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**FORUM FOR INDIAN
SCIENCE DIPLOMACY**

SCIENCE DIPLOMACY NEWS ALERTS | 16-31 DECEMBER 2020 | ISSUE 52

www.fisd.in

NEWS ALERT

Forum for Indian Science Diplomacy

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GLOBAL

Science and technology achievements of 2020 in the world

Notwithstanding the COVID-19 pandemic which slowed down life on earth, the year 2020 witnessed some truly revolutionary advances in the field of science and technology. Following are some of the most interesting scientific discoveries and technological achievements of 2020. A) the vaccines produced by

Pfizer/BioNTech and Moderna against Covid-19 became the first vaccines developed using Messenger RNA which marks the fastest vaccine development and approval, taking only 10 months. B) The engineering of plastic-eating 'super-enzymes' that break down a common type of plastic used in single-use bottles, clothing and carpets into its chemical building blocks. C) The discovery by NASA's SOFIA mission about the presence of water molecule, H₂O, in sunlit areas of the Moon. D) The harvest of radish plants by Nasa astronaut Kate Rubinsin the Advanced Plant Habitat (APH) aboard the International Space Station. E) Scientists got one of the first hints of detecting an exoplanet in the radio realm by capturing a radio signal emanating from a planet outside the solar system about 51 light-years away. F) Waymo became the first company to offer self-driving car (robotaxi) services to the general public that could make travel very affordable for the customers.

[New world record set for operation of high temperature plasma](#)

The Korea Superconducting Tokamak Advanced Research (KSTAR), a superconducting fusion device also known as the Korean artificial sun, set a new world record of maintaining the high temperature plasma for 20 seconds with an ion temperature over 100 million degrees (Celsius). This is one of the core conditions of nuclear fusion in the 2020 KSTAR Plasma Campaign. This is an improvement over the 8 second plasma operation time during the 2019 KSTAR Plasma Campaign. In its 2020 experiment, the KSTAR improved the performance of the Internal Transport Barrier (ITB) mode, one of the next generation plasma operation modes developed last year and succeeded in maintaining the plasma state for a long period of time, overcoming the existing limits of the ultra-high-temperature plasma operation. The technologies required for long operations of 100 million- plasma are the key to the realization of fusion energy.

[Scientists develop new gene therapy for deafness](#)

A new study from Tel Aviv University (TAU) presents an innovative treatment for deafness, based on the delivery of genetic material into the cells of the inner ear. There are currently about 100 different genes associated with hereditary deafness. The study focused on genetic deafness caused by a mutation in the gene SYNE4 -- a rare deafness discovered in Israel, Turkey and the UK. The researchers devised an innovative gene therapy technology: creating a harmless synthetic virus and using it to deliver genetic material -- a normal version of the gene that is defective in both the mouse model and the affected human families. They injected the virus into the inner ear of the mice, so that it entered the hair cells and released its genetic payload. By so doing, they repaired the defect in the hair cells and enabled them to mature and function normally. The treated mice developed normal hearing, with sensitivity almost identical to that of healthy mice who do not have the mutation.

[Solar Winds network monitoring software Orion breached in cyberattack](#)

A sophisticated operation reportedly targeted US federal government networks and marks the biggest cyber-raid against US officials in years. In early March this year, a malicious code was sneaked into updates to popular software called Orion, made by the company SolarWinds, which gave elite hackers remote access to an organization's networks so they could steal information for several months until the breach was discovered. The scale of the hack is potentially global and, because the affected software touches many parts of a business, potentially devastating for organizations. The Orion software has centralized monitoring which looks for problems in an organization's computer networks, which means that breaking in gave the attackers a full view of those networks. SolarWinds sent an advisory to about 33,000 of its Orion customers who might have been affected. Because this software monitors entire networks, a large share of what companies and organizations do online is at risk of a breach.

[New drug inhibits the growth of cancer cells](#)

A new chemical compound developed by translational drug discovery organization can starve cancer cells by attacking their “power plants”, the so-called mitochondria that provides cells with energy and cellular building blocks necessary for normal tissue and organ function. Contrary to long-standing belief that cancer cell's growth was independent of mitochondrial function, the recent research reveals that cancer stem cells are highly dependent on mitochondrial metabolism. The newly developed drug, according to researchers, could potentially treat cancer by targeting mitochondrial function without severe side effects and without harming healthy cells. The new compound inhibits mitochondrial RNA polymerase called POLRMT which strongly decreased cancer cell viability and tumour growth in tumour-bearing mice but was generally well tolerated by the animals. Their data suggest that the compound starved cells into dying without large toxic side effects, thereby providing a potential window of opportunity for treatment of cancer.

[Putting on the pressure improves glass for fiber optics](#)

Researchers from Penn State and AGC Inc. in Japan suggest that the signal loss from fiber optic cables could be significantly reduced if silica glass used in the fibre is manufactured under high pressure. Due to signal loss, there is a need to use amplifiers every 80 to 100 kilometres, which is a significant issue if optical fibre is to be laid across continents or oceans. Glass fibers' lose signal strength due to scattering of light that comes from fluctuations in the glass's atomic structure. Glass, on an atomic scale, is heterogeneous and like all glass, optical fibers are manufactured at ambient pressure. The researchers used molecular simulations to investigate the effects of pressure when making optical fibers. Their simulations showed that using pressure quenching of the glass, the scattering loss could be reduced by more than 50%. According to their findings, the pressure treatment of the glass would make the material more homogeneous and decrease the microscopic holes in the structure.

[Machine learning boosts the search for 'superhard' materials](#)

Notwithstanding the high demand for super-hard materials in various industries ranging from energy production to aerospace, finding suitable new materials has been a serious challenge. The super-hard materials with a hardness value exceeding 40 gigapascals on Vickers scale, are rare. The testing of materials is also experimentally complex due to varying hardness of a material due to the amount of pressure exerted. Researchers from University of Houston and Manhattan College have reported a machine learning model that can overcome this challenge by predicting the load-dependent Vickers hardness based solely on the chemical composition of the material. The model accurately predicts the hardness of new materials, allowing scientists to more readily find compounds suitable for use in a variety of applications. The researchers report finding more than 10 new and promising stable boro-carbide phases. And work is now underway to design and produce the materials so they can be tested in the lab.

[New material system to convert and generate terahertz waves developed](#)

Terahertz light holds enormous potential for future technologies such as extremely fast mobile communications connections and wireless networks. However, the transition from gigahertz to terahertz frequencies is not possible without efficient sources and converters. A German-Spanish research team with the participation of the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) has now developed a material system based on graphene, i.e., a super-thin carbon sheet, coated with a metallic lamellar structure, which allows generating terahertz pulses very efficiently. Since terahertz waves have higher frequencies than the gigahertz mobile communications frequencies, they could be used to transmit significantly more wireless data. Therefore, 5G could soon become 6G. The terahertz range also has

applications in fields like quality control in industry and security scanners at airports to a wide variety of scientific applications in materials research.

COVID-19

COVID-19 (WORLD)

[Trials of instant immunity antibody drug treatment for COVID-19](#)

University College London Hospitals NHS Trust (UCLH) researchers are carrying out a study (Storm Chaser) on a Long-Acting Anti Body (LAAB) known as AZD7442, developed by AstraZeneca, which could offer immediate and long-term protection to people who have been recently exposed to the SARS-CoV-2 coronavirus and prevent them developing COVID-19. The second study (Provent) is looking at the use of AZD7442 in people who may not respond to vaccination. AZD7442 has the potential to be an important preventive and therapeutic medicine against COVID-19 as it has been engineered to have a longer life of up to 12 months.

[COVID-19 virus enters the brain, research strongly suggests](#)

With more and more evidence coming out that people with COVID-19 are suffering from cognitive effects such as brain fog and fatigue, researchers started examining the effects of SARS-CoV-2 virus on the brain. A new study published by researchers from Oregon Health & Science University found that the spike protein can cross the blood-brain barrier in mice, suggesting that SARS-CoV-2 can enter the brain and may cause the brain to release cytokines and inflammatory products. However, this hypothesis has yet to be confirmed for humans. If so, the infection could result in brain fog, fatigue and other cognitive issues.

[Traditional model for disease spread may not work in COVID-19](#)

According to researchers from Augusta University, the traditional mathematical model called R-naught is not the best way to project the contagiousness and spread of coronavirus since COVID-19 pandemic has varied widely in different areas of the country and world. The R-naught was used to predict the spread of coronavirus using factors like - the infectious period of the disease, how the disease spreads and how many people an infected individual will likely come into contact with. Historically, if the R-naught is larger than one, infections can become rampant and the epidemic to become more widespread pandemic. The research however argued that lockdowns have changed the way people contact each other as well as different factors have continuously altered the ground-level basic reproductive numbers. The researchers have therefore called for more of a dynamic, moment in time approach using the geometric mean for better predictions and to mitigating the spread of COVID-19 and for future planning.

[Masks not enough to stop COVID-19's spread without distancing, study finds](#)

Researchers from American Institute of Physics tested how five different types of mask materials, namely a regular cloth mask, a two-layer cloth mask, a wet two-layer cloth mask, a surgical mask, and a medical-grade N-95 mask impacted the spread of droplets carrying coronavirus when we cough or sneeze. The test conducted through a custom-built machine blew tiny liquid particles, like the airborne droplets of sneezes and coughs, through laser sheets in an airtight square tube with a camera. Although the masks dramatically reduced the number of droplets that were spread, there were enough droplets to potentially cause illness still made it through several of the materials at distances of less than 6 feet. Based on this evidence, researchers noted that simply wearing a mask may not be enough to stop the contracting of virus, if people are very close to each other and it needs both the masks and distancing.

With COVID exacerbating superbug threat, researchers ID new weapon

Amidst the ongoing scientific efforts against COVID-19 pandemic globally, the University of Colorado Boulder lab has discovered a new solution to deal with rising tide of antibiotic-resistant bacteria. The new compound is capable of pushing through barriers used by Gram-negative bacteria to resist antibiotics, damaging the bugs and preventing them from spreading. The discovery of the new compound is significant as it offers a totally new approach and could point the way toward new drugs that work better and have fewer side effects. During the ongoing pandemic, many patients have died not from the virus but from hard-to-treat secondary bacterial infections. Almost 35,000 people die annually in the United States from bacterial infections that could not be treated because they've grown resistant to existing drugs. The rise of anti-bacterial resistance, according to researchers, could kill an estimated 10 million people annually by 2050, if left unchecked.

COVID-19 (INDIA)

India sets up genomic surveillance consortium to check new coronavirus variant

In the wake of a mutated variant of coronavirus detected in the UK, a genomic surveillance consortium called, INSACOG, has been formed under the leadership of the National Centre for Disease Control (NCDC), New Delhi. INSACOG will carry out laboratory and epidemiological surveillance of circulating strains of the SARS-CoV-2 in India. Five percent of the positive cases of Covid-19 from all over India will be tested for Whole Genome Sequencing (WGS) as part of the strategy that has been put in place to detect and contain the mutant variant. The Health Ministry said that the variant strain has 14 non-synonymous (amino acid altering) mutations, 6 synonymous (non-amino acid altering), and 3 deletions. There are 10 designated laboratories where samples are currently under sequencing. From 25th November to 23rd December 2020 midnight, about 33,000 passengers from the UK were subjected to RT-PCR tests and 114 have been found positive. A total of 6 samples of UK returnees have been found to be positive with the new U.K variant genome.

India is missing about 90 infections for every COVID case

An analysis of India's COVID numbers till last month has shown that India had missed about 90 infections for every detected case. While states like Delhi and Kerala had missed just about 25 infections for every case, Uttar Pradesh and Bihar are estimated to have missed about 300 infections for every case detected. The expert panel also developed the India-specific supermodel that predicted that the pandemic would taper off by February 2021 in India. In countries like Italy and the United Kingdom, the number of missed infections for every case is only about 10-15.

India records 16,432 new cases of Covid-19, recoveries cross 9.8 million

According to Union health ministry update on 28th December, India recorded 16,432 new cases of the coronavirus disease (Covid-19) cases taking the nationwide tally to 10,224,303. The number of active cases dropped to 2,68,581, while 98,07,569 patients were cured/discharged from hospitals. The country also recorded 252 new fatalities due to the infection, which took the overall death toll to 1,48,153. The advisory noted that India's recovery rate has increased to 95.83 per cent. And that India's Covid-19 cases per million population are among the lowest in the world (7,397) and the global

average is 10,149. The government is carrying out a vaccination dry run to prepare the infrastructure before the expected rollout of Covid-19 vaccine in January. The Union Ministry has provided detailed instructions to states for their active support in identification, preparation of databases, vaccine delivery, storage, security, shipment and vaccination of beneficiaries.

India conducts successful dry run for COVID-19 vaccination

India has carried out a dry run in four states, namely Punjab, Gujarat, Andhra Pradesh and Assam as part of the steps towards putting in place a system to effectively conduct the vaccination programme for COVID-19. The two-day-long exercise was undertaken ahead of the expected introduction of the COVID-19 vaccine in Indian by mid-January. The exercise focused on mock registration of volunteers, while the participants were called in to be administered 'dummy vaccination'.

India to play key role in distribution of Covid-19 vaccine

Since the start of Covid-19 pandemic, the Indian pharma industry has played an important role in maintaining medical supply chains. The Indian industry exported medicines such as HCQ and paracetamol to more than 150 countries. The world is now looking at India with hope to manufacture and supply the huge quantity of vaccines needed to tackle the Covid-19 pandemic. India contributes 60% of the world's vaccine production and is set to play a vital role in the equitable distribution of vaccines around the world. According to industry experts, India will become the benchmark in vaccine distribution and will ensure targeted and phased distribution with the help of technology. Presently, three Covid-19 vaccine candidates of Bharat Biotech, Serum Institute of India and Pfizer are under active consideration of India's drug regulator and there is hope that early licensure is possible for all or any of them.

Serum Institute expects India nod for Covid-19 vaccine emergency use

Serum Institute of India, world's largest vaccine producer which is manufacturing the Oxford-AstraZeneca coronavirus vaccine in India, is expecting the Indian government to approve the shot for emergency use in a few days. According to its CEO Adar Poonawalla, the company has already made 40 million to 50 million doses of the Covi-shield vaccine and will be able to ramp up capacity to around 100 million a month by March when a new facility comes online. Regulators in both India and the UK are closely reviewing documents and data on the Oxford-AstraZeneca COVID19 vaccine. And after receiving the regulatory approval, it will be for governments to decide how much they can take and how fast. Mr. Poonawalla also informed that India is a part of 'COVAX' and hence, the company will give 50% of doses to India and to COVAX at the same time. He also said that Serum will be producing around 300 million doses by July 2021.

Scientists quell Covid-19 variant fears, say staying cautious sufficient

Amid fears about the return of six people from the UK to India who tested positive for the new mutated variant called VUI-202012/01, Scientists have assured the public that standard mechanisms such as masks, sanitisation and physical distancing will work to contain the new coronavirus strain. According to the Health Ministry, the SARS-CoV-2's UK variant genome was detected in three samples in the National Institute of Mental Health and Neurosciences Hospital (NIMHANS), Bengaluru, two in the

Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and one in the National Institute of Virology (NIV), Pune. After this, several scientists including Dr Anurag Agrawal, director of CSIR-Institute of Genomics and Integrative Biology (IGIB) noted that there is no evidence yet that the variant is more deadly and that staying cautious and following good practices should be sufficient to tackle the variant.

19 SARS-CoV-2 mutations in India can evade antibodies, 1 causes reinfection

A study by CSIR Institute of Genomics and Integrative Biology (CSIR-IGIB) revealed that as many as 19 genetic variants of the SARS-CoV-2 in India have evolved which can evade neutralising antibodies that the human immune system creates against Covid-19. One of these variants has already caused a confirmed case of reinfection. An immune escape variant of the SARS-CoV-2 is a mutation in the virus that allows it to evade the immune system. Of the 19 immune escape variants found in genomes from India, the S:N440K variant was found to be in 2.1 per cent of the gene sequences in India. This variant has a high prevalence in the state of Andhra Pradesh. The authors of the study have called for sequencing all SARS-CoV-2 cases in vaccine trials, to understand what variants could emerge and a continued genomic surveillance to identify such events in time.

INDIA – SCIENCE & TECHNOLOGY

Prime Minister Modi inaugurates India International Science Festival-2020

Prime Minister, Shri Narendra Modi inaugurated the India International Science Festival (IISF)-2020 in a virtual mode. He called the Festival a celebration of science and added that India has a rich legacy in science, technology and innovation. Indian scientists' path-breaking research. Indian tech industry is at the forefront of solving global problems. But India wants to do more in future and become a most trustworthy centre for scientific learning. He said now focus has shifted from outlays to outcome, from textbooks to research and application. The Prime Minister emphasized the importance of bringing the benefits of science and technology to all. The Prime Minister said there are many challenges in our country like Water Scarcity, Pollution, Soil Quality, Food Security, for which modern science has a solution. Science also has a big role in rapidly exploring the water, energy and food resources in our sea. The Prime Minister stressed that the biggest long-term challenge science faces is to attract high quality youngsters and retain them in the science domain. The sixth edition of this mega science festival will take place from December 22 -25, 2020 with the theme 'Science for Self-Reliant India and Global Welfare'.

India's First Pneumococcal Conjugate Vaccine

Dr Harsh Vardhan, Union Minister for Health and Family Welfare today inaugurated India's first pneumococcal conjugate vaccine (PCV). The vaccine "Pneumosil" has been developed by the Serum Institute of India Private Limited (SIPL) in collaboration with partners like the Bill and Melinda Gates Foundation. SIPL is the world's largest manufacturer of vaccines by number of doses used in 170 countries and every third child in the world is immunized with the manufacturer's Vaccine. Pneumosil has been extensively evaluated in 5 randomized controlled clinical trials and has demonstrated comparable safety and immunogenicity against licensed pneumococcal vaccines across diverse populations of India and Africa. Pneumonia is the single largest infectious cause of death among children under five years of age worldwide, accounting for nearly 1 million deaths globally.

Successful Maiden Launch of medium range surface to air missile (MRSAM)

Defence Research and Development Organisation (DRDO) successfully launched the Medium Range Surface to Air Missile (MRSAM), Army Version. The missile completely destroyed a high speed unmanned aerial target which was mimicking an aircraft with a direct hit. Army version of MRSAM is a surface to Air Missile developed jointly by DRDO, India and IAI, Israel for use of the Indian Army. MRSAM Army weapon system comprises of Command post, Multi-Function Radar and Mobile Launcher system. The complete Fire Unit has been used during the launch in the deliverable configuration. Number of range instruments such as Radar, Telemetry and Electro-Optical Tracking System were deployed and captured the complete mission data, validating the weapon system performance including the destruction of the target.

Disturbance from North Atlantic could derail Indian monsoon in August

According to researchers from Indian Institute of Science (IISc), the planetary wave from the North Atlantic is capable of derailing the Indian monsoon. The findings suggest that improved modelling efforts are necessary, including the influence of mid-latitudes, for better predictability of the monsoon, its variability as well as droughts. By looking at the interaction between upper-level winds and deep cyclonic perturbations in the cold North Atlantic waters during late August to early September, they found the occurrence of a disturbance called Rossby wave, which curves in towards India and disrupts the flow of the monsoon winds.

ARCI and IIT-H Scientists develop high-performance hybrid supercapacitors

Scientists at the International Advanced Research Center for Powder Metallurgy and New Materials (ARCI), Hyderabad have developed a low-cost supercapacitor device with excellent capacitive retention with a novel electrode material they have synthesized, which can pave the way for the next generation high power-high energy storage devices. The new capacitor is a facile, scalable, and cost-effective electrochemical route to synthesize electrodes made of Nickel cobaltite (NiCo_2O_4) containing nanosheet structures with incorporated oxygen vacancies as an active material, for hybrid supercapacitors. These electrodes have been found to have excellent electrochemical performance. This could be an effective alternative to the existing carbon-based electrodes for supercapacitors to achieve high energy density.

India launches CMS-01 communications satellite

India successfully sent the CMS-01 extended C-band communications satellite into a geostationary transfer orbit on 17 December using the 44-meter-high Polar Satellite Launch Vehicle-C50 (PSLV-C50) with lift off from the Satish Dhawan Space Center. The CMS-01 communications satellite, the sole passenger, separated from the PSLV fourth stage 20 minutes later. Once in geostationary orbit CMS-01 will provide extended C-band frequency communications for the Indian mainland and the Andaman-Nicobar and Lakshadweep islands. CMS-01 is expected to operate for more than seven years from 83 degrees East GEO with two deployable solar arrays providing 1500 W of power generation. The PSLV-XL upgraded variant used for the mission includes six, extended length side boosters. India recently drafted Spacecom Policy which is expected to revolutionize India's space sector. Earth observation is noted as one of main areas for potential growth.

New facility part of TMT opens near Bengaluru

As part of the global Thirty Meter Telescope (TMT) project, the Indian Institute of Astrophysics (IIA) inaugurated the optics fabrication facility at its Centre for Research and Education in Science and

Technology (CREST) campus near Bengaluru. The TMT, which is being set up on Mauna Kea island in Hawaii, will be the world's most advanced and capable ground-based optical, near-infrared, and mid-infrared observatory. It will integrate the latest innovations in precision control, segmented mirror design, and adaptive optics. And the new IIA facility will fabricate optics for realization of this international endeavour. The project is an international partnership between CalTech, universities of California, Canada, Japan, China and India. Dedicating this facility to the nation, Vice president Venkaiah Naidu, commended India's foray into global scientific ventures and its importance for the growth of the space sector in the future.

IN BRIEF

[Cyberattacks reported on Israeli institutions](#)

During the past few weeks, cyberattacks have hit high-profile Israeli companies, including Israel Aerospace Industries, as well as the country's health and transportation ministries. They were carried out by Pay2Key, thought by cyberspace experts to be a group with a mixture of political and financial motivations. The group followed up its attacks with a provocative Twitter post that boasted of its ability to penetrate and harm the networks at the heart of Israel's government and economy. The assault on Israel's water and sewage facilities disrupted mainly local systems. Israel's retaliatory cyberattack on the port of Shahid Rajaei disrupted shipping companies' operating systems and resulted in several days of road and waterway delays. Hacking operations can be contracted out and carried out through advanced persistent threat (APT) organizations that conduct cyberattacks in different places across the globe.

[Bt cotton helps to eliminate devastating pest](#)

A multifaceted strategy combining genetically engineered cotton with classical pest control tactics eradicated the pink bollworm from cotton-producing areas of the continental U.S. and Mexico. Genetically engineered cotton and the release of billions of sterile pink bollworm moths acted synergistically to suppress this pest. The eradication program saved U.S. cotton growers \$192 million from 2014 to 2019. It also helped to reduce insecticides sprayed against all cotton pests by 82%. Since 1996, the introduction of Bt-cotton reduced pink bollworm populations by 90%. A program was launched in 2006 to eradicate the invasive pest by combining traditional pest control tactics with mass releases of sterile pink bollworm moths was initiated in Arizona in 2006. Computer simulations and analysis of field data showed that neither of the two tactics would have worked alone. The results highlight the benefits of collaboration and synergy between biotechnology and classical tactics and the need for integrated approaches to combat other invasive life forms.

[DeepMind's MuZero learns the rules of games](#)

DeepMind's MuZero has mastered games without first learning the rules, using a principle called "look-ahead search". With that approach, MuZero assesses a number of potential moves based on how an opponent would respond. While there would likely be a staggering number of potential moves in complex games such as chess, MuZero prioritizes the most relevant and most likely manoeuvres, learning from successful gambits and avoiding ones that failed. For the first time, this system is able to build its own understanding of how the world works and use that understanding to do this kind of sophisticated look-ahead planning that is seen for games like chess. MuZero can start from nothing, and just through trial and error, both discover the rules of the world and use those rules to achieve kind of superhuman performance. Potential applications include video compression, robotics programming and protein architecture design, which holds promise for personalized production of drugs.

[Recycling plastic bags into adhesives](#)

A new chemical process developed at the University of California, Berkeley, converts polyethylene plastic into a strong and more valuable adhesive making recycling more attractive. The new process catalytically adds a chemical hydroxyl group to the polyethylene polymer that makes it stick to metal enabling the modified polyethylene to be painted with water-based latex. The process could be improved for adding other properties besides stickiness. Other catalysts could work with other types of plastics, such as the polypropylene found in recycled plastic bottles, to produce higher-value products that are economically attractive. Getting polyethylene to adhere to things opens up many opportunities such as artificial hip sockets and knee implants, coating electrical wire, or make more durable composites of plastic and metal.

[New nanobiomaterial from the silk of a mite](#)

An international team of researchers has developed a new nanomaterial from the silk produced by the *Tetranychus lintearius* mite found the European Atlantic coast. This nanomaterial has the ability to penetrate human cells without damaging them and, therefore, has potential as a source of nanoparticles and biomaterials for medical and technological uses. The new material is more resistant than steel, ultra-flexible, nano-sized, biodegradable, biocompatible and has an excellent ability to penetrate human cells without damaging them is of natural origin. The strength of the silk produced by *Tetranychus lintearius* is twice that of spider silk. *Tetranychus lintearius* can produce a large amount of silk and can be reared in the laboratory.

[Transforming clean energy technology](#)

Scientists from US national laboratories and UVA have developed an innovative chemical strategy to produce a new form of catalyst using the elements cobalt and titanium which are much more abundant in nature than other commonly used catalytic materials containing precious metals such as iridium or ruthenium. The new process involves creating active catalytic sites at the atomic level on the surface of titanium oxide nanocrystals, a technique that produces a durable catalytic material and one that is better at triggering the breakup of water molecules into hydrogen and oxygen. The team will further work on modifying 2D substrates in ways that support tiny metal clusters, to develop even more efficient catalysts. The technique could help to optimize the process of extracting hydrogen from liquid chemical carriers. The new process could enable scaled up use of renewable solar energy.

[Land ecosystems are becoming less efficient at absorbing CO2](#)

According to new research from NASA's Goddard Space Flight Center, 86 percent of land ecosystems globally are becoming progressively less efficient at absorbing atmospheric CO₂. The trapping of CO₂ can cause temperatures to rise as levels of CO₂ in the atmosphere increases significantly. The study analyzed multiple fields, satellite-derived and model-based datasets to better understand what effect increasing levels of CO₂ may be having on CFE. By analyzing the long-term data from remote sensing and land-surface models, the researchers found that since 1982, the global average carbon absorption has decreased steadily from 21 percent to 12 percent per 100 ppm of CO₂ in the atmosphere. This means that to avoid 1.5 or 2°C warming and the associated climate impacts, there is a need to adjust the remaining carbon budget to account for the weakening of the plant CO₂ absorption.

RESOURCES AND EVENTS

[Scientists set a path for field trials of gene drive organisms](#)

Scientists are proposing a course for responsible testing of gene drive technology in a new Policy Forum article on biotechnology governance, "Core commitments for field trials of gene drive organisms," published by more than 40 researchers, including several University of California San Diego scientists. They outline twelve core commitments under the following broad categories: fair partnership and

transparency; product efficacy and safety; regulatory evaluation and risk/benefit assessment; and monitoring and mitigation. They urge that stakeholders in other countries outside North America need to be brought into this conversation. The accelerated rise of gene drive technologies in recent years has emerged without a broadly accepted set of definitions. Without common agreement on gene drive-related terms, confusion and disagreement can emerge as gene drive policies and regulations are being developed.

[Emission reductions pledges at Climate Ambition Summit 2020](#)

On the fifth anniversary of the adoption of the Paris Agreement, the United Nations, United Kingdom, and France, in partnership with Chile and Italy, co-convened a high-level event to mobilize government and non-governmental leaders to demonstrate their commitment to the Paris Agreement and the multilateral process. The summit was the third in a series of high-level events intended to support the UN Framework Convention on Climate Change (UNFCCC) in delivering higher ambition. A total of 75 leaders announced new commitments, including China's NDC-related commitment to lower its carbon dioxide emissions per unit of gross domestic product (GDP) by over 65% by 2030, from 2005 levels; Climate finance pledges were made by several donors. Indian Prime Minister Narendra Modi, of India, described India's solar capacity growth, highlighting that its renewable energy capacity is the fourth largest in the world. He said India has set a more ambitious target than its previous one, attempting to achieve 450 gigawatts of renewable energy capacity by 2030.

[International Science Film Festival of India opens in IISF-2020](#)

International Science Film Festival of India (ISFFI) is a major attraction of India International Science Festival 2020. This year, the ISFFI has received 634 science film entries from 60 countries. IISF has emerged as a vital platform to attract enthusiasts and young filmmakers towards science film making and contribute to science popularization. Speaking at the inaugural session of ISFFI, Dr. Harsh Vardhan, Union Minister of Science & Technology, Earth Sciences and Health & Family Welfare said that films at IISF-2020 have a huge variety covering themes like science, technology, awareness related to COVID-19 and India's efforts to be self-reliant. He noted that science film is a good medium to communicate science. Shri Mike Pandey, Filmmaker and ISFFI jury chairman noted that IISF has grown in size and scale and becoming a vital platform for hand holding the upcoming science film makers.

[IISF-2020 concludes with the Valedictory address by the Vice President](#)

The IISF 2020 was drawn to close with the valedictory address by the Vice President Shri M. Venkaiah Naidu. The four days' event saw the organisation of a vast number of events and a large participation of people and scientists from India and abroad. In his address, Mr Naidu lauded Indian scientists for their efforts in developing an indigenous COVID vaccine, which is on the verge of releasing. Observing that false information on the nature of the coronavirus, medication and the vaccine has caused panic and anxiety among the people, Shri Naidu observed that 'infodemic' also reinforces the importance of scientific temper in our lives. Expressing the need to promote science education and inculcate the scientific temper from a young age, the Vice President emphasized on the need to invest and sustain R&D and strive to become self-reliant.

SCIENCE POLICY AND DIPLOMACY

[WTO Members discuss proposed Covid-19 waiver of IPR rules](#)

India and South Africa have proposed a waiver from some of the WTO's intellectual property rules for better accessibility and availability of vaccines and other essential medical products. The Ottawa Group

of countries has proposed a new “Trade and Health Initiative” aimed at protecting supply chains from further instability and making sure that access to essential medical goods is not further hampered. The issues raised are expected to remain high on the WTO agenda over the coming months. The proposed “COVID-19 waiver” for several aspects of the WTO’s Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), meanwhile, has gained a series of co-sponsors since being introduced earlier this autumn and sources indicate that over half of the WTO’s 164 members are now in support of the initiative. However, several members said they would need to see further evidence that the existing flexibilities available under the TRIPS Agreement, as recognized under the 2001 Doha Declaration on TRIPS and Public Health, do not provide enough policy space for national governments. Talks in the TRIPS Council are set to continue in early 2021, with reports then shared with the General Council.

[India proposed a 9-point plan on WHO Reforms](#)

India has submitted a 9-point proposal for WHO reform. The recommendations are that (1) To devise objective criteria with clear parameters for declaring a Public Health Emergency of International Concern if there is a broad agreement, if not a consensus, within the IHR Emergency Committee. (2) Ensure that extra budgetary or voluntary contributions are unearmarked to ensure that the WHO has necessary flexibility for its usage in areas where they are required the most and increasing the regular budget of the WHO (3) Strengthen the effectiveness, and efficiency of various funding mechanisms e.g. WHO Solidarity Response Fund, WHO Foundation and Strategic Preparedness and Response Plan (SPRP). (4) Support creation of IHR technical and core competencies in each country. See the link for more details:

<https://main.mohfw.gov.in/sites/default/files/India%27s%20Approach%20on%20WHO%20Reforms.pdf>

The editorial team of the Science Diplomacy Programme at RIS takes this opportunity to wish all its readers and stakeholders a very safe and happy New Year 2021. We look forward to your feedback and comments at science.diplomacy@ris.org.in.

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