 percent of all transmission. This silent transmission is a key way COVID-19 has spread, by predominantly airborne mode of transmission. Long-range transmission of the virus has happened between people in adjacent rooms in hotels and people who were never in each other's presence. This suggests greater airborne control measures, which deal with inhalation of infectious particles suspended in the air. Such airborne control measures include ventilation, air filtration, reducing crowding and the amount of time people spend indoors, wearing masks whenever indoors (even if not within 6 feet or 2 meters of others), attention to

mask quality and fit, and higher-grade PPE for healthcare and other staff when working in contact with potentially infectious people.

Nanotraps to catch coronavirus

Researchers at the University of Chicago have designed a completely novel potential treatment for COVID-19. "Nanotraps" attract the virus by mimicking the target cells the virus infects. These nanoparticles capture SARS-CoV-2 viruses within the body and then use the body's own immune system to destroy it. To create a trap that would bind to the virus in the same way, they designed nanoparticles with a high density of ACE2 proteins on their surface. Similarly, they designed other nanoparticles with neutralizing antibodies on their surfaces. Both ACE2 proteins and neutralizing antibodies have been used in treatments for COVID-19, but by attaching them to nanoparticles, the researchers created an even more robust system for trapping and eliminating the virus. The nanoparticles are made of FDA-approved polymers and phospholipids, are about 500 nanometers in diameter - much smaller than a cell. That means the Nanotraps can reach more areas inside the body and more effectively trap the virus. The researchers tested the safety of the system in a mouse model and found no toxicity. They then tested the Nanotraps against a pseudovirus - a less potent model of a virus that doesn't replicate - in human lung cells in tissue culture plates and found that they completely blocked entry into the cells.

New test to predict severe COVID-19 cases

Researchers at UC Irvine have developed a two-step prognostic test that can help predict a patient's response to infection with SARS-CoV-2. The test combines a disease risk factor score with a test for antibodies produced early in the infection. The test could be administered at the time of diagnosis to help guide therapeutic choices before the most severe symptoms appear. Previous studies have predicted that the SARS-CoV-2 particle has more than 55 epitopes, or sites on the virus where antibodies can attach. The best studied epitopes to date are those found on the S, or spike, protein, but the virus has three other structural proteins. Using ELISAs, or enzyme-linked immunosorbent assays, the researchers compiled a list of antibodies that might correlate with worse prognosis and ultimately focused on one that attaches to epitope 9 on the N, or nucleocapsid, protein. The group also developed a tool that used data on factors including age, sex, and pre-existing health conditions to produce a disease risk factor score (DRFS).

Heat-inactivation method successfully neutralizes coronavirus

Texas A&M research shows that exposure of coronavirus to a very high temperature, even if applied for less than a second, can be sufficient to neutralize the virus so that it can no longer infect another human host. Applying heat to neutralize COVID-19 for a long period of time is both difficult and costly. Their process works by heating one section of a stainless-steel tube, through which the coronavirus-containing solution is run, to a high temperature and then cooling the section immediately afterward. This experimental setup allows the coronavirus running through the tube to be heated only for a very short period of time. Through this rapid thermal process, the team found the virus to be completely neutralized in a significantly shorter time than previously thought possible. The solution is heated to nearly 72 degrees Celsius for about half a second, it can reduce the virus titer, or quantity of the virus in the solution, by 100,000 times which is sufficient to neutralize the virus and prevent transmission.

Human genes that fight COVID infection identified

To gain better understanding of the cellular response to SARS-CoV-2, including what drives a strong or weak response to infection Scientists at Sanford Burnham Prebys have identified a set of human genes that fight SARS-CoV-2 infection. New insights have been gained into how the virus exploits the human cells it invades, but they are still searching for its Achilles' heel to enable development of optimal antivirals.

Knowing which genes help control viral infection can greatly assist researchers' understanding of factors that affect disease severity and also suggest possible therapeutic options. The genes in question are related to interferons, the body's frontline virus fighters. As a next step, the researchers will look at the biology of SARS-CoV-2 variants that continue to evolve and threaten vaccine efficacy.

[New neutralizing antibody target on SARS-CoV-2 spike protein unmasked](#)

Scientists have identified another potential target for neutralizing antibodies on the SARS-CoV-2 spike protein that is masked by metabolites in the blood, making the target inaccessible to antibodies. This may represent another method of immune evasion by the SARS-CoV-2 virus. Using cryo-electron microscopy and X-ray crystallography, scientists mapped a deep cleft of the N-terminal domain(NTD), showing that a specific pocket in the cleft binds the blood metabolite biliverdin with high affinity. This activity leads to stabilization of the NTD structure and hides the spike protein site from binding and neutralization by a subset of human anti-spike protein antibodies. Addition of excess biliverdin to sera isolated from SARS-CoV-2-infected and convalescent individuals reduced the reactivity of the immune sera by as much as 50%. The results highlight the importance of this small pocket in the NTD for the stimulation of antibody immunity against SARS-CoV-2.

[Hepatitis C drugs multiply effect of antiviral Remdesivir](#)

A team of scientists led by the Rensselaer Polytechnic Institute have found that when combined with drugs currently used to treat hepatitis C, the antiviral remdesivir is 10 times more effective in treating cells infected with SARS-CoV-2. The efficacy of the drug combination would extend to other polymerase inhibitors, of which at least one orally administered version is under development, making possible an oral drug combination that could be taken at home. Four hepatitis C drugs, simeprevir, grazoprevir, paritaprevir, and vaniprevir, exhibited a synergistic effect - an effect that is greater than the sum of its parts. For example, when administered at low doses to virus-infected cells in the presence of simeprevir, 10 times less remdesivir is needed to inhibit 90% of the virus than when remdesivir is used on its own. Increasing the efficacy of the polymerase inhibitor remdesivir reduces the dosage required, and therefore could be more effective, and also reduce unwanted side effects in treating COVID-19.

[LEOPARD paves way for novel COVID testing method](#)

Most conventional molecular diagnostics usually detect only a single disease-related biomarker. Scientists from the Helmholtz Institute for RNA-based Infection Research (HIRI) and the Julius Maximilians University (JMU) in Würzburg have now paved the way for a completely new diagnostic platform - LEOPARD. It is a CRISPR-based method that is highly multiplexable, with the potential to detect a variety of disease-related biomarkers in just one test. LEOPARD, which stands for 'Leveraging Engineered tracrRNAs and On-target DNAs for PARallel RNA Detection', is based on the finding that DNA cutting by Cas9 could be linked to the presence of a specific ribonucleic acid (RNA). This link allows LEOPARD to detect many RNAs at once, opening opportunities for the simultaneous detection of RNAs from viruses and other pathogens in a patient sample.

COVID-19 (INDIA)

[COVID-19 Second Wave in India May Peak by Mid-May](#)

The ongoing second wave of the COVID-19 pandemic in India is likely to peak between May 11-15 with about 3.4 million total 'active' cases and decline steeply by the end of May, according to a mathematical module devised by IIT Kanpur and Hyderabad scientists. The team applied the 'Susceptible, Undetected, Tested (positive), and

Removed Approach' (SUTRA) model which also takes into account the fraction of asymptomatic patients detected due to contact tracing and other such protocols. The model has been tested with data from Italy, India, and the US and the predictions closely match the actually observed outcomes.

Haffkine Institute gets nod to produce Covaxin

The Centre has given permission to the Maharashtra government to produce Bharat Biotech's Covaxin in the Haffkine Institute in Mumbai, Maharashtra. The Maharashtra government had sought permission from the Centre in March seeking Centre's nod in getting Haffkine to have a deal with Bharat Biotech to produce Covaxin under a 'fill and finish basis' or some other arrangement. The Ministry of Science and Technology allowed the state to produce vaccines for a period of one year.

IISc team building indigenous ventilator prototype for COVID-19 patients

With the setting in of the second wave of COVID-19 and cases surging, there is a growing need for ventilators. A team of engineers at the Indian Institute of Science (IISc) are currently building a prototype of an electro-mechanical ventilator from scratch, using only components found or made in India, based on guidelines issued by the UK Medicines and Healthcare Products Regulatory Agency. The ventilator has built-in sensors and actuators that allow doctors to set the volume and pressure of gas delivered to the patient precisely, which depends on the severity of their illness. The team is also getting inputs from doctors to simplify the interface and create a dashboard preloaded with approved settings. This would allow it to be operated quickly in an emergency even by untrained technicians or nurses. They are currently working with potential manufacturers to check the inventory of critical components before including them in the final design.

CSIR-CMERI develops Oxygen enrichment technology

CSIR-CMERI developed an oxygen enrichment unit which requires easily available oil free reciprocating compressors, oxygen grade zeolite sieves and pneumatic components. The unit can safely be placed in the isolation ward of the hospital for patients who are in need of oxygen. CSIR-CMERI will be providing manufacturing guidance to the technology transferees as well as provide information on raw materials sourcing. Various industries have shown their interest in CSIR-CMERI developed Oxygen Enrichment technology and expressed their willingness to start manufacturing with the cooperation of CSIR-CMERI.

Oxygen Generation Plants to be set up in public health facilities across the country.

To boost the availability of oxygen to hospitals, the PM CARES Fund has given in-principle approval for allocation of funds for installation of 551 dedicated Pressure Swing Adsorption (PSA) Medical Oxygen Generation Plants inside public health facilities in the country. These dedicated plants will be established in identified Government hospitals in district headquarters in various States/UTs. The procurement will be done through the Ministry of Health and Family Welfare. This initiative would strengthen the public health system and ensure that each of these hospitals has a captive oxygen generation facility to address the day to day medical oxygen needs of these hospitals and the district.

Virafin drug from Zydus gets Emergency nod

Drug Controller General of India (DCGI) gave a restricted emergency use approval to the ZydusCadila's 'Virafin' for treating the patients showing moderate COVID-19 symptoms in adults. Virafin is a pegylated interferon alpha-2b(PegIFN), which when subcutaneously injected to the patient in the early stages of infection, resulted in their faster recovery. Phase II and III human clinical trials for the drug have been carried out.

Phase II trial confirmed the safety, tolerability and efficacy of Virafin. The trial also reported that Virafin reduces viral load and aids in managing the disease in a better way by reducing the need for supplemental oxygen. Phase III clinical trial studies reported that 91.1% of the patients when administered subcutaneously with Virafin turned out to be RT-PCR negative by day 7, apart from faster recovery as compared to other anti-viral agents.

DRDO develops SpO2 based Supplemental Oxygen Delivery System

Defence Research and Development Organisation (DRDO) has developed SpO2 (Blood Oxygen Saturation) supplemental Oxygen Delivery System for soldiers posted at extreme high-altitude areas. The system delivers supplemental oxygen based on the SpO2 levels and prevents the person from sinking into a state of Hypoxia, which is fatal in most cases, if it sets in. This automatic system can also prove to be a boon during the current Covid-19 situation. The electronic hardware of the system is designed for functioning at extreme altitudes featuring low barometric pressures, low temperatures and humidity. The software safety checks incorporated into the system are critical in ensuring the functional reliability of the system in field conditions. This automated, easy to use Oxygen Delivery System now available is a great help during the present crisis.

IIT Kharagpur launches COVIRAP diagnostic technology

IIT Kharagpur has successfully commercialised its flagship healthcare product COVIRAP, the novel diagnostic technology to focus on infectious diseases including COVID-19. The researchers claimed COVIRAP test overcomes several potential bottlenecks faced by similar other tests in the past, for instance, poor performance outside highly controlled laboratory and lack of simple, affordable, yet generic and universal instrument that may be used for home-based testing and community health care for a wide variety of infectious and non-infectious diseases. The kit has also been supplemented with a free smartphone app to facilitate unambiguous results interpretation and automated dissemination to the patients.

VINCOV-19 cleared for clinical trials to treat COVID-19

University of Hyderabad (UoH), CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB) and VinsBioproducts Ltd., has developed VINCOV-19 a therapeutic antibody product obtained after immunisation of horses with inactivated SARS-CoV-2 virus in combination with adjuvants. The antibodies triggered in the horses are purified and further processed to generate a highly pure antibody fragment-based product — Fab2. Results have indicated that this product has a high neutralising capacity against SARS-CoV-2. Pre-clinical trials for VINCOV-19 were highly successful, showing potent virus neutralising capability. The next phase of clinical trials will involve over 300 COVID-19 patients spread across the country to examine the safety and efficacy of the antibodies.

IIT Bombay develops a simple and fast solution to oxygen crisis

The Indian Institute of Technology (IIT) Bombay has come up with a creative and ingenious solution to addressing the shortage of medical oxygen for the treatment of COVID-19 patients in the country. The pilot project is a collaborative effort between IIT Bombay, Tata Consulting Engineers and Spantech Engineers, Mumbai, who deal with PSA Nitrogen & Oxygen plant production. Spantech Engineers installed the required plant components as a skid at IIT Bombay for evaluation using IIT Bombay's infrastructure. The process has been tested successfully and relies on conversion of PSA (Pressure Swing Adsorption) Nitrogen Unit to PSA Oxygen Unit. Initial tests done at IIT Bombay have shown promising results. Oxygen production could be achieved at 3.5 atm pressure, with a purity level of 93% - 96 %.

Efficient technology for recycling Aluminium scraps developed

A team of scientists has developed a cost-effective technology to recycle aluminum scraps efficiently minimizing material losses in the process. The technology involves washing the basic inputs - assorted aluminium scraps (mixed), drying and preheating, removal of basic impurities in melting furnace, degassing in nitrogen atmosphere and addition of alloying elements in holding furnace, filtering (refining) and pouring the metal into the mold. Three problems such as separation of iron and silicon materials, preventing the loss of magnesium and adding of other elements like chromium, strontium, zirconium and so on to improve the mechanical properties under the prescribed limits have been addressed during the process. The conversion rate in the new technology developed has also been increased by 70% to 80% depending on various cases of scraps dealt with. The technology increases the purity and quality of recycled aluminium melt. The developed technology can be used in tiny and cottage Industries, small scale industries and MSME Aluminium foundries and recycling industries. The team is also in the process of filing a patent for the technology and has also transferred it to Swayam Industries, Coimbatore, Servo Scientific Equipments, Coimbatore.

IIT Guwahati researchers develop membrane to remove micro-plastics from seawater

Indian Institute of Technology Guwahati (IIT-G) researchers have developed a microfiltration process to remove micro-plastics from seawater. Micro-plastics – plastic pieces smaller than one-fifth of an inch – are now found in almost all oceans and marine animals. The IIT Guwahati team has, for the first time, shown efficient removal of micro-plastics from synthetic seawater using hollow fibre microfiltration (HF-MF) membranes. Hollow fibre membranes are already used extensively in daily life applications such as RO pre-treatment, industrial water/wastewater, juice processing, and other biotech applications, including in dialysis membranes used for kidney ailments. The hollow fibres are made of many kinds of materials and the ones used by the IITG team was made of polypropylene and a silk protein called sericin. Micro-plastics ingested by human beings can disrupt hormones, leading to infertility, and cause nervous system problems, and even cancer. Some advantages of hollow fibre membrane technology that make it promising for pre-treatment of seawater include simplicity of installation and use, cost effectiveness, no need for power supply, no generation of waste, and operability under low water pressure.

DRDO conducts maiden trial of Python-5 Air to Air Missile

The successful tests at Goa of the 5th generation Python-5 Air-to-Air Missile (AAM) and Derby Beyond Visual Range (BVR) AAM have completed a series of missile trials to validate performance under extremely challenging scenarios. The Derby missile achieved direct hits on a high-speed maneuvering aerial target and the Python missiles also achieved 100% hits, thereby validating their complete capability. The trials met all their planned objectives. The missile systems will be integrated into the Tejas, India's indigenous Light Combat Aircraft

IN BRIEF

Microalgae for producing various oils

Scientists from China have combined the genes for a Acyl-ACP thioesterase (TE) enzyme pathway from a Cuphea plant to the microalgae Nannochloropsis oceanica (N. oceanica). By combining the enzymes, the team showed that it was possible to vary the fatty acid chain up and down a broad range of desired lengths, and within the N. oceanica algae. The researchers hope that this basic framework will now accelerate the development of various fatty acid chain lengths within other species of Nannochloropsis

and other oleaginous microalgae. By directly turning CO₂, sunlight and seawater into designer oils, such microalgae cell factories are carbon negative.

Plasma device can quickly disinfect surfaces

US scientists have demonstrated a flexible, hand-held device based on low-temperature plasma that can quickly and easily use to disinfect surfaces without special training. The prototype, which operates at room temperature under normal atmospheric pressure, can eliminate 99.99 percent of the bacteria on surfaces, including textiles and metals in just 90 seconds. It is being tested with human viruses. The device, called a dielectric barrier discharge (DBD), is built like a sandwich with an electrode made of copper tape. The other electrode is grounded with holes in it to let the plasma flow through. Between these electrodes is an insulating tape. The room-temperature plasma interacts with air to produce what are called reactive oxygen and nitrogen species, along with electrons, currents, and electrical fields which penetrate and destroy bacteria cell walls and kill the cells. The device is able to improve the action of hydrogen peroxide, a common antiseptic cleanser.

Malaria vaccine achieves 75% efficacy goal

Researchers from the Multi-stage Malaria Vaccine Consortium, led by the University of Oxford have reported findings from a Phase IIb trial of a candidate malaria vaccine, R21/Matrix-M, which demonstrated high-level efficacy of 77% over 12-months of follow-up. was conducted in Burkina Faso with 450 participants, aged 5-17 months during May-August 2019, prior to the peak malaria season. The researchers, in collaboration with Serum Institute of India Private Ltd., and Novavax Inc., have now started recruitment for a Phase III licensure trial to assess large-scale safety and efficacy in 4,800 children, aged 5-36 months, across four African countries. This vaccine could be the first to reach the WHO's goal of 75% efficacy.

NASA's Perseverance Mars rover extracts first oxygen

Perseverance, NASA's six-wheeled robot on the Martian surface, has converted some of the Red Planet's thin, carbon dioxide-rich atmosphere into oxygen. An experimental instrument aboard Perseverance called the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) accomplished the task. The device separates oxygen atoms from carbon dioxide molecules, and generates a waste product, carbon monoxide. The process requires high levels of heat and a temperature of approximately 800 Celsius. To achieve this, the MOXIE unit is made with heat-tolerant materials such as 3D-printed nickel alloy parts, and a lightweight aerogel that helps retain the heat. In this first operation, MOXIE's oxygen production was quite modest -- about 5 grams. MOXIE is designed to generate up to 10 grams of oxygen per hour.

Vertical turbines could be the future for wind farms

Researchers from Oxford Brookes University has found that the vertical turbine design is far more efficient than traditional turbines in large scale wind farms, and when set in pairs the vertical turbines increase each other's performance by up to 15%. They used computer simulation to show that wind farms can perform more efficiently by substituting the traditional propeller type Horizontal Axis Wind Turbines (HAWTs), for compact Vertical Axis Wind Turbines (VAWTs). The research found that VAWTs increase each other's performance when arranged in grid formations. Positioning wind turbines to maximise outputs is critical to the design of wind farms. The study is the first to comprehensively analyse many aspects of wind turbine performance, with regards to array angle, direction of rotation, turbine spacing, and number of rotors. It is also the first research to investigate whether the performance improvements hold true for three VAWT turbines set in a series

National climate vulnerability assessment report released

The report 'National climate vulnerability assessment for Adaptation Planning in India Using a Common Framework' - a nationwide exercise jointly supported by the Department of Science and Technology and the Swiss Agency for Development and Cooperation (SDC) has been released. The report identified the most vulnerable states and districts in India with respect to current climate risk and key drivers of vulnerability. The report pointed out that Jharkhand, Mizoram, Orissa, Chhattisgarh, Assam, Bihar, Arunachal Pradesh, and West Bengal as states highly vulnerable to climate change and these states, mostly in the eastern part of the country, require prioritization of adaptation interventions. A total of 94 representatives from 24 states and 2 Union Territories participated in the nation-wide exercise which involved participation of States and Union Territory governments and hands-on training and capacity-building exercises to identify vulnerable districts. Among all states, Assam, Bihar, and Jharkhand have over 60% districts in the category of highly vulnerable districts. The assessments will contribute to the development of more targeted climate change projects and that they will support the implementation and the potential revisions of the State Action Plans on Climate Change. The assessments can further be used for India's reporting on the Nationally Determined Contributions under the Paris Agreement.

European Parliament approves Horizon Europe programme

The European Parliament approved the €95.5 billion (at current prices) Horizon Europe programme, down from the original €120 billion. The previous programme, Horizon 2020, had a budget of €76.26 billion in 2018 prices. The UK's departure from the bloc and estimates that the Horizon 2020 budget would have reduced it to €67.06 billion. The net allocation for Horizon Europe is 30% per cent above Horizon 2020 (with Brexit). MEPs are still looking for new sources to top up the Horizon Europe budget. Horizon Europe is designed to address societal challenges through six different funding clusters, from health to democracy. The new regulation also streamlines the European public private R&D partnerships and introduces the research missions, which are intended to advance breakthrough discoveries and innovations in strategic sectors. The Horizon Europe law also regulates international cooperation between the EU and third countries in research and innovation, subject to individual deals being struck with each country wishing to participate in the programme. Negotiations with the UK, Switzerland and Israel are ongoing. Other countries, such as Canada, Japan or Australia might also join. The UK wants to be an associate country participating in Horizon Europe, but the terms for scientific collaboration are still unclear. Talks with Switzerland are also deadlocked and could impact the country's status in the research programme. The new legislation also establishes the EU's own start-up fund, the European Innovation Council (EIC), which will award grants and make equity investments to help small and medium-sized companies scale up new technologies.

CSIR-CMERI developed technologies for North East development

CSIR-CMERI, Durgapur has exhibited developed technologies such as Ginger-Turmeric Processing Technologies, Municipal Solid Waste Management, Solar Tree and Artifacts, Complete Water Purification Technologies (Arsenic-Iron-Fluoride) & solutions, Effluent Treatment Plant, Hybrid Mini-Grid among others. The exhibition led to exploratory discussions between officials from National Institute of Technology, Meghalaya for using these technologies in Meghalaya, incubation of Start-Ups, skill development and research collaboration.

IISc, Prorigo develop patent management software

Indian Institute of Science, Bengaluru, (IISc) and Prorigo Software Pvt. Ltd. have jointly developed a software named ProriISe that helps automate the legal and

bureaucratic part of the patent process for intellectual property. The software is customized for Indian academic needs and comes at a fraction of the cost of software developed outside India — which was the only choice available until now. Version 1.0 of the software has been released after about three years of testing and positive feedback. The software would automate the process, allowing the department to focus on translating the IP to industry.

SCIENCE POLICY AND DIPLOMACY

[India and Japan discuss Hydrogen based technologies](#)

Experts from India and Japan discussed possibilities of collaboration for promotion of hydrogen-based technologies as well as related innovations, trends, concerns, and solutions at a webinar on De-carbonisation: Exploring the Hydrogen Prospects and Innovative Technologies. The webinar was jointly organised by the Embassy of India in Japan, Department of Science & Technology (DST), Government of India along with The Institute for Global Environmental Strategies (IGES), Japan, and The Energy and Resources Institute (TERI), India, which provided a platform for the experts to deliberate on the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions. The experts agreed that hydrogen could be a good alternative because of its capability of producing lower emissions and less pollution and looked forward to collaborations between groups in India and Japan to that end.

[EU reaches agreement on emissions reduction](#)

Negotiators from the European parliament and EU member states reached an agreement on the European Climate Law that will include the EU's commitment to reaching climate neutrality by 2050, reducing net greenhouse gas emissions by 'at least 55%' by 2030, compared to 1990 levels. That objective will therefore also become a legal obligation for the EU and its member states. A 15-member European Scientific Advisory Board will be set up to advise policymakers on the alignment of EU policies with the bloc's climate neutrality goal. Beyond 2050, EU negotiators agreed to strive towards reaching negative emissions. The 2050 climate goal will remain an objective for the EU to attain as a group, rather than for individual countries. The agreement will now be vetted by legal experts and submitted for a final approval from the European Council and the Parliament.

[Prime Minister Modi and President Putin discuss cooperation](#)

In a telephonic conversation, Prime Minister Narendra Modi discussed the evolving Covid-19 pandemic situation and noted the ongoing cooperation between the two countries to fight the global pandemic with the President of the Russian Federation H.E. Vladimir Putin. The emergency use of Sputnik-V vaccine has been approved in India. The leaders noted that the Russian vaccine will be manufactured in India for use in India, Russia and third countries. They attached importance to further deepening bilateral cooperation in various sectors in the spirit of our special and privileged partnership. Prime Minister Modi conveyed appreciation for the support received from Russia for India's Gaganyaan Program and the completion of the Russian phase of training of the four Gaganyaan astronauts. The leaders noted the scope for increasing cooperation in the area of renewable energy, including the Hydrogen economy. They decided to establish a new 2+2 dialogue at Minister level comprising Foreign and Defence Ministers from both countries.

[Leaders Summit on commitments to tackle Global Climate Change](#)

The Leaders Summit on Climate of 40 world leaders met virtually on 22-23 April. The US presented its goal of reducing emissions by 50-52% by 2030 compared to 2005 levels, and commitments to create jobs, mobilize finance, spur transformational innovations, conserve nature, build resilience, strengthen adaptation, and drive

economic growth for communities. The two-day event included eight sessions on: raising our climate ambition; investing in climate solutions; adaptation and resilience; climate action at all levels; climate security; nature-based solutions; unleashing climate innovation; and the economic opportunities of climate action. A meeting of the US-led Major Economies Forum (MEF) on Energy and Climate, was also held, whose 17 members are Australia, Brazil, Canada, China, the EU, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, the Russian Federation, South Africa, the UK, and the US. Together, they are responsible for approximately 80% of global greenhouse gas (GHG) emissions and global gross domestic product (GDP). MEF meetings had taken place periodically from 2009-2016. Pledges to cut emissions were offered by several countries.

RIS-FISD programme invites contributions for the next (July 2021) issue of its peer reviewed journal Science Diplomacy Review. For more details, see the call for paper: http://fisd.in/sites/default/files/Science_Diplomacy_Review_Call_for_Papers_July_2021_Issue_F.pdf

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