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**FORUM FOR INDIAN
SCIENCE DIPLOMACY**

SCIENCE DIPLOMACY NEWS ALERTS | 16-29 FEBRUARY 2020 | ISSUE 32

www.fisd.in

NEWS ALERT

Forum for Indian Science Diplomacy

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GLOBAL

[Novel biotechnology process to obtain useful chemicals from agricultural waste](#)

Sugarcane bagasse and other kinds of agricultural waste biomass can be used as raw materials for the manufacturing of fine chemicals. A group of researchers affiliated with institutions in Brazil and the United Kingdom has succeeded in advancing in developing a novel simplified biotechnological route to convert sugarcane bagasse and wheat straw into fine chemicals with applications in the food, cosmetics and pharmaceutical industries, among others. They have managed to develop a biocatalytic route to produce coniferol and other aldehydes and aromatic acids directly from agricultural waste biomass. Coniferol is so valuable that a gram can cost as much as €300. It is used to synthesize various chemicals that are equally costly, such as pinoresinol, a hypoglycemic agent, and sesamin, which has anti-hypertensive properties and helps lower cholesterol levels. The researchers produced biocatalysts from genetically modified E Coli bacteria and applied them directly to agricultural waste. They succeeded in releasing ferulic acid from lignocellulosic biomass and converting it directly into coniferol. Preliminary calculations show that the new biotechnological route can increase the value of sugarcane bagasse and wheat straw up to 5,000-fold and multiply the price of ferulic acid by a factor of up to 75 when these residues are converted into coniferol. The research group is searching for partners interested in developing the technology for industrial use and possibly adapting it to other raw materials or to produce other commercially worthwhile compounds.

[Conversion of solar energy to electricity using quantum dots new record](#)

University of Queensland researchers have set a world record for the conversion of solar energy to electricity via the use of tiny nanoparticles called 'quantum dots'. The technology has a huge range of potential applications, including the possibility to use it as a flexible, transparent skin to power cars, planes, homes and wearable technology. The quantum dot solar cell made from Cs_{0.5}FA_{0.5}PbI₃ achieves certified record power conversion efficiency (PCE) of 16.6 percent and exhibit substantially enhanced photostability compared with their thin-film counterparts and they retain 94 percent of the original PCE under continuous 1-sun illumination for 600 hours. Conventional solar technologies use rigid, expensive materials. The new class of quantum dots the university has developed are flexible and printable. The researchers developed a unique oleic acid (OA) strategy that allows controllable synthesis of the quantum dots overcoming previous challenges.

Breakthrough in fast-charging, long-running energy storage technologies

A new bendable supercapacitor made from graphene, which charges quickly and safely stores a record-high level of energy for use over a long period, has been developed and demonstrated by UCL and Chinese Academy of Sciences researchers. While at the proof-of-concept stage, it shows enormous potential as a portable power supply in several practical applications including electric vehicles, phones and wearable technology. It can bend to 180 degrees without affecting performance and doesn't use a liquid electrolyte, which minimises any risk of explosion and makes it perfect for integrating into bendy phones or wearable electronics. The new design uses an innovative graphene electrode material with pores that can be changed in size to store the charge more efficiently. This tuning maximises the energy density of the supercapacitor to a record 88.1 Wh/L (Watt-hour per litre), which is the highest ever reported energy density for carbon-based supercapacitors. The supercapacitor developed by the team has a comparable energy density to state-of-the-art lead-acid batteries; and its power density is two orders of magnitude higher at over 100,000 Watt per litre. The 6cm x 6cm supercapacitor was made from two identical electrodes layered either side of a gel-like substance which acted as a chemical medium for the transfer of electrical charge. This was used to power dozens of light-emitting diodes (LEDs) and was found to be highly robust, flexible and stable. Even when bent at 180 degrees, it performed almost same as when it was flat, and after 5,000 cycles, it retained 97.8 percent of its capacity.

Artificial intelligence yields new antibiotic

Using a machine-learning algorithm, MIT researchers have identified a powerful new antibiotic compound. In laboratory tests, the drug killed many of the world's most problematic disease-causing bacteria, including some strains that are resistant to all known antibiotics. It also cleared infections in two different mouse models. The computer model, which can screen more than a hundred million chemical compounds in a matter of days, is designed to pick out potential antibiotics that kill bacteria using different mechanisms than those of existing drugs. In their new study, the researchers also identified several other promising antibiotic candidates, which they plan to test further. They believe the model could also be used to design new drugs, based on what it has learned about chemical structures that enable drugs to kill bacteria. In this case, the researchers designed their computer model to look for chemical features that make molecules effective at killing *E. coli*. Once the model was trained, the researchers tested it on the Broad Institute's Drug Repurposing Hub, a library of about 6,000 compounds. The model picked out one molecule that was predicted to have strong antibacterial activity and had a chemical structure different from any existing antibiotics. Using a different machine-learning model, the researchers also showed that this molecule would likely have low toxicity to human cells. This molecule, which the researchers decided to call Halicin, had been previously investigated as possible diabetes drug. The researchers tested it against dozens of bacterial strains isolated from patients and grown in lab dishes, and found that it was able to kill many

that are resistant to treatment, including *Clostridium difficile*, *Acinetobacter baumannii*, and *Mycobacterium tuberculosis*. The drug worked against every species that they tested, with the exception of *Pseudomonas aeruginosa*, a difficult-to-treat lung pathogen. The researchers plan to pursue further studies of halicin, working with a pharmaceutical company or nonprofit organisation, in hopes of developing it for use in humans. After identifying halicin, the researchers also used their model to screen more than 100 million molecules selected from the ZINC15 database, an online collection of about 1.5 billion chemical compounds. This screen, which took only three days, identified 23 candidates that were structurally dissimilar from existing antibiotics and predicted to be nontoxic to human cells. In laboratory tests against five species of bacteria, the researchers found that eight of the molecules showed antibacterial activity, and two were particularly powerful. The researchers now plan to test these molecules further, and also to screen more of the ZINC15 database.

[New technologies and strategies are expanding the search for extraterrestrial life](#)

Emerging technologies and new strategies are opening a revitalised era in the search for Extraterrestrial Intelligence (SETI). Scientists now are designing state-of-the-art techniques to detect a variety of signatures that can indicate the possibility of extraterrestrial technologies. Such ‘technosignatures’ can range from the chemical composition of a planet’s atmosphere, to laser emissions, to structures orbiting other stars, among others. The National Radio Astronomy Observatory (NRAO) and the privately-funded SETI Institute announced an agreement to collaborate on new systems to add SETI capabilities to radio telescopes operated by NRAO. The first project will develop a system to piggyback on the National Science Foundation’s Very Large Array (VLA) antenna that will provide data to a state-of-the-art technosignature search system. The VLA’s usual scientific observations will allow for an additional and important use for the data and will help to determine whether we are alone in the Universe as technologically capable life.

INDIA

[PM urges scientists to focus on real-time social issues](#)

Prime Minister Narendra Modi has urged scientists to focus on real-time social issues being faced by the country such as malnutrition by providing value addition in agricultural products and water management. He emphasised on the importance of developing virtual labs so that science can further be taken to all students in each and every corner of the country. He stressed the following points - (1) the need to attract young students toward science and further strengthen scientific acumen in the next generation (2) measures to enhance collaboration in research and development projects among Indians working in different parts of the world. (3) 5G wireless technology, artificial intelligence and affordable and long-lasting batteries for renewable energy storage are merging challenges which the scientists need to focus on (4) the need to combine traditional knowledge with modern

science to develop world-class products (5) the importance of commercialisation of innovations, the release said (6) work towards improving the quality of life of the common man.

Reserves of lithium found near Bengaluru

In what appears to be good news for the Electric Vehicle (EV) sector, reserves of lithium have been discovered in Mandya, 100 km from Bengaluru in Karnataka. This find could boost the local manufacturing of EV batteries. A unit of India's Atomic Energy Commission, Atomic Minerals Directorate estimated lithium reserves of 14,100 tonnes in a small area in Southern Karnataka. While this comes as welcome news, the reserve is small as compared to major producers such as Chile with its 8.6 million tonnes reserve, Australia with 2.8 million tonnes, Argentina with 1.7 million tonnes, and Portugal with 60,000 tonnes. So, far India has been importing all its lithium requirements. The Indian government has been pushing for an electric vehicle ecosystem. India's imports of lithium batteries tripled to \$1.2 billion in 2019 from \$384 million in FY17. In the eight months in 2019, India's lithium battery imports stood at \$929 million. India has set up Khanij Bidesh India Ltd to source and acquire mines in Argentina, Bolivia and Chile.

President Trump's visit boosts India-U.S. partnership in science and technology

The President of the United States of America, the Honorable Donald J. Trump, paid a State Visit to India on 24-25 February 2020. The leaders agreed to strengthen the India-U.S. Comprehensive Global Strategic Partnership. Cooperation activities envisaged included (a) co-development and co-production of advanced defence components, equipment and platforms and partnership between their defence industries, (b) enhance energy security, expand energy and innovation linkages across respective energy sectors, including the construction of six nuclear reactors in India at the earliest date, (c) development and launch in 2022 of a joint mission with the world's first dual-frequency Synthetic Aperture Radar satellite, and cooperation in Earth observation, Mars and planetary exploration, heliophysics, human spaceflight, and commercial space cooperation, (d) increase higher education collaboration and educational exchange opportunities, including through the "Young Innovators" internships, (e) prevention, early detection, and rapid response to disease outbreaks, (f) promote access to high quality, safe, effective, and affordable medications for Indian and U.S. consumers. The U.S. International Development Finance Corporation (DFC) has announced of a \$600 million financing facility for renewable energy projects in India. USAID and India's Development Partnership Administration will cooperate in third countries. President Trump reaffirmed U.S. support for India's entry to the Nuclear Suppliers Group without any delay. The leaders expressed interest in the concept of the Blue Dot Network, a multi-stakeholder initiative that will bring governments, the private sector, and civil society together to promote high-quality trusted standards for global infrastructure development. Both sides are committed to an open, reliable, and secure Internet that facilitates trade and communication and recognised the

need for an innovative digital ecosystem that is secure and reliable, and facilitates the flow of information and data. The leaders decided to promote open, secure, and resilient supply of strategic materials and critical infrastructure, and to independently evaluate the risk associated with deployment of emerging technologies.

Cabinet approves Technology Group to aid cross-sector economic growth

Dr. K. Vijay Raghavan, the Principal Scientific Adviser to the Government of India revealed that the Union Cabinet had approved the appointment of a Technology Officer in every ministry and government department. Moreover, the formation of a 12-member Technology Group, with Dr Raghavan as Chair has also been approved. The group will consist of six secretaries from the Science and Technology departments and other secretaries and five industry and academia experts will be invited as per requirement. The Technology Group would be responsible for examining the technologies which would be valuable for society and the economy. It will also advise on the most efficient manner in which these technologies can be procured and deployed. For this, the Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC) would provide inputs to the group. The Technology Group will develop structures to enhance sustainable economic and social growth while using Science and Technology as an essential element. The group will also plan out methods to commercialise technologies developed in the national laboratories and universities. With this, it is expected that the field of Science and Technology will not only grow in itself but will also aid the growth of other sectors.

Government eyes public-private fund to give R&D a shot in the arm

In an effort to stimulate investment in research and development (R&D), the Department of Science and Technology is mooting a fund that will match the contributions made by private companies in R&D. Ashutosh Sharma, Secretary, Department of Science and Technology said that discussions were on with certain "large, private sector" companies and currently, a 40 crore rupees target was on the anvil. "The idea is to pool funds from a group of companies willing to invest in fundamental research, such as quantum computers or artificial intelligence, and whatever is invested government will match that. A major beneficiary of such private sector funds could be the Indian Institutes of Technology. The scheme will be coordinated through the department's Science and Engineering Research Board, which funds a variety of basic science projects in several universities.

India rated among top 12 biotechnology destinations in the world

Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi celebrated its 34th Foundation Day on 26th February, 2020. The biotechnology sector in India has evolved over the last three decades and has made significant contribution in various sectors especially health, agriculture etc. With an annual growth rate of nearly 20 percent, India is rated among top 12 biotechnology destinations in the world. It is the

demand for biotechnology products and services that has been the base for setting an ambitious target of US\$150 billion by 2025.

IN BRIEF

[Swarming robots to avoid collisions and traffic jams](#)

For self-driving vehicles to become an everyday reality, they need to safely and flawlessly navigate one another without crashing or causing unnecessary traffic jams. To help make this possible, Northwestern University researchers have developed the first decentralised algorithm with a collision-free, deadlock-free guarantee. The researchers tested the algorithm in a simulation of 1,024 robots and on a swarm of 100 real robots in the laboratory. The robots reliably, safely and efficiently converged to form a pre-determined shape in less than a minute. Understanding how to control our swarm robots to form shapes can help to control fleets of autonomous vehicles as they interact with each other.

[EU invests 45 million Euros for coronavirus vaccine research](#)

The EU is backing a new €90 million public private partnership to develop a vaccine against the COVID-19 coronavirus, as the epidemic spreads further in Europe. The commission announced the funding shortly after Italy reported a spike in confirmed cases of the infection. The money is on top of €10 million the commission announced at the end of January for research to help stop the spread of the disease. The emergency funding call is open for projects on epidemiology, diagnostics, therapeutics and clinical management of the infection. The €90 million will be channelled through the Innovative Medicines Initiative, a partnership between the EU and the pharmaceutical industry. This includes €45 million of contribution from pharma companies. The virus is now quickly spreading through Europe.

[CRISPR gene cuts may offer new way to chart human genome](#)

In search of new ways to sequence human genomes and read critical alterations in DNA, researchers at Johns Hopkins Medicine have reportedly used the gene cutting tool CRISPR to make cuts in DNA around lengthy tumor genes, which can be used to collect sequence information. The pairing of CRISPR with tools that sequence the DNA components of human cancer tissue is a technique that could enable fast, relatively cheap sequencing of patients' tumors, streamlining the selection and use of treatments that target highly specific and personal genetic alterations. Tumor sequencing in cancer patients of particular areas can be very useful. IN new experiment, scientists were able to skip the DNA-copying part of conventional sequencing by using CRISPR to make targeted cuts in DNA isolated from a sample of tissue taken from a patient's breast cancer tumor. Then, the scientists glued so-called "sequencing adaptors" to the CRISPR-snipped ends of the DNA sections. The adaptors serve as a kind of handle that guide DNA to tiny holes or "nanopores" which read the sequence. In addition to its potential to guide treatment for patients, the combination of

CRISPR technology and nanopore sequencing provides such depth that it may help scientists find new disease-linked gene alterations specific to one allele (inherited from one parent) and not another.

RESOURCES AND EVENTS

[Prime Minister inaugurates COP13 on Conservation of Migratory Species.](#)

Prime Minister Shri Narendra Modi inaugurated the 13th Conference of Parties on Conservation of Migratory Species of Wild Animals at Gandhinagar through video conferencing. He asserted that India is one of the most diverse countries of the world and that for ages, conservation of wildlife and habitats has been part of the cultural ethos of India. He said that India's forest cover had increased to 21.67 percent of the total geographical area of the country and that India has been championing the cause of “climate action” through conservation, sustainable lifestyle and green development model. In this context, he mentioned the push towards Electric Vehicles, Smart Cities, and Conservation of Water. The Prime Minister explained how focused species conservation programmes have shown encouraging results. The number of tigers had doubled from 1411 in 2010 to 2967, two years before the committed date of 2022. He elaborated on some of India's priority areas, while holding the Presidency of this convention for the coming three years. India has prepared a ‘National Action Plan for conservation of Migratory Birds along the Central Asian Flyway’. India would be happy to facilitate preparation of Action Plans for other countries in this regard. India proposes to strengthen its association with the ASEAN and East Asia Summit countries. Mentioning that several Protected Areas in India share common boundaries with the Protected Areas of neighbouring countries, the Prime Minister said that cooperation in conservation of wildlife through establishment of ‘Trans-boundary Protected Areas’ would lead to very positive outcomes.

[COP13 of the Convention on Migratory Species meeting adopts Gandhinagar Declaration](#)

The 13th Meeting of the Conference of the Parties to the Convention on Migratory Species of Wild Animals (CMS COP13) was held in Gandhinagar, 15-22 February 2020. The main theme was “Migratory species connect the planet and together we welcome them home.” CMS parties adopted the Gandhinagar Declaration, which calls for migratory species and the concept of “ecological connectivity” to be integrated and prioritised in the new global biodiversity framework. COP13 also agreed on the need to integrate biodiversity and migratory species considerations into national energy and climate policy and promote wildlife-friendly renewable energy; and to strengthen initiatives to combat the illegal killing, taking, and trade of migratory birds. This was the largest meeting in the history of the Convention, with 2,550 people attending, including 263 delegates representing 82 parties. India will be the Chair of the CMS for the 3 year period till the next session.

[India to Celebrated National Science Day on February 28](#)

National Science Day (NSD) is celebrated every year on February 28 to commemorate the discovery of the 'Raman Effect' for which Nobel Prize was awarded to Dr C V Raman in 1930. On this occasion, theme-based science communication activities are carried out all over the country. This year 'women in science' was the focussed theme of the programme and a total of 21 awards have been given to woman scientists.

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