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SCIENCE DIPLOMACY**

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NEWS ALERT

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GLOBAL

[Russian chemists develop polymer cathodes for batteries](#)

Russian researchers have synthesized and tested new polymer-based cathode materials for lithium dual-ion batteries. The tests showed that the new cathodes withstand up to 25,000 operating cycles and charge in a matter of seconds, thus outperforming lithium-ion batteries. The cathodes can also be used to produce less expensive potassium dual-ion batteries. The team used a promising post-lithium dual-ion technology and cathode prototypes made of polymeric aromatic amines synthesized from various organic compounds. The team synthesized two novel copolymers of dihydrophenazine with diphenylamine (PDPAPZ) and phenothiazine (PPTZPZ), which they used to produce cathodes. As anodes, they used metallic lithium and potassium. Lithium half-cells with PDPAPZ were fairly quick to charge

and discharge while displaying good stability and retaining up to a third of their capacity even after 25,000 operating cycles. PDPAPZ potassium half-cells exhibited a high energy density of 398 Wh/kg compared to 200-250 Wh/g for common lithium cells.

[Semiconductor chip detects exhaled gas with high sensitivity at room temperature](#)

Researchers at the Toyohashi University of Technology have developed a testing chip using semiconductor micro-machining that can detect volatile gases in exhaled breath in ppm concentrations at room temperature. A polymer that expands and contracts when gas is absorbed is formed on a flexibly deformable nanosheet, and the amount of deformation that occurs when a target gas is absorbed is measured, allowing gas to be detected at high sensitivity. The testing chip, which is formed in the size of a few square millimeters with semiconductor micro-machining technology, is expected to contribute to tele-health as an IoT gas sensor that can easily be used in the home for breath tests. The sensor measures the amount of the target gas absorbed in terms of the amount of deformation of the sheet. It uses the interference of light passing through an air gap of up to a few hundred nanometers between the thin nanosheet that changes shape and the semiconductor substrate. The testing chip can detect ethanol gas in ppm concentrations. The sensor can be expected to be used as a small, portable breath testing device.

[Inexpensive battery charges rapidly for electric vehicles](#)

A team of Penn State engineers have developed lithium iron phosphate batteries that could give electric vehicles a range of 400 km with and the ability to charge in 10 minutes. The researchers also say that the battery should be good for 3.2 million km in its lifetime. The key to long-life and rapid recharging is the battery's ability to quickly heat up to 60 degrees C, for charge and discharge, and then cool down when the battery is not working. The battery uses a thin nickel foil with one end attached to the negative terminal and the other extending outside the cell to create a third terminal. Once electrons flow, it rapidly heats up the nickel foil through resistance heating and warm the inside of the battery. Once the battery's internal temperature is 60 degrees C, the switch opens and the battery is ready for rapid charge or discharge. This self-heating method, enables the use of low-cost materials for the battery's cathode and anode and a safe, low-voltage electrolyte. The cathode is thermally stable, lithium iron phosphate, which does not contain any of the expensive and critical materials like cobalt. The anode is made of very large particle graphite, a safe, light and inexpensive material. Because of the self-heating, the researchers said they do not have to worry about uneven deposition of lithium on the anode, which can cause lithium spikes that are dangerous. These batteries can produce a large amount of power upon heating -- 40 kilowatt hours and 300 kilowatts of power. An electric vehicle with this battery could go from zero to 100 km per hour in 3 seconds.

[CRISPR gene editing technology to treat sickle cell disease](#)

University of Illinois researchers have used gene editing to modify the DNA of stem cells by deleting the gene BCL11A, the gene responsible for suppressing fetal hemoglobin production. By doing so, stem cells start producing fetal hemoglobin so that patients with congenital hemoglobin defects (beta thalassemia or sickle cell disease) make enough fetal hemoglobin to overcome the effect of the defective hemoglobin that causes their disease. The gene manipulation does not use a viral vector, but is done with electroporation (quick production of pores into the cells with high voltage) which is known to have low risk of off-

target gene activation. The first two patients to receive the treatment have had successful results and continue to be monitored. An international clinical trial is being done. This gene-editing procedure has the potential to use cells of the same patient which can be manipulated and can be transplanted without the risk of rejection or to cause immune reactions from the donor (graft-versus-host disease). Patients who participate in the trial in future will have cells sent to the CRISPR manufacturing site, where the cells undergo genetic editing. Patients then receive chemotherapy prior to the edited stem cells being re-inserted into their bloodstream. Currently, 30% of transplants being performed in India are to treat severe beta thalassemia. This treatment could be accessible and affordable in many low-middle-income countries in the Middle East, Africa, and India.

COVID-19

COVID-19 (WORLD)

[Rapid blood test identifies COVID-19 patients at high risk of severe disease](#)

Scientists at Washington University School of Medicine in St. Louis have shown that a relatively simple and rapid blood test can predict -- within a day of a hospital admission -- which patients with COVID-19 are at highest risk of severe complications or death. The blood test measures levels of mitochondrial DNA, the presence of which in the bloodstream is a sign that violent cell death is taking place in the body. The researchers evaluated 97 patients with COVID-19, measuring their mitochondrial DNA levels on the first day of their hospital stays. They found that mitochondrial DNA levels were much higher in patients who eventually were admitted to the ICU, intubated or died. The researchers found this association held independently of a patient's age, sex and underlying health conditions. On average, mitochondrial DNA levels were about tenfold higher in patients with COVID-19 who developed severe lung dysfunction or eventually died. The test predicted outcomes as well as or better than existing markers of inflammation currently measured in patients hospitalized with COVID-19. The test is quick and straightforward to perform in most hospital settings because it uses the same machinery that processes the standard PCR test for COVID-19. The method allows mitochondrial DNA levels to be quantified directly in the blood, without requiring intermediate steps to extract the DNA from the blood, and the technique returned results in less than an hour.

[WHO Emergency Committee reviews emerging SARS-CoV-2 variants](#)

The WHO Emergency Committee (EC) on COVID-19 met virtually on 14 January to review the emerging variants of SARS-CoV-2, and to consider the potential use of vaccination and testing certificates for international travel. On variants, the EC called for a global expansion of genomic sequencing and sharing of data, along with greater scientific collaboration to address critical unknowns. The committee urged WHO to develop a standardized system for naming new variants that avoids geographical markers. On vaccines, the committee underlined the need for equitable access through the COVAX Facility as well as technology transfer to increase global production capacities. The committee strongly encouraged vaccine manufacturers to rapidly provide safety and efficacy data to WHO for emergency use listing. The lack of such data is a barrier to ensuring the timely and equitable supply of vaccines at the global level. Given that the impact of vaccines in reducing transmission is yet unknown, and the current availability of vaccines is too limited, the committee recommended that countries do not require proof of vaccination from incoming

travellers. The committee advised countries to implement coordinated, evidence-based measures for safe travel and to share with WHO experiences and best practices learned.

[Machine learning technique to enhance predictions of COVID-19 outcomes](#)

Researchers from Mount Sinai Health System, New York, have used a machine learning technique called "federated learning" to examine electronic health records to better predict how COVID-19 patients will progress. The researchers used data from electronic health records at five separate hospitals within the Health System to predict mortality in COVID-19 patients. They compared the performance of a federated model against ones built using data from each hospital separately, referred to as local model and found that the federated models demonstrated enhanced predictive power and outperformed local models at most of the hospitals. This emerging technique holds promise to create more robust machine learning models that extend beyond a single health system without compromising patient privacy and to improve the quality of care for the triage patients.

[Free online tool to calculate risk of COVID-19 transmission in poorly-ventilated spaces](#)

Researchers from the University of Cambridge and Imperial College London, used mathematical models to show how SARS-CoV-2 spreads in different indoor spaces, depending on the size, occupancy, ventilation and masks being worn by people. They found that in poorly ventilated spaces, the virus spreads further than two meters in seconds, and is far more likely to spread through prolonged talking than through coughing. The researchers used characteristics of the virus, such as its decay rate and viral load in infected individuals, to estimate the risk of transmission in an indoor setting due to normal speech or a short cough by an infectious person. They developed mathematical models to calculate the amount of virus contained in exhaled particles, and to determine how these evaporate and settle on surfaces. Based on their models, the researchers have now built Airborne.cam a free, open-source tool which can be used in public spaces, such as shops, workplaces and classrooms, in order to determine adequate ventilation and the risk of indoor transmission or how that risk changes over time.

[Potential COVID-19 drug successful in laboratory study](#)

A study conducted on mouse models with COVID-19 showed positive results in preventing the disease from progression, when a small peptide, ACE-2 interacting Domain of SARS-CoV-2 (AIDS) was introduced nasally. The peptide proved effective in reducing fever, protecting the lungs, improving heart function and reversing cytokine storm - a condition in which an infection triggers the immune system to flood the bloodstream with inflammatory proteins. Researchers conducting this study at Rush University Medical Centre designed a hexapeptide corresponding to the ACE-2 interacting domain of SARS-CoV-2 to inhibit the binding of virus with ACE-2 receptors. Such a specific medicine for reducing SARS-CoV-2 related inflammatory events and taking care of respiratory and cardiac issues of COVID-19, offers hope for better management of the disease even in the post-vaccine era.

[COVID-19 attack on brain, not lungs, triggers severe disease in mice](#)

Researchers from Georgia State University have found that infecting the nasal passages of mice with the virus that causes COVID-19 led to a rapid, escalating attack on the brain that triggered severe illness, even after the lungs were cleared off the virus. The study assessed

virus levels in multiple organs of the infected mice and found that virus levels in the lungs of infected mice peaked three days after infection, then began to decline. However, very high levels of infectious virus were found in the brains of all the affected mice on the fifth and sixth days, which is when symptoms of severe disease became obvious, including laboured breathing, disorientation and weakness. The study found virus levels in the brain to be about 1,000 times higher than in other parts of the body.

MicroRNAs and zoonotic COVID transmission

Researchers at University of Westminster have shown that small single stranded genetic material may play a role in how SARS-CoV-2 passes from animals to humans and why some animal carriers of the virus may show no symptoms while it can be deadly in humans. The researchers assessed small genetic material known as microRNAs, which can help to regulate the immune system. They assessed seven key microRNAs in some of the main wild and domestic zoonotic species reported for human viruses. These seven microRNAs regulate genes that play important roles in viral-host interactions and other relevant cellular and immunological processes. They revealed differences in these microRNA sequences between the different suspected zoonotic carriers compared with humans, indicating possible roles for these microRNAs in the coevolution of the virus and the host. The results also highlight pangolin, bat, cow, and pig as likely zoonotic carriers, and point to specific changes in the pangolin, which may affect disease severity of COVID-19 in humans. The research suggests that targeting microRNAs in emerging infectious diseases may be a promising strategy for novel therapeutic intervention.

Ultra-absorptive nanofiber swabs for improved test sensitivity of SARS-CoV-2

Researchers from the University of Nebraska Medical Center developed an ultra-absorptive nanofiber swabs tipped with hierarchical 3D nanofiber objects which can absorb and release more virus, proteins, cells, bacteria and DNA from solutions and surfaces. Implementation of nanofiber swabs in SARS-CoV-2 detection can reduce the false negative rates at two viral concentrations and can identify SARS-CoV-2 at a 10 times lower viral concentration compared to flocked and cotton swabs. The nanofiber swabs show greater promise in improving test sensitivity. Currently, the most sensitive test for COVID-19 involves using a long swab to collect a specimen from deep inside a patient's nose, and then using RT-PCR to detect SARS-CoV-2 RNA. But if the viral load is low, which can occur in the early course of infection, the swab might not pick up enough virus to be detectable. The nanofiber swabs could address this challenge and reduce the number of false-negative tests by improving sample collection and test sensitivity. This also has far-reaching potential in diagnosing other diseases, testing for foodborne illnesses and forensic identification for crime suspects from miniscule biological specimens.

New biosensors quickly detect coronavirus proteins and antibodies

A team of researchers from the Institute for Protein Design at University of Washington Health Science, used computers to design new biosensors that glow within minutes when mixed with fluid from a nasal swab or blood sample. The protein-based biosensors can recognize specific molecules on the surface of the virus or COVID-19 antibodies, bind to them, and emit light through a biochemical reaction. It can directly detect coronavirus in patient samples without the need for genetic amplification by RT PCR- a technique that requires specialized staff, lab supplies and equipment. This work highlights the power of de

novo protein design to create molecular devices from scratch with new and useful functions. Biosensors similar to these could also be designed to detect medically relevant human proteins such as Her2 (a biomarker and therapy target for some forms of breast cancer) and Bcl-2 (which has clinical significance in lymphoma and some other cancers), as well as a bacterial toxin and antibodies that target Hepatitis B virus.

COVID-19 (INDIA)

[Sero surveillance by CSIR reveals presence of antibodies six months after infection](#)

In a first of its kind, a pan-India survey tracking about 10,000 employees of the Council of Scientific and Industrial Research (CSIR) in different laboratories spread across 24 Indian cities, on the prevalence of COVID-19 antibodies and its stability was conducted for six months. The survey found that nearly 10% of the staff were infected and the key neutralising antibodies that protect against the virus waned after infection but were at detectable levels even after six months. This sheds light in the effectiveness of future vaccination and general immunity. Such longitudinal study to track a cohort over time, will also continue in future which is first of its kind being conducted anywhere in the world.

[India's biggest vaccination drive uses MEITY's Rapid Assessment System Platform](#)

Under the COVID-19 Vaccination drive, the Government of India has been using 'Rapid Assessment System (RAS)', a platform developed by the Ministry of Electronics and IT (MeitY) for taking feedback from those who gets vaccinated. This initiative to utilize RAS platform is aimed at improving the vaccination experience for citizens, while ensuring that all norms are being followed during the vaccination process at all vaccination centres. Registered mobile numbers and names of those vaccinated on a day are sent to the RAS system by Co-WIN platform at midnight and the RAS system prepares a unique URL for feedback questions and sends personalized SMSs to all beneficiaries of that day.

[India sends COVID vaccines to 9 countries](#)

India has informed the UN Security Council that it will gradually supply vaccines to the COVAX facility of the World Health Organisation and undertake contractual supplies to various countries in a phased manner. More than six million doses have been airlifted to nine countries under New Delhi's "vaccine diplomacy", in Phase-I as grant assistance. India has also provided training to several partner countries to strengthen their clinical capabilities, as well as to enhance their capacities for vaccine administration. Nepal, Bangladesh, Bhutan and the Maldives have received India's COVID-19 vaccines under grant assistance. India sent 150,000 doses of Covishield vaccines to Bhutan and 100,000 doses to the Maldives, while over 2 million doses of vaccines were provided to Bangladesh, and about one million doses to Nepal. Myanmar received over one million doses and Sri Lanka 500,000. India began commercial exports of COVID-19 vaccines and sent two million doses each to Brazil and Morocco. Further, 3 million doses are to be sent to Saudi Arabia and 500,000 to Afghanistan.

[More than 3 million Healthcare Workers Vaccinated for COVID-19 across the country](#)

India has seen a significant hike in the number of healthcare workers getting vaccinated against COVID-19, under the countrywide COVID-19 vaccination program which began on 16 January. The cumulative number of healthcare workers who have been administered the COVID-19 vaccine was 3,368,734 beneficiaries through 62,939 sessions till the evening of 14th day of vaccination.

INDIA – SCIENCE & TECHNOLOGY

[DRDO develops Motor Bike Ambulance ‘Rakshita’](#)

Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi has handed over Rakshita, a bike-based casualty transport emergency vehicle to Central Reserve Police Force (CRPF). The bike ambulance will help in overcoming the problems faced by Indian security forces and emergency healthcare providers. It will provide life-saving aid for evacuation of injured patients from low intensity conflict areas. This will be handy in the congested streets and remote locations, where access through conventional ambulance is difficult and time consuming. The bike can respond to a medical emergency need of patients faster than a four-wheeler due to its functionality and integrated emergency medical support system. Rakshita is fitted with a customized reclining Casualty Evacuation Seat (CES), which can be fitted in and taken out as per requirement. Other major features are the head immobilizer, safety harness jacket, hand and foot straps for safety, adjustable footrest and physiological parameter measuring equipment with wireless monitoring capability and auto warning system for driver. The vital parameters of the patient can be monitored on the dashboard mounted LCD. It is also equipped with air splint, medical and oxygen kit for on spot medical care. This bike ambulance is useful not only for the paramilitary and military forces but has potential civil applications too.

[Biodegradable Plastic Using Marine Seaweed](#)

The National Institute of Ocean Technology (NIOT) has developed a bio-plastic film using marine seaweed and PEG-3000. This could be a game-changer in the plastic industry, and have a huge impact on limiting the usage of non-biodegradable plastics. The scientists utilised a macro-algae *Kappaphycus alvarezii* (whole seaweed) which they cultivated in the Gulf of Mannar region for bioplastic film production with the plasticiser polyethylene glycol (PEG)-3000 to achieve higher tensile strength. PEG is a non-toxic and eco-friendly polymer, mainly used to increase the thermo-plasticity of the polymer used in the medicinal fields to make creams and dispersing agents that are used in medicinal products. The result of the present NIOT study revealed that bio-plastic polymers can biodegrade naturally in a short time without producing any toxic wastes. These can also be disposed of through an ordinary food waste collection mechanism. The study suggests that commercial manufacturing of bio-plastics from this seaweed would be a game-changer in future.

[Superfluidity and giant number fluctuations in a model of self-propelled particles](#)

Scientists from the S N Bose National Centre for Basic Sciences found a clue to anomalous behaviour of self-propelled fluctuations in active matter systems like fish schools, flocking

birds and bacterial colonies. The study used a toy model of self-propelled particles to probe into this anomalous behaviour. The study explained the dynamical origin of ‘giant’ mass fluctuations in the system, which provided insights into the emergent properties of such active matters in general. The finding can be useful in nanotechnology applications like building small-scale energy-efficient bio-devices as well as biomedical applications like characterizing infection spread in organs, antibiotic resistance etc.

Purifying Waste Water for Irrigation/Farming Purposes

CSIR-Central Mechanical Engineering Research Institute, Durgapur unveiled the first-ever Waste-Water Treatment Technology Model which purifies Waste Water for Irrigation/Farming purposes. Aqua Rejuvenation Plant (ARP) is an Integrated Waste Water Rejuvenation Model which has Six-Stage purification profile for comprehensive treatment of Waste Water, based upon diverse purification parameters. The water that can be rejuvenated using ARP will be sufficient for almost 4 acres of Agricultural Land (barring seasonal variations in water requirements). The filtration media have been specially developed to handle Indian Sewage Water Parameters and based upon Geographical Variations. The filter media is also locally source-able. The treated water which is now being used for irrigation can be used even for drinking purpose also when little more time is given for settling.

Technology Transfer Agreements to bring country’s first indigenous flow diverter stent

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), an autonomous institute of the Department of Science & Technology, GoI has entered into Technology Transfer Agreements with Pune based Biorad Medisys for two biomedical implant devices - an Atrial Septal Defect Occluder and an Intracranial Flow Diverter Stent developed by the institute in collaboration with National Aerospace Laboratories, Bangalore (CSIR-NAL) using superelastic Nitinol alloys. This will enable Indians to have access to the country’s first indigenous flow diverter stent for diverting blood flow away from localized ballooning of arteries in the brain and a device that promotes better healing of the hole in the heart, at a significantly lower cost than the currently used imported devices.

Successful Flight Test of Smart Anti Airfield Weapon

Defence Research and Development Organization (DRDO) has successfully conducted captive and release trial of indigenously developed Smart Anti-Airfield Weapon (SAAW) from a Hawk-I aircraft. This was the 9th successful mission of SAAW conducted till now which met all mission objectives. SAAW is indigenously designed and developed by DRDO’s Research Centre Imarat (RCI) Hyderabad. This is 125 kg class smart weapon, capable of engaging ground enemy airfield assets such as radars, bunkers, taxi tracks, and runways etc. up to a range of 100 kms. The high precision guided bomb is light weight as compared to weapon system of the same class. The weapon was earlier successfully test fired from Jaguar aircraft.

Innovative low-cost intervention tackles water supply challenges in Maharashtra

[towns](#)

With support from the Department of Science and Technology (DST)-Water Technology Initiative, IIT Bombay and IIT Madras, with participation of local gram panchayat, implemented 'Shaft with Multiple Outlets' as an intervention for improving the performance of existing piped water distribution networks in the towns of Saphale, and Umerpada, in Palghar district, Maharashtra. These solutions will minimize the need for costly infrastructure components and improve the operation of the system.

[Patent Filed for IoT based fertilizers](#)

A senior faculty and her research team at Universal Business School (UBS), Mumbai have recently filed for a patent for inventing an IoT based mechanism for manufacturing organic fertilizers for sustainable farming in India. The system is an automatic sluice-controlled valve fitted with a temporary reservoir to allow all ingredients, with a central storage container fitted with an automatic D.C drive stirring device. This could be monitored by a mobile application for the sensors for measuring the Nitrogen, phosphorus, potash and pulsating pump. The complete power supply of the system has been supported by solar panels. The main ingredients for fertilizer used in this system were cattle shade urine and cow dung mixture, wastewater released from urinals; domestic kitchen waste and green leaves. This innovation could help farmers to use the app and access this system from their home to monitor the sensors and create exact proportions of fertiliser contents for their crops.

IN BRIEF

[AI use to detect virus mutations](#)

Researchers at MIT have used natural language processing (NLP) to predict mutations that allow viruses to avoid being detected by antibodies in the human immune system, a process known as viral immune escape. They used an LSTM, a type of neural network on thousands of genetic sequences taken from a large number of strains of three different viruses: influenza, HIV, and SARS-CoV-2. They took the top mutations identified by the tool and, using real viruses in a lab, checked how many of them were actual escape mutations. Their results were better than results from other models. This research could make it easier for hospitals and public health authorities to plan ahead. The team has been running models on new variants of the coronavirus, including the so-called UK mutation, the mink mutation from Denmark, and variants taken from South Africa, Singapore and Malaysia.

[New biomaterials can be 'fine-tuned' for medical applications](#)

Researchers in the UK and the United States have succeeded in 'fine tuning' a new thermoplastic biomaterial to enable both the rate at which it degrades in the body and its mechanical properties to be controlled independently. The material, a type of polyester, has been designed for use in soft tissue repair or flexible bioelectronics. The team has added succinic acid - a product found naturally within the body, to control the degradation rate. The polyester biomaterial degrades gradually over a period of four months, with healthy tissues growing into and eventually replacing the implant. Varying the amounts of succinic acid controls the rate at which water penetrates the material and hence the degradation speed. The material has been designed with specific stereochemistry that mimics natural rubber and allow its mechanical properties to be finely controlled. This means any loss of strength can be compensated for by making suitable stereochemical adjustments. The

tunable nature of the material makes it suitable for a range of different applications, from replacement bone to vascular stents to wearable electronics.

[Nutrient that helps prevent bacterial infection](#)

Scientists from five institutes of National Institutes of Health studying microbiota to understand the body's natural defences against bacterial infection have identified a class of bacteria - Deltaproteobacteria in mice, which are involved in fighting infections. Further analysis led to the identification of a nutrient called 'taurine' that acts as a trigger for Deltaproteobacteria activity i.e., the nutrient helps the gut recall prior infections and kill invading bacteria. This finding could aid efforts seeking natural treatments to replace antibiotics.

[A 'smart' aerogel that turns air into drinking water](#)

Researchers at the National University of Singapore (NUS) have created a substance that extracts water from air without any external power source. They created a type of aerogel, a solid material that weighs almost nothing. In a humid environment, one kilogram of it can produce 17 litres of water a day. It contains long, snakelike molecules, known as polymers of a sophisticated chemical structure that can continuously switch between attracting water and repelling water. The 'smart' aerogel autonomously gathers water molecules from the air, condenses them into a liquid and releases the water. When there is sunshine, the smart structure can further boost the water release by transitioning to a complete water-repelling state. 95 percent of the water vapour that goes into the aerogel comes out as water. In laboratory tests, the aerogel gave water non-stop for months. The researchers tested the water, and found that it met World Health Organization's standards for drinking water. The team is looking for industry partners to scale it up for domestic or industrial use, including in endurance sports or survival kits.

[Plant genome editing using a CRISPR-SpRY toolbox](#)

Researchers at the University of Maryland developed SpRY, a newly engineered variant of the famous gene editing tool CRISPR-Cas9. With this new toolbox, it is possible for the first time to target nearly any genomic sequence in plants for potential mutation. The original CRISPR-Cas9 targets a specific short sequence of DNA known as a PAM sequence, which the CRISPR systems typically use to make their molecular cuts in DNA. However, the new SpRY variant could move beyond these traditional PAM sequences in ways that was never possible before. SpRY has enabled overcoming the major bottleneck in plant genome editing, which was the targeting scope restrictions associated with CRISPR-Cas9. Using this tool, researchers will now be able to edit anywhere within their favorable genes.

[Biodegradable displays for sustainable electronics](#)

Scientists from Karlsruhe Institute of Technology (KIT) are the first to produce sustainable displays that were based on natural materials with the help of industrially relevant production methods. After use, these displays will not be dumped as electronic scrap, but can be composted. The functioning of the display was based on the electrochromic effect of organic material. On application of voltage, light absorption gets modified and the material changes its colour. Electrochromic displays have a low energy consumption and simple component architecture compared to commercially available displays, such as LED, LCD, and E-paper.

Another advantage of these displays was that it could be produced by inkjet printing in a customized, inexpensive, and material-efficient way. Such innovations shows the potential to pave the way to sustainable innovations for other electronic components and to the production of eco-friendlier electronics.

RESOURCES AND EVENTS

[Prime Minister Modi's address at Climate Adaptation Summit 2021](#)

Welcoming the Climate Adaptation Summit, Prime Minister Modi said that Climate Adaptation is a key element of India's developmental efforts. He said that India will exceed the targets of the Paris Agreement, reverse environmental degradation and create new capacities for global good. India was targeting 450 gigawatt of renewable energy capacity by 2030. Already promotion of LED lighting was saving 38 million tons of carbon-dioxide emissions annually. 26 million hectares of degraded land is to be restored by 2030. Clean cooking fuel was being given to 80 million rural households and 64 million households connected to piped water supply. India had promoted the International Solar Alliance and the Coalition for Disaster Resilient Infrastructure. He called on the Global Commission on Adaptation to work with CDRI to enhance infrastructure resilience globally, and announced the Third International Conference on Disaster Resilient Infrastructure later this year in India.

[Biden puts U.S. back into fight against global warming](#)

President Joe Biden returned the United States to the worldwide fight to slow global warming in one of his first official acts and immediately launched a series of climate-friendly efforts that would transform how Americans drive and get their power. Biden signed an executive order re-joining the Paris climate accord within hours of taking the oath of office, reversing the U.S. withdrawal ordered by predecessor Donald Trump. Biden ordered a temporary moratorium on new oil and gas leasing in what had been virgin Arctic wilderness, directed federal agencies to start looking at tougher mileage standards and other emission limits again, and began revoking Trump's approval for the Keystone XL oil and gas pipeline. Another order directed agencies to consider the impact on climate, disadvantaged communities, and on future generations from any regulatory action that affects fossil fuel emissions, a new requirement. Re-joining the Paris accords could put the U.S. on track to cutting carbon dioxide emissions by 40% to 50% by 2030, experts said.

[Post-draft consultations of Indian scientific diaspora on draft STIP](#)

Indian scientific diaspora, including academicians, thought leaders, stakeholders, members of Science India Forum, and distinguished community leaders from Gulf Cooperation Council (GCC) countries like Saudi Arabia, Qatar, Kuwait, Bahrain, UAE and Oman consulted on post- draft STIP on 22nd January 2021. The policy making process involved consulting the Indian Diaspora with an objective to leverage the internal strength of the country by making India self-reliant through science and technology interventions and at the same time proactively promoting international cooperation. Indian diaspora representatives attending the event provided suggestions on challenges to cover the Article Processing Charge (APC) in facilitating open science policy, availability of Post-doc fellowships in India, interconnectivity of state-level institutions to maintain high-quality standards, watertight compartments in definition of science, contribution of the new policy towards Industry 4.0,

registration process of innovation incubators in India to create opportunities for innovators etc.

Prime Minister Modi's address at World Economic Forum's Davos Dialogue

Addressing the World Economic Forum's Davos Dialogue via video conferencing PM Modi spoke on the 'Fourth Industrial Revolution - using technology for the good of humanity'. He interacted with the CEOs during the event and informed the forum about the steps being taken in India on the economic front. He said that India has maintained economic activity by starting infrastructure projects worth billions of rupees and initiating special schemes for employment. During the pandemic, he said the focus was initially on saving lives, but now the focus has been on the growth of the country. He stressed on India's ambition of self-reliance which will strengthen globalism anew and help in working on all the four factors of Industry 4.0- connectivity, automation, artificial intelligence or machine learning and real-time data.

SCIENCE POLICY AND DIPLOMACY

India and Japan Sign MoU to Enhance Cooperation in the Field of ICT

India and Japan signed a MoU to enhance cooperation in the field of Information and Communications Technologies through a video conference. The collaboration between Department of Telecom, Government of India and Ministry of Communications, Government of Japan will enhance mutual cooperation in the field of 5G technologies, telecom security, submarine optical fiber cable system to islands of India, spectrum management, smart cities, high altitude platform for broadband in unconnected areas, disaster management and public safety etc. Apart from Ministry level cooperation, Government of India organizations such as C-DOT and ITI Limited along with industry partners from Japan will also be part of this cooperation.

Membership of the International Solar Alliance (ISA) universalized

The First General Assembly of the ISA, held on 3 October 2018, adopted the amendment of the Framework Agreement on the establishment of the International Solar Alliance, to expand the scope of Membership of the ISA to all Member States of the United Nations. After the necessary ratifications/ approvals/ acceptances were obtained from the requisite number of ISA Member countries as mandated by the Framework Agreement of the ISA, the said amendment has entered into force on 8th January 2021. The coming into force of the amendment of the ISA Framework Agreement allows all the Member States of the United Nations to join the International Solar Alliance, including those lying beyond the Tropics. It is hoped that membership will grow further, including some major solar energy players such as Germany, South Korea, etc.

Persistent Organic Pollutants Reviewed

The sixteenth meeting of the Persistent Organic Pollutants (POPs) Review Committee (POPRC-16) to the Stockholm Convention on POPs met on 11-16 January online and reviewed three potential POPs—methoxychlor, Dechlorane Plus, and UV-328 (a plastic stabilizer)—and undertook work to support parties' efforts to eliminate several substances that have already been listed in the Stockholm Convention: decabromodiphenyl ether, short-

chain chlorinated paraffin, and perfluorooctanoic acid. The reviews of Dechlorane Plus and UV-328 proved to be particularly challenging, raising questions about how the POPRC should address newer chemicals that have not been extensively studied. POPs are chemical substances that persist in the environment, bioaccumulate in living organisms, and can have adverse effects on human health and the environment. The pollutants that come before the POPRC have changed over the last two decades - to “live” substances that are still of significant economic and practical importance; and to more technically-complex industrial chemicals, and regulatory authorities and scientists have struggled to keep up with their proliferation. The Convention also needs to respond to other environmental problems, such as climate change and plastic wastes that are exacerbating the global impact of chemical pollution. The next (17th) meeting of the POPRC is scheduled for 27 September to 1 October, 2021 at the FAO headquarters in Rome, Italy.

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