



NEWS ALERT

Forum for Indian Science Diplomacy

RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in science research, technological advancements, science diplomacy, policy and governance. The archives of this news alert are available at <http://fisd.in>. Please email your valuable feedback and comments to science.diplomacy@ris.org.in

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GLOBAL

[Physicists observe room-temperature superconductivity](#)

Physicists from the University of Nevada, Las Vegas and the University of Rochester have established room temperature superconductivity in a diamond anvil cell to varying temperature and pressure on a carbon sulfur hydrogen mixture. They found a maximum superconducting transition temperature of 289 kelvin (about 15 degrees Celsius) achieved at 267 gigapascals. The superconducting state is observed over a broad pressure range from 140 to 275 gigapascals, with an upper critical magnetic field of about 62 tesla. It is hoped that chemical tuning of the system could enable the preservation of room-temperature superconductivity at lower pressures. Structural aspects could be probed by Raman spectroscopy.



A team of researchers from China, Canada and Australia has found a way to improve the efficiency of all-perovskite solar cells through use of a reducing agent. To improve the efficiency of solar panels, scientists have turned to new raw materials such as perovskite—a mineral that consists mostly of calcium titanate. Prior research has shown that stacking perovskite cells on top of silicon cells can increase efficiency but not enough to warrant their use. More recent research has focused on replacing silicon altogether by stacking two kinds of perovskite cells by 30 percent. The work by the researchers involved looking for something to add to the tin to keep it from oxidizing. After a great deal of search and testing, they found the zwitterionic antioxidant inhibitor commonly known as the reducing agent FSA and added it to the mix when making lead-tin perovskite cells with improved efficiency.

[A controllable membrane to remove carbon dioxide out of exhaust streams](#)

Engineers at MIT have found a way of continuously removing carbon dioxide from a stream of waste gases, or even from the air, using an electrochemically assisted membrane whose permeability to gas can be switched on and off at will, using no moving parts and relatively little energy. The membranes are made of anodized aluminum oxide with a honeycomb-like structure made up of hexagonal openings that allow gas molecules to flow in and out when in the open state. However, gas passage can be blocked when a thin layer of metal is electrically deposited to cover the pores of the membrane. The device uses a redox-active carbon-absorbing material, sandwiched between two switchable gas gating membranes. The sorbent and the gating membranes are in close contact with each other and are immersed in an organic electrolyte. These two gating membranes can be opened or closed electrically by switching the polarity of a voltage between them. When the sorbent layer is open to the side where the waste gases are flowing by, the material readily soaks up carbon dioxide until it reaches its capacity. The voltage can then be switched to block off the feed side and open up the other side, where a concentrated stream of nearly pure carbon dioxide is released. By building a system with alternating sections of membrane that operate in opposite phases, the system would allow for continuous operation in a setting such as an industrial scrubber. At any one time, half of the sections would be absorbing the gas while the other half would be releasing it. Potentially, such a system could make an important contribution toward limiting emissions of greenhouse gases into the atmosphere, and even direct-air capture of carbon dioxide that has already been emitted. The system could actually be adapted to a wide variety of chemical separation and purification processes.

[CRISPR meets Pac-Man: New DNA cut-and-paste tool enables bigger gene edit](#)

A new study by UC San Francisco scientists showed that gene editing for the development of new treatments, and for studying disease as well as normal function in humans and other organisms, may advance more quickly with a new tool for cutting larger pieces of DNA out of a cell's genome. The new CRISPR-Cas3 system adapted by the UCSF scientists employs a different bacterial immune system including a new enzyme, Cas3, which acts more like a molecular wood chipper to remove much longer stretches of DNA quickly and accurately. Cas3 is like Cas9 with a motor and after finding its specific DNA target; it runs on DNA and chews it up like a Pac-Man. This new capability to delete or replace long stretches of DNA will enable researchers to more efficiently assess the importance of genomic regions that contain DNA sequences of indeterminate function. CRISPR-Cas3 will enable biotechnology industry scientists to more easily remove potentially pathogenic or useless DNA from these cells, according to Bondy-Denomy.

[Colorful perovskites: Thermochromic window technologies](#)

Scientists at the National Renewable Energy Laboratory (NREL), U.S. report a breakthrough in developing a next-generation thermochromic window that not only reduces the need for air conditioning but simultaneously generates electricity. Heat generated by sunlight shining through windows is the single largest contributor to the need for air conditioning and cooling in buildings. Residential and commercial buildings use 74% of all electricity and 39% of all energy in the United States. The shading effect from tinting windows helps buildings use less energy. The technology, termed "thermochromic photovoltaic," allows the window to change color to block glare and reduce unwanted solar heating when the glass gets warm on a hot, sunny day. The newest breakthrough now enables myriad colors and a broader range of temperatures that drive the color switch. This increases design flexibility for improving energy efficiency as well as control over building aesthetics that is highly desirable for both architects and end users.

[Rapid charging and discharging electrode material developed](#)

A team from the Pohang University of Science & Technology (POSTECH), Republic of Korea has reported on ultrafast charging and discharging Li-ion battery electrode materials, in which high power can be produced by significantly reducing the charging and discharging time without reducing the particle size. For fast charging and discharging of Li-ion batteries, methods that reduce the particle size of electrode materials were used so far. However, reducing the particle size has a disadvantage of decreasing the volumetric energy density of the batteries. To this, the research team confirmed The resulting phase separating material



particle size distribution from 50 nm to 600 nm with an average of ~300 nm. The research is a promising sign for developing high-power Li-ion batteries that can achieve quick charging and discharging speed, high energy density, and prolonged performance.

[Soil-powered fuel cell promises cheap, sustainable water purification](#)

A University of Bath team has demonstrated the potential of cheap, simple 'soil microbial fuel cells' (SMFCs), buried in the earth to power an electrochemical reactor that purifies water. The proof-of-concept design was demonstrated during field testing in North-East Brazil that took place in 2019 and showed that SMFCs can purify about three liters of water per day- enough to cover a person's daily water needs. SMFCs generate energy from the metabolic activity of specific microorganisms (electrigenes) naturally present in soil, which are able to transfer electrons outside their cells. The system consists of two carbon-based electrodes positioned at a fixed distance apart (4 cm) and connected to an external circuit. One electrode, the anode, is buried inside the soil, while the other, the cathode, is exposed to air on the soil surface. Electrigenes populate the surface of the anode and as they 'consume' the organic compounds present in soil, they generate electrons. These electrons are transferred to the anode and travel to the cathode via the external circuit, generating electricity. By building a stack of several SMFCs and by connecting this to a battery it is possible to harvest and store this energy, and use it to power an electrochemical reactor for water treatment. Single SMFC unit costs just a few dollars, which could be further, reduced with mass production and with the use of local resources for the electrode fabrication. This project shows that SMFCs have true potential as a sustainable, low-energy energy source.

[Breakthrough quantum-dot transistors developed](#)

Researchers led by Los Alamos National Laboratory have created fundamental electronic building blocks out of tiny structures known as quantum dots and used them to assemble functional logic circuits. The innovation promises a cheaper and manufacturing-friendly approach to complex electronic devices that can be fabricated in a chemistry laboratory, and offer long-sought components for a host of innovative devices. Potential applications of the new approach to electronic devices based on non-toxic quantum dots include printable circuits, flexible displays, lab-on-a-chip diagnostics, wearable devices, medical testing, smart implants, and biometrics. A colloidal quantum dot consists of a semiconductor core covered with organic giving them interesting properties. The team of researchers have demonstrated that by using copper indium selenide (CuInSe₂) quantum dots devoid of heavy metals they were able to address both the problem of toxicity and simultaneously achieve straightforward integration of n- and p-transistors in the same quantum dot layer. As a proof of practical utility of the developed approach, they created functional circuits that performed logical operations. This approach permits fabrication of an arbitrary number of complementary p- and n-type transistors into the same quantum dot layer.

COVID-19

COVID-19 (WORLD)

[25-minute COVID-19 test reaches final stages of clinical validation](#)

A test for COVID-19 called MicrosensDx COVID-19, which works in just 25 minutes, with high accuracy and requiring only routine laboratory equipment, is currently in the final stages of clinical validation by British biotech firm MicrosensDx. The test has been used successfully to test more than 8,000 people a week and uses fewer of the globally scarce reagents that other COVID-19 test technologies require and can be used to enable rapid real-time testing. The test can analyse multiple types of sample (throat and nasal swabs, in addition to saliva and sputum) and, the virus is neutralized once it is captured in a vial, making it safe for the operator administering the test. The sample is placed in a solution containing the company's highly-sensitive magnetic beads which attract RNA from the virus, even at the lowest of levels. This allows the RNA to be extracted from the patient's sample ready for amplification. The detection technology is based on the biotech's loop-mediated isothermal amplification (LAMP) technology. In addition to detecting COVID-19, the testing platform can detect many other viral RNA targets, such as norovirus, respiratory syncytial virus (RSV) or influenza. The ability to quickly and accurately detect these other diseases has real potential to reduce inappropriate prescription of antibiotics and help to control outbreaks at their onset.

[Neuropilin-1 makes the SARS-CoV-2 virus highly infectious](#)

In a major breakthrough an international team of scientists, led by the University of Bristol, has potentially identified what makes SARS-CoV-2 highly infectious and able to spread rapidly in human cells. They describe how the virus's ability to infect human cells can be reduced by inhibitors that block a newly discovered interaction between virus and host, demonstrating a potential anti-viral treatment. The virus's process of attachment to and invasion of human cells is performed by a viral protein, called the 'Spike' protein. The team discovered that SARS-CoV-2 recognizes a protein called neuropilin-1 on the surface of human cells to facilitate viral infection. The interaction serves to enhance SARS-CoV-2 invasion of human cells grown in cell culture. The team also found that by using monoclonal



Germany and the University of Helsinki, Finland, have independently found that neuropilin-1 facilitates SARS-CoV-2 cell entry and infectivity.

[New blood test predicts which COVID-19 patients will develop severe infection](#)

The study, led by researchers at RCSI University of Medicine and Health Sciences has, for the first time, developed a score that can accurately predict which patients will develop a severe form of Covid-19. The measurement, called the Dublin-Boston score, is a blood test which works by measuring the levels of two molecules that send messages to the body's immune system and control inflammation. One of these molecules, interleukin (IL)-6, is pro-inflammatory, and a different one, called IL-10, is anti-inflammatory. The levels of both are altered in severe Covid-19 patients. Based on the changes in the ratio of these two molecules over time, the test enables clinicians to make more informed decisions when identifying patients who may benefit from therapies, such as steroids, and admission to intensive care units. The Dublin-Boston score can now accurately predict how severe the infection will be on day seven after measuring the patient's blood for the first four days.

[Highly sensitive and rapid saliva test for SARS-CoV-2 virus](#)

Scientists at the University of Technology Sydney (UTS) have used novel optical technology to design a highly sensitive saliva test for the SARS-CoV-2 virus antigens, or viral protein fragments. The test can deliver a positive result in fewer than 15 minutes. The rapid antigen test collects saliva in a cartridge placed in an existing hand-held device, first developed by West Australian company Alcolizer for illicit drug testing. Customized iStrip technology measures the viral load in the saliva sample, even at very low levels, and displays the result on the instrument's small screen. This device has GPS location technology and integration to cloud reporting tools to assist with contact tracing. The test bypasses the time-consuming molecular amplification currently in use. With the quick turnaround of results and a cost of less than \$A25 per test, it would allow testing rates to increase.

[COVID-19 Vaccine Update](#)

COVID19- vaccine developed by Brazilian Institute and Chinese biotech Sinovac has reported to have a clean safety profile and data. The results involving 9,000 volunteers aged between 18 and 59 years, showing only 35 per cent had light reactions such as pain at the injection site and headaches. Sao Paulo state has signed a contract for 60 million doses of the Coronavac vaccine. Later this month, tests will begin on older volunteers, people with comorbidities and pregnant women. In another development, the preclinical studies of mRNA COVID-19 vaccine candidate MRT5500 developed by Sanofi Pasteur and its partner Translate Bio has shown high levels of antibody in non-human primates and mice. Based on this, a phase I/II clinical trial is due to begin by the end of 2020. According to Sanofi officials, the results have provided additional support for using our mRNA platform to potentially expedite the development of alternative approaches to traditional vaccines.

[Novel antiviral strategy for treatment of COVID-19](#)

Researchers from University of Hong Kong (HKU), has discovered a class of metallodrugs, namely ranitidine bismuth citrate (RBC), a commonly used anti-ulcer drug which contains the metal Bismuth for treatment of Helicobacter pylori-associated infection, as a potent anti-SARS-CoV-2 agent. The drug suppresses SARS-CoV-2 replication and relieves viral-associated symptoms in an animal model, both in vitro and in vivo. RBC targets the vital non-structural protein 13 (Nsp13), a viral helicase essential for SARS-CoV-2 to replicate, by displacing the crucial zinc (II) ions in the zinc-binding with Bismuth-ions, to potently suppress the activity of the helicase. RBC has been demonstrated to greatly reduce viral loads by over 1,000-folds in SARS-CoV-2-infected cells. The findings provide a new and readily available therapeutic option with high clinical potential for infection with SARS-CoV-2. A related patent has been filed in the US.

[Study helps explain declines in death rates from COVID-19](#)

A new study at NYU Grossman School of Medicine shows fewer New Yorkers are dying from the coronavirus than health experts had anticipated. After New York became the epicenter for the pandemic in early March, experts predicted that infections would remain deadly in the following months. Instead, a new investigation showed that by mid-August the death rate in those hospitalized with coronavirus-related illness had dropped from 27 percentage points to about 3 percentage points based on 5,263 patient records of people treated for COVID-19 at NYU Langone hospitals. The study attributed the drop to factors like health care providers' growing experience with the coronavirus and physicians learning that resting COVID-19 patients on their stomachs rather than their backs and delaying the use of ventilators as long as possible were more effective practices. In addition to drugs, other factors such as decreasing hospital volumes, less exposure to infection, and earlier testing and treatment, may have played a role.

[Scientist develops new way to test for COVID-19 antibodies](#)

Dr. Stephen Smith from Seattle Children's Research Institute developed a reliable way to



coronavirus from infecting cells using a method that is more broadly applicable than those currently available. The novel coronavirus enters cells when the viral spike protein binds to the ACE2 protein on the surface of human cells. Neutralizing antibodies that block this binding are thought to contribute to immunity to the virus in people who recover from COVID-19. Smith applied a technique called immunoprecipitation detected by flow cytometry (IP-FCM) to study the interactions between the proteins and to look for evidence that antibodies were inhibiting the interaction and blocking the virus from binding to cells. Through newly developed diagnostics, a range of commercial applications are possible for broad community testing to assess vaccine responses and screening for convalescent plasmas that have particularly high levels of neutralizing antibodies as a potential treatment.

COVID-19 (INDIA)

[Indian COVID caseload drops below 800000](#)

The active Covid caseload of India has fallen below 8 lakh for the first time after one and a half months. They comprise merely 10.70% of the total cases. India is also reporting a high number of recoveries. The total recovered cases have crossed 6.5 million. The national Recovery Rate has further grown to 87.78% India has one of the lowest fatality rates globally at 1.52%. The Centre continues to support the State and UT Governments in the collective fight against the global pandemic. Ministry of Health and Family Welfare has deputed high level Central teams to Kerala, Karnataka, Rajasthan, Chhattisgarh and West Bengal. These States have been reporting a surge in the number of new COVID cases in the recent days.

[No major mutation observed in SARS-COV 2, shows a pan-India study](#)

Two pan-India studies on the Genome of SARS-CoV-2 in India conducted by ICMR and the Department of Biotechnology (DBT) suggest that the virus is genetically stable and there is no major mutation in the virus. A research suggests that A2a strain of SARS-CoV-2, which is the prominent novel coronavirus subtype found in the country, has not undergone any major mutation and there is no indication that the vaccine or diagnostics strategy would be hindered. In the past six months, DBT institutions sequenced about 1,058 virus genomes from different parts of the country. Initially, there were different strains. But by June, it was noted that A2a strain of the virus did not see any major mutation. The scientists involved in the study noted that there will be one or two mutations, but no major mutation is likely to take place which will not have a major impact on vaccine development strategy.

[New age sustainable disinfectants & sanitizers](#)

During COVID-19 outbreak, a number of Indian start-ups have developed sustainable alternatives to conventional chemical-based decontaminants that can disinfect surfaces and even microcavities. They include technologies for disinfection of the biomedical waste generated at hospitals and the use of novel nano-materials and chemical process innovations for long-lasting & safe sterilization of the recurrent use surfaces. The national Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) supported a total of 10 companies for has Safe disinfection and sanitization technologies. These include, among other, Inphlox Water Systems, Mumbai, Eta Purification, Coimbatore, MicroGO, Chennai, Weinnovate Biosolutions Pune, etc. These startups have developed commercial systems and are working on improving product certifications for rapid deployment in specialized labs. The products include advanced sterilization solutions micro-cavity plasma technology; COSMO system to rapidly disinfect Covid-19 infected areas. These decontamination systems are 10 times less than the conventional system of equivalent capacity, making it suitable for resource constraint environments.

[Serum Institute, Merck, IAVI Ink Agreement For Developing Monoclonal Antibodies](#)

Non-profit scientific research organisation IAVI, vaccine major Serum Institute of India and global science and technology firm Merck KGaA have entered into an agreement to develop SARS-CoV-2 neutralising monoclonal antibodies (mAbs) co-invented by IAVI and Scripps Research as innovative interventions to address the Covid-19 pandemic. The agreement builds on the advanced antibody discovery and optimisation expertise of International AIDS Vaccine Initiative (IAVI) and Scripps Research, and on Germany's Merck KGaA's and Serum Institute's significant capabilities in design and scale up of accelerated manufacturing processes for mAb production. If the SARS-CoV-2 neutralising antibody candidates being promoted are shown to be efficacious in clinical trials, either as a single antibody or a potential combination of both candidates, Merck KGaA will lead commercialisation in developed countries, while Serum Institute will lead global manufacturing as well as commercialisation in low- and middle-low-income countries, including India. This



Research by Indian scientists on bio-inspired materials

Scientists from the Jawaharlal Nehru Centre for Advanced Science and Research (JNCASR) have developed a synthetic material that mimics the dynamic capability of living organisms to adapt to new environments by utilizing simple natural design principles to create complex networks. This opens new avenues for smart materials because of their dynamic and adaptive nature. Hence, they would be useful as recyclable polymers for the energy and biotechnology sector. The researchers developed a synthetic mimic of such redox-active biological assemblies, with precise structure and dynamics that can be manipulated. Such bio-inspired structures are formed by assembling transient dormant monomeric molecules (basic units of polymers) by coupling them to a reduction-oxidation reaction network. They form a chemical entity called supra-molecular polymers with strikingly dynamic properties. The properties arise because they are connected by non-covalent bonds, which are reversible bonds that hold their chains together.

Frontier Technologies Cloud Innovation Center in India

To address societal challenges through digital innovation, NITI Aayog today announced the establishment of a Frontier Technologies Cloud Innovation Center (CIC) with Amazon Web Services (AWS)—the first of its kind in India. This CIC is part of the AWS CIC Global Program, which provides an opportunity for government agencies, non-profits, and educational institutions, to come together on pressing challenges, apply design thinking, test new ideas, and access the technology expertise of AWS. The NITI Aayog Frontier Technologies CIC addresses a core mission: to identify and deploy leading-edge technologies to drive continuous innovation in delivering citizen services. The center will identify and prioritize projects as well as collaborate with local leaders, including subject matter experts at the state and district levels, to solve critical challenges. Local enterprises, start-ups, researchers, and universities in India can experiment and build prototypes on AWS Cloud. The NITI Aayog Frontier Technologies CIC joins a global network of AWS public sector cloud innovation centers across Australia, Bahrain, Canada, France, Germany, South Korea, and United States.

India progressing rapidly towards the goal of indigenously made Supercomputers

India is fast expanding its supercomputer facilities and developing the capacity to manufacture its own supercomputers in the country. The National Super Computing Mission (NSM) is rapidly boosting high power computing in the country to meet the computational demands of academia, MSMEs, and startups in areas like oil exploration, flood prediction, genomics, drug discovery, etc. With the infrastructure planned in NSM Phase-I already installed and much of Phase-II in place, the network of supercomputers through the country will soon reach to around 16 Petaflops (PF). Phase-III, to be initiated in January 2021, will take the computing speed to around 45 Petaflops. The three phases will provide access to High-Performance Computing (HPC) Facilities to around 75 institutions and more than thousands of active researchers, academicians working through Nation Knowledge Network (NKN). The mission has also created the next generation of supercomputer experts by training more than 2400 supercomputing manpower and faculties till date.

Sustainable Processing of Municipal Solid Waste: 'Waste to Wealth'

With an ever increasing population and rapid pace of urbanization, the volume of waste is projected to rise from the present 62 million tonnes to about 150 million tonnes by 2030. The CSIR-CMERI developed Municipal Solid Waste Processing Facility has not only helped achieving decentralized decimation of solid wastes, but has also helped create value-added end-products from abundantly available redundant stuff such as dry leaves, dry grass etc. The MSW Processing Facility involves mechanized segregation system which segregates solid waste into metallic waste (metal body, metal container etc.), biodegradable waste (foods, vegetables, fruits, grass etc.), non-biodegradable (plastics, packaging material, pouches, bottles etc.) & inert (glass, stones etc.) wastes. The biodegradable component of the waste is decomposed in an anaerobic environment popularly known as bio-gasification. In this process biogas is liberated through conversion of organic matter, which can be used for cooking or generation of electricity.

New Trends in India's Advanced Manufacturing Sector

IIT Kharagpur has developed novel Industry 4.0 technology for remotely controlled factory operations and real-time quality correction during industrial production, jointly with TCS to set a new trend in India's advanced manufacturing sector. The innovative technology developed by IIT-K in association with TCS will acquire real-time information about the welding process through multiple sensors and enable online control of weld quality by means of cloud-based communication with the friction stir welding machine. Welding is at the heart of any industrial operations and improving the weld quality in real-time during batch production can be useful for reducing rejections in post-production sample checks. The



the Indian industrial sector but has also enabled real-time quality check and correction during the production process.

[With tech developed by NCL, green fuel-operated cooking stoves launched](#)

Union Minister for Science and Technology Dr Harsh Vardhan launched a gas stove that operates on dimethylether (DME) blended with LPG, developed by scientists from city-based CSIR-National Chemical Laboratory (NCL). Scientists have demonstrated an indigenous and patented technology for producing DME from methanol dehydration. Stoves using 20 per cent blended DME and LPG in the laboratory had showcased 10 to 15 per cent improved efficiency. NCL and Automotive Research Association of India (ARAI), Pune, are working on developing DME-blended diesel, which can then be tested for vehicles. NCL is presently in talks with a few companies to scale up research on this blended fuel for applications outside cooking stoves.

[CSIR-KPIT demonstrates Hydrogen Fuel Cell fitted car](#)

Council of Scientific and Industrial Research (CSIR) and KPIT successfully ran trials of India's first Hydrogen Fuel Cell (HFC) prototype car running on an indigenously developed fuel cell stack at CSIR-National Chemical Laboratory, Pune. The fuel cell is a low temperature PEM (Proton Exchange Membrane) type Fuel Cell that operates at 65-75 degree centigrade, which is suitable for vehicular applications. The 10 kWe automotive grade LT-PEMFC fuel cell stack is developed based on CSIR's know-how. The heart of PEM fuel cell technology includes the membrane electrode assembly, which is wholly a CSIR knowhow whereas KPIT brought in expertise in stack engineering which included light-weight metal bipolar plate and gasket design, development of the balance of plant (BoP), system integration, control software and electric powertrain that enabled running the fuel cell vehicle. The technology is expected to be more suited for commercial vehicles (CV) such as buses and trucks, since HFC technology requires a much smaller battery for a very large operating range. Hence, HFC technology offers more promise for the CV segment. According to project scientists, the technology has a great future and owing to its indigenous development and is expected to be more commercially viable than ever before

IN BRIEF

[New technology diagnoses sickle cell disease in record time](#)

Researchers at the University of Colorado Boulder and the University of Colorado Anschutz Medical Campus have developed a new way to diagnose diseases of the blood like sickle cell disease with sensitivity and precision and in only one minute. Their technology is smaller than a quarter and requires only a small droplet of blood to assess protein interactions, dysfunction or mutations. The new technology, an Acousto Thermal Shift Assay (ATSA), uses high-amplitude sound waves, or ultrasound, to heat a protein sample. The tool then measures data continuously, recording how much of the protein has dissolved at every fraction of change in degrees Celsius. The ATSA can distinguish the sickle cell protein from normal protein. The ATSA requires only a power source, a microscope and a camera on a smart phone.

[Breakthrough blood test developed for brain tumors](#)

Researchers at Massachusetts General Hospital (MGH) found that a novel digital droplet polymerase chain reaction (ddPCR) blood test could accurately detect and monitor over time two mutations of the gene TERT. The mutations, labeled C228T and C250T, are known to promote cancer growth and are present in more than 60 percent of all gliomas, and in 80 percent of all high-grade gliomas, the most aggressive and life-threatening type of brain cancer. The researchers found that the ddPCR assay could detect TERT mutations both in samples from MGH as well as from similarly matched plasma and tumor samples from collaborators at other institutions. The ddPCR assay has an overall sensitivity (ability to detect the presence of a glioma) of 62.5 percent, which is a tenfold improvement over the standard of tissue-based detection of TERT mutations. The test is easy to use, quick, and low cost, and could be performed in most laboratories, and can also be used to follow the course of disease.

[A new material for separating CO2 from industrial waste gases, natural gas, or biogas](#)

Chemists at the University of Bayreuth have developed a material, diammonium-pillared microporous organically pillared layered silicate 7 (MOPS-7) which is a CO₂-selective physisorbent. The material can be synthesized by simple ion exchange of inexpensive clay. This MOPS provides high dynamic, reversible, and reproducible CO₂ uptakes and selectivities against Methane and Nitrogen, proven in dynamic breakthrough experiments simulating flue gas, natural gas, and biogas conditions. The energy penalty attributed to regeneration is intrinsically reduced. The simplicity and modularity of pillaring low-budget and environmentally friendly clays combined with industrially capable performance with respect to thermal stability, high dynamic CO₂ adsorption selectivity, and energy-efficient restoration renders MOPS-7 a highly attractive CO₂ adsorbent for processing natural gas,



[Air pollution biggest health risk in India, according to a new study.](#)

According to a study by a US-based Health Effects Institute (HEI) air pollution contributed to the death of 1.7 million people in India in 2019. Outdoor and household particulate matter pollution contributed to the death of more than 1,16,000 Indian infants in their first month of life in 2019. More than half of these deaths were associated with outdoor PM2.5 and others were linked to the use of solid fuels such as charcoal, wood, and animal dung for cooking. The report also said there is clear evidence linking air pollution and increased heart and lung disease, creating a growing concern that exposures to high levels of air pollution could exacerbate the effects of COVID-19.

RESOURCES AND EVENTS

[PM Modi delivers inaugural address at 4th India Energy Forum](#)

Prime Minister Modi delivered the inaugural address at 4th India Energy Forum CERAWEEK. He said India was projected to emerge as a leading energy consumer and is projected to nearly double its energy consumption over the long term and that access to energy must be affordable and reliable. India's Energy Plan aims to ensure energy justice while fully following India's global commitments for sustainable growth. This means more energy is needed to improve the lives of Indians with a smaller carbon foot-print. He envisioned India's energy sector to be growth centric, industry friendly and environment conscious. He said that is why India is among the most active nations in furthering renewable sources of energy. The Prime Minister remarked that India is well on track to meet the global commitment. He said the target to increase the installed renewable energy capacity to 175 GW by 2022 has been further extended to 450 GW by 2030. He said in spite of India having one of the lowest carbon emissions than the rest of the industrialized world, India would continue its efforts to fight climate change. The Prime Minister said India's energy map will have seven key drivers.

[Countrywide S&T infrastructure facilities to be accessible to industry & startups](#)

The dept. of science and technology has announced that start-ups and industries in the nation will have access to equipment and science and technology (S&T) infrastructure in different institutions, universities and colleges spread all over the country. The move will let them carry out experiments and tests they require for their technology and product development. The DST is restructuring its FIST (Fund for Improvement of S&T Infrastructure in Universities and Higher Educational institutions) programme to cater to high-end requirements of start-ups and industries. Industries and start-ups have to carry out most high-end experiments and testing of technologies from laboratories outside India. The S&T infrastructure network would now be available to industry and start-ups. This would also encourage Indian-origin researchers in academic and research institutions to explore collaborative joint ventures to strengthen the S&T base in India for global development and bring about direct benefits for the society.

[DST holds consultations with States formulating an inclusive STIP 2020](#)

At a meeting with State S&T Ministers, Union Minister for Science Technology, Earth Sciences, Health & Family Welfare, Dr. Harsh Vardhan called on states to join the exercise of building an evidence-driven, inclusive national Science, Technology and Innovation policy STIP 2020, that would percolate to the grassroots level. Dr Vardhan articulated the government's vision for creating an inclusive policy that makes States equal partners and share ownership and responsibility in its implementation. The policy aims to re-energize the scientific ecosystem and redefine the priorities and sectoral focus to directly translate efforts in science & technology for the benefit of society and the economy. In the context of COVID-19 pandemic, he highlighted the urgent need for indigenous STI development and growth and that center-state cooperation remains at the heart of building a truly Atmanirbhar Bharat. To empower the STI ecosystem, he called for strengthening institutional linkages, joint funding systems, & reinvigoration of State S&T Councils.

[NASA's SOFIA discovers water on sunlit surface of Moon](#)

NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) has confirmed, for the first time, water on the sunlit surface of the Moon. This discovery indicates that water may be distributed across the lunar surface, and not limited to cold, shadowed places. SOFIA has detected water molecules (H₂O) in Clavius Crater, one of the largest craters visible from Earth, located in the Moon's southern hemisphere. Previous observations of the Moon's surface detected some form of hydrogen, but were unable to distinguish between water and its close chemical relative, hydroxyl (OH). Data from this location reveal water in concentrations of 100 to 412 parts per million -- roughly equivalent to a 12-ounce bottle of water -- trapped in a cubic meter of soil spread across the lunar surface. Under NASA's Artemis program, the agency is eager to learn all it can about the presence of water on the Moon in advance of sending the first woman and next man to the lunar surface in 2024 and



evidence of hydration in sunnier regions. SOFIA offered a new means of looking at the Moon. Flying at altitudes of up to 45,000 feet, this modified Boeing 747SP jetliner with a 106-inch diameter telescope reaches above 99% of the water vapor in Earth's atmosphere to get a clearer view of the infrared universe. Using its Faint Object infraRed CAmera for the SOFIA Telescope (FORCAST), SOFIA was able to pick up the specific wavelength unique to water molecules, at 6.1 microns, and discovered a relatively surprising concentration in sunny Clavius Crater. SOFIA is a joint project of NASA and the German Aerospace Center.

SCIENCE POLICY AND DIPLOMACY

[International Solar Alliance holds third assembly](#)

India and France were re-elected as president and co-president of the International Solar Alliance (ISA) for a term of two years at its third assembly meeting virtually on 14 October. The Assembly was attended by 53 member countries and five other countries, including 34 ministers. The assembly approved the initiatives of the ISA Secretariat in institutionalising ISA's engagement with the private and public corporate sector through the Coalition for Sustainable Climate Action (CSCA). Ten Indian public sector organisations presented a cheque for \$1 million each at the assembly. A robust pipeline of more than \$5 billion has been developed for solar energy applications to meet lighting, irrigation, drinking water and productive energy requirements of the ISA member countries. The ISA has aggregated a demand for more than 270,000 solar pumps across 22 countries, more than 1 GW of solar rooftop across 11 countries, and more than 10 GW of solar mini-grids across nine countries under its respective programmes. The membership of the ISA has continued to grow, supported by 68 member countries, and a further 20 countries are in the process of becoming members.

[A Joint Appeal for Open Science by CERN, OHCHR, UNESCO and WHO](#)

UN High Commissioner for Human Rights, Michelle Bachelet in her appeal to international community noted that broadest possible sharing of scientific knowledge and the access to the benefits of scientific knowledge is a key to any effective public health policy. She noted that the Universal Declaration of Human Rights explicitly proclaims the right "to share scientific advances and its benefits". COVID-19 has brought this issue of open information into sharp focus. The suppression or denial of scientific evidence in some circles – and reluctance to adopt evidence-based policies – have magnified the devastating harms the pandemic is generating. A basic principle of public health is the need for full and honest engagement with the public. The benefits of scientific and medical progress were always meant to be shared. She highlighted the need to ensure non-discriminatory access to the benefits of science – such as any COVID-19 treatments and vaccines and states have a clear obligation to ensure international cooperation and access to a vaccine under international human rights law.

[Third India-U.S. 2+2 Ministerial Dialogue boosts STI cooperation](#)

The Ministers applauded the exemplary cooperation between India and the United States in confronting challenges emerging from the COVID-19 pandemic including the development of vaccines, therapeutics, diagnostics, ventilators and other essential medical equipment. Both sides will jointly promote access to high quality, safe, effective and affordable COVID-19 vaccines and treatments on a global scale and will conclude an overarching MoU between India's Ministry of Health and Family Welfare and the U.S. Department of Health and Human Services (HHS), including collaboration through an International Center of Excellence in Research focused on infectious diseases including COVID-19 and other emerging threats. The United States expressed strong support for the Coalition for Disaster Resilient Infrastructure (CDRI) as a leading mechanism for promoting regional economic development. The U.S. also reaffirmed its continued strong support for India's permanent membership in a reformed UNSC as well as for India's early entry into the Nuclear Suppliers Group (NSG). Both sides welcomed the Major Defense Partnership (MDP) between India and the United States and the signing of the Basic Exchange and Cooperation Agreement (BECA), and agreed to explore opportunities to expand cooperation on defence technology, innovation and industrial cooperation. Both sides welcomed growing cooperation in Energy, Civil Nuclear cooperation, ICT and cybersecurity, outer space and space defence, and education.

[NASA, European Space Agency Formalize Artemis Gateway Partnership](#)

NASA and ESA (European Space Agency) have finalized an agreement to collaborate on the Artemis Gateway an effort by the United States to engage international partners in sustainable lunar exploration and to demonstrate technologies necessary for a future human mission to Mars. The agreement marks NASA's first formal commitment to launch international crew members to the lunar vicinity as part of NASA's Artemis missions and is a critical part of NASA's efforts to lead an unprecedented global coalition to the Moon. Additional Gateway agreements with other international partners will be executed in the near future. This partnership leverages the outstanding cooperation established by the



space destinations. It will serve as a rendezvous point for astronauts traveling to lunar orbit aboard NASA's Space Launch System (SLS) and Orion prior to transit to low-lunar orbit and the surface of the Moon. NASA has contracted with U.S. industry to develop the first two Gateway components. Science will play a critical role in the Artemis program. The Gateway will support activities that will test technologies needed for human missions to Mars.

[Academies' report reviews debate on genome editing for crop improvement](#)

A new ALLEA report "Genome Editing for Crop Improvement" summarises the discussions between scientific experts, policy-makers and civil-society organisations on Genome Editing for Crop Improvement following the ruling of the Court of Justice of the EU in 2018 which is seen as a barrier to research in this field. The present report provides an overview of the latest scientific evidence with respect to safety of genome-edited crops and their possible potential to provide solutions to current and future agricultural challenges. Issues related to the traceability of genome-edited crops and how this will likely affect international trade of food and feed are also addressed. The report also discusses economic and social implications of genome editing for crop improvement, and the legal hurdles in readdressing the court decision by legislative means.

[India & UK announce 8 million funding for COVID-19 research](#)

India and UK have announced a GBP 8-million joint funding initiative to support collaborative research on COVID-19. The 4 million GBP funding each by UKRI and DBT aims to support mechanistic studies of the disease and its sequela, virology, immunity & pathophysiology, and epidemiology & behavioural science. Research from this new programme helps to mitigate the severity of COVID-19 in the UK and India.

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