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NEWS ALERT

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GLOBAL

[Scientists build high-performing hybrid solar energy converter](#)

A team of scientists at Tulane University have developed a hybrid solar energy converter that generates electricity and steam with high efficiency and low cost. The project is the culmination of a U.S. Department of Energy ARPA-E project that began in 2014 with \$3.3 million in funding and involved years of prototype development at Tulane and field testing in San Diego. Thermal energy consumption is a huge piece of the global energy economy -- much larger than electricity use. There has been a rising interest in solar combined heat and power systems to deliver both electricity and process heat for zero-net-energy and greenhouse-gas-free development. The hybrid converter utilizes an approach that more fully captures the whole spectrum of sunlight and generates electricity from high efficiency multi-junction solar cells. With follow-on funding from the local commercialization partners, the team is continuing to refine the technology and move towards pilot-scale validation.

[Engineers create strange four-winged flapping drones inspired by bird wings](#)

Engineers from Australia have developed four-winged bird-like robots, called ornithopters that can take off and fly with the agility of swifts, hummingbirds and insects, by reverse engineering the aerodynamics and biomechanics of these creatures. The ornithopters have the potential to outperform and outmanoeuvre existing drone configurations with static wings or propellers. The new design uses the "clap and fling" effect. The two pairs of wings flap such that they meet, like hands clapping. This makes enough extra thrust to lift their body weight when hovering. Efficiency was improved by tuning the wing/body hinge to store and recover the energy of the moving wing when the wings change direction, like a spring. Other innovations include use of minute bearings and by rearranging shafts in the transmission. The large tail, comprising a rudder and elevator, creates a lot of turning force enabling aggressive aerobatic manoeuvres and switching fast from horizontal to vertical flight.

COVID-19

COVID-19 (WORLD)

[Experimental COVID-19 vaccine safe generates an immune response](#)

An investigational anti Covid-19 vaccine, mRNA-1273, co-developed by researchers at NIAID and at Moderna, USA, was well tolerated and prompted neutralizing antibody

Diseases (NIAID). The mRNA-1273 vaccine is designed to induce neutralizing antibodies directed at a portion of the coronavirus "spike" protein, which the virus uses to bind to and enter human cells. Data on side effects and immune responses at various vaccine dosages were used to plan the next Phase 2 and 3 clinical trials of the vaccine.

[Seaweed extract outperforms remdesivir in blocking COVID-19 virus in cell studies](#)

In a test of antiviral effectiveness against the virus that causes COVID-19, an extract from edible seaweeds substantially outperformed remdesivir, the current standard antiviral used to combat the disease. Heparin, a common blood thinner, and a heparin variant stripped of its anticoagulant properties, performed on par with remdesivir in inhibiting SARS-CoV-2 infection in mammalian cells. Tests were carried out on antiviral activity in three variants of heparin (heparin, trisulfated heparin, and a non-anticoagulant low molecular weight heparin) and two fucoidans (RPI-27 and RPI-28) extracted from seaweed. All five compounds are long chains of sugar molecules known as sulfated polysaccharides. The researchers performed a dose response study of EC50, the effective concentration of the compound that inhibits 50% of viral infectivity, with each of the five compounds on mammalian cells. RPI-27 yielded an EC50 value of approximately 83 nanomolar compared to an EC50 of 770 nanomolar for remdesivir.

[Rapid COVID-19 test to detect neutralizing antibodies of high specificity, sensitivity](#)

A unique and rapid SARS-CoV-2 surrogate virus neutralisation test (sVNT), developed in Singapore, is capable of detecting the functional neutralising antibodies (NAbs) that can block the binding of the coronavirus spike protein to the angiotensin-converting enzyme 2 (ACE2) host receptor. The sVNT was developed by scientists from Duke-NUS Medical School, in close collaboration with National Centre for Infectious Diseases (NCID) Singapore, and GenScript Biotech. The scientists in Singapore and China validated the test with a sample size of 250 from China and 375 from Singapore, achieving 99-100 per cent specificity and 95-100 per cent sensitivity. The sVNT kit can detect functional NAbs in an hour and differentiate them with binding antibodies (BAbs), without the need for live virus or a biocontainment facility. The sVNT kit is commercialised by GenScript and offered worldwide under the brand cPass™ for research use only.

[COVID-19 vaccine innovation could dramatically speed up worldwide production](#)

Researchers at the University of Texas at Austin has successfully redesigned a key protein on the surface of the SARS-CoV-2 virus called the spike protein, and the modification could enable much faster and more stable production of vaccines worldwide. They designed a new version of the protein that, when expressed in cells, produces up to 10 times more protein than that of an earlier synthetic spike protein already in use in multiple COVID-19 vaccines. Called HexaPro, the new protein is more stable and also keeps its shape even under heat stress. The team's original version of the spike protein forms the basis of vaccine candidates currently in human clinical trials, including Moderna's mRNA-1273 and Novavax's NVX-CoV2373. This improved spike protein might enable next-generation versions that require a much smaller dose to elicit the same immune response from a patient. A U.S. patent application was recently filed for HexaPro. Biotechnology Company Sino Biological has

[Two European COVID-19 vaccines report encouraging results](#)

AstraZeneca and BioNTech have reported positive data from ongoing phase I/II trials of their COVID-19 vaccines, with both being shown to be safe and to induce a broad immune response against the virus. The results on the AstraZeneca vaccine AZD1222 have been published by researchers at Oxford University who are conducting the trial. The adenoviral vectored vaccine induced strong antibody and T-cell immune responses up to the data cut-off of 56 days post vaccination. Meanwhile, BioNTech published data from the German arm of the phase I/II study of its mRNA vaccine as a preprint on Biorxiv, reporting for the first time that the product generated strong T cell responses. This follows on from the publication earlier this month of data from the US arm of the trial showing the vaccine provokes a strong antibody response. The results, according to researchers, are “an important milestone” on the path to getting a vaccine, however there is still a long way to go before heralding the arrival of a successful coronavirus vaccine.

[Clinical trial of potential COVID-19 drug apilimod launched](#)

Yale School of Medicine and the biopharmaceutical firm AI Therapeutics have launched a multi-institutional clinical trial of a drug known as LAM-002A (apilimod). Preliminary research has shown it can block cellular entry and trafficking of the SARS-CoV-2 virus, the cause of COVID-19. Previous trials involving more than 700 patients have shown LAM-002A to be safe for the treatment for autoimmune diseases and follicular lymphoma. A Phase II trial is underway for the drug's use as a COVID-19 treatment. LAM-002A holds promise to be a powerful new therapy for COVID-19 patients to prevent progression of disease, hopefully avoiding the need for hospitalization, particularly in high-risk populations, such as the elderly in nursing homes, health care and frontline workers, or people in underserved communities.

COVID-19 (INDIA)

[DBT supported COVID 19 vaccine begins adaptive phase I/II clinical trials](#)

ZyCoV-D, the plasmid DNA vaccine designed and developed by Zydus and partially funded by the Department of Biotechnology, Government of India has initiated Phase I/ II clinical trials in healthy subjects, to assess the safety, tolerability and immunogenicity of the vaccine. The human dosing of the vaccine marks a key milestone since the launching of the accelerated vaccine development programme for COVID-19 in February 2020. The DNA vaccine platform provides safety, ease of manufacturing the vaccine with minimal biosafety requirements (BSL-1), improved vaccine stability and lower cold chain requirements, and easy modification of the vaccine for new strains of the virus.

[Cuban drug Itolizumab gets approval for Covid-19 treatment in India](#)

Drugs Controller General of India (DCGI) approved biopharmaceuticals company Biocon's Itolizumab (ALZUMAb) which is a plaque psoriasis drug as an emergency use for COVID-

for which Biocon had got the technology license. The drug which has been repurposed by Biocon, was launched in the year 2013 in India and was named ALZUMAb, for treating chronic plaque psoriasis. Biocon's bio-manufacturing facility which is located at Biocon Park in Bengaluru will be manufacturing and formulating Itolizumab as an intravenous injection. A US company is also conducting trials for the same drug. Cuba has also granted approval on 25 July for the drug based on the Indian trial results. The drug works by controlling the hyperactivation of the immune system that is related to the cytokine storm. The Drug Control General of India's approval is based on favorable data received from a controlled, randomized clinical trial on just 30 patients which were conducted in the Indian hospitals.

IIT Kharagpur researchers develop novel technology for covid-19 rapid test

Researchers at IIT Kharagpur have innovated a portable rapid diagnostic device to detect COVID-19 infection. This entire test with the extracted RNA from the patient saliva samples can be conducted in an ultra-low-cost portable enclosure. The same portable unit can be used for a large number of tests, on simpler replacement of the paper cartridge after each test. The device has been proven to produce no false result with remarkable accuracy and sensitivity compatible to standard RT-PCR tests. This test has an unprecedented low cost of less than INR 400/- per test, taking all components of expenses and business model into account. The technology essentially deploys a disposable simple paper-strip for chemical analysis and visualization of results. The portable device has not only been validated for the diagnostics of COVID-19, but also been designed to be capable of detecting any other kind of RNA virus by following the same generic procedure and could be useful in viral pandemics in the future. IIT Kharagpur is ready for commercialization of the product.

DBT supports production & scale-up of test kits from Mylab

With the help of strategic funding under National Biopharma Mission of Department of Biotechnology (DBT)-Biotechnology Industry Research Assistance Council (BIRAC), Pune-based Mylab Discovery Solutions has scaled up its production and development of COVID-19 pathodetect testing kits. With DBT support, Mylab is able to accelerate the process of production. In the fight against COVID-19, an indigenous supply of qualitative RT-PCR test kits was identified as a critical need in enhancing the testing ability across the country. The scale-up of Mylab's pathodetect production was a step DBT took very early in that direction. Currently, Mylab has a manufacturing capacity of 2,00,000 RT-PCR and 50,000 RNA tests. Mylab has obtained CDSCO/India-FDA and ICMR approval to manufacture NAT, HIV, HBV, HCV, and for detection of novel coronavirus 2019-n COV/SARS-COV-2.

Rapid regulatory framework for COVID -19

To combat the healthcare challenges posed by COVID-19, the Department of Biotechnology (DBT), & Ministry of Science & Technology has been proactively working on the development of Diagnostics, Therapeutics, Drugs and Vaccines. DBT has also taken

activity towards combating COVID-19, DBT has evolved a set of Rapid Response Regulatory Frameworks. In order to accelerate research and development pertaining to COVID-19, the Review Committee on Genetic Manipulation (RCGM) functioning in DBT has processed/considered more than 100 applications till date, on a fast-track mode. These include applications received from various Institutes, Universities and Industries on import, export, transfer, receipt of COVID-19 clinical specimens/SARS-CoV2 isolates/process intermediates, undertake research for the development of COVID-19 prophylactics, therapeutics or diagnostic platforms.

3 ways digital technology can help drug makers fight COVID-19

COVID-19 is disrupting the pharma industry, causing drug shortages around the world and exposing the need for a more resilient global supply chain. Digital technology could help change the sector and make global pharma production stronger, more diverse and more flexible. One way to do this is through the use of digital technologies for quality control, in the form of advanced analytics, robotics and automation. Using technology to reduce manual errors and variability and improve quality can deliver 30-40% increases in productivity. Digital technology can help Indian drug manufacturers increase their exports as a proportion of total sales - what's known as export intensity - enabling India to embed itself more firmly in pharma global value chains (GVCs) and reduce its reliance on domestic demand. Research has shown that investing in IT can, for example, boost the export performance of pharma firms. For Indian pharma firms that invest in building digital capabilities, exports make up 45% of sales, on average. For those that are digital followers rather than leaders, and invest less in new technology, exports make up only 28% of sales, on average.

NRDC funds 16 COVID technologies for scaling up and validation

The National Research Development Corporation (NRDC), an enterprise under Ministry of Science and Technology, identified 16 projects for funding in the area of Testing, Tracing, and Treatment of Covid-19 and the technologies selected for support are in the area of Test Kits, Sanitizers, Ventilators, PPEs, Masks and COVID hospital effluents treatment. Currently, there is a huge gap in availability of grant funds for scale up and prototyping of innovative technologies and the financial support would help the innovators and start-ups in accelerating the technology development process and bring the innovative technologies to the market place within the next one year. NRDC has also brought out a Compendium of Indian Technologies for combating Covid-19 which has listed about 200 technologies developed by Indian institutions and startups and NRDC has transferred 9 technologies to startups and MSMEs which are useful in combating Covid-19 in the country.

High throughput COVID testing facilities launched at Kolkata, Mumbai and Noida

Prime Minister Shri Narendra Modi launched three high throughput COVID-19 testing facilities via video conferencing, located at the National Institutes of Indian Council of Medical Research, at Kolkata, Mumbai and Noida. These hi-tech state-of-the-art testing facilities will boost the testing capacity by almost 10,000 daily tests, enabling early detection

become the second largest PPE kit manufacturer in the world with more than 1200 manufacturers now, producing more than 500,000 such kits daily.

INDIA – SCIENCE & TECHNOLOGY

India-EU to step up cooperation in climate change, science and technology, space

The 15th India-European Union Summit has resolved to step up cooperation in science and technology and cooperation in the areas of space, water, air quality and nuclear energy. They also welcomed the signing of the India-EURATOM Agreement on the peaceful uses of nuclear energy and agreed to set up a Working Group for comprehensive space collaboration, besides exploring opportunities of cooperation in space-related matters in the UN framework. Both sides agreed to cooperate in (1) Developing a post-2020 global framework to protect biodiversity for the 2021 UN Biodiversity Conference. (2) Getting an ambitious mandate for an international chemical and waste management framework beyond 2020 for the fifth International Conference on Chemical Management in Bonn in 2021. (3) to strengthen the India-EU Clean Energy and Climate Partnership agreed at the 2016 Summit and prepare and implement a new work programme.(4) The Coalition for Disaster Resilient Infrastructure (CDRI) launched by India.

India-EU renews the agreement on Scientific and Technological Cooperation

India and the EU have renewed the Agreement on Scientific and Technological Cooperation for the next five years (2020-2025) to expand the cooperation in scientific and technological research and strengthen the conduct of cooperative activities in areas of common interest and application of the results of such cooperation. In the last 5 years, the level of co-investment on India-EU Research Technology Development Projects for addressing societal challenges such as affordable healthcare, water, energy, food & nutrition has been stepped up. The cooperation has been focused on water, green transport, e-mobility, clean energy, circular economy, bio-economy, health, and ICT. Additional areas, such as climate change, sustainable urban development, manufacturing, advanced materials, nanotechnologies and biotechnology, food processing, and ocean research may also be considered in future endeavours.

Indo-US Strategic Energy Partnership meeting highlight new cooperation areas

At a virtual ministerial meeting of the U.S.-India Strategic Energy Partnership (SEP) held on July 17, 2020, India and the United States have announced new areas of research on transformational power generation based on supercritical CO₂ (sCO₂) power cycles and advanced coal technologies, including carbon capture, utilization, and storage (CCUS). The two sides discussed new areas of research on transformational power generation based on supercritical CO₂ (sCO₂) power cycles and advanced coal technologies, including carbon capture, utilization, and storage (CCUS). They announced Smart grids and energy storage is being implemented by consortium comprising of 30 Indian and US entities Policy directions for the societal acceptance of smart grid concepts; Distributed Energy Resources, impact

Technologies, Supercritical Carbon Dioxide (sCO₂) Power Cycles and Carbon Capture Utilisation & Storage (CCUS) technologies.

DST launches Rs 150 million fund to support India-Russia joint R&D

The Department of Science and Technology has launched the India-Russia Joint Technology Assessment and Accelerated Commercialisation Programme that will connect Indian and Russian science and technology (S&T) led SMEs and start-ups for joint R&D. Federation of Indian Chambers of Commerce and Industry (FICCI) and the Foundation for Assistance to Small Innovative Enterprises (FASIE) of the Russian Federation will implement it. The programme will run through two annual cycles with up to five projects to be funded under each cycle. Projects are being sought on leading S&T focus areas, including but not limited to, IT & ICT, medicine and pharmaceuticals, renewable energy, aerospace, alternative technologies, environment, new materials, biotechnologies, robotics, and drones. Over two years, the Department of Science and Technology will provide up to Rs 150 million to 10 Indian SMEs/start-ups and FASIE will provide similar funding to the Russian projects. The programme will provide access to partial public funding for jointly selected projects with the participation of at least one start-up/SME from India and one SME from Russia. In addition to the financial support, the teams will also be supported through capacity building, mentorship and business development.

D-Wave's quantum computing cloud comes to India

D-Wave's systems and software have been used in financial modelling, machine learning and route optimization. Canadian quantum computing giant D-Wave Systems is launching its cloud service in India, giving developers and researchers in the country real-time access to its quantum computers. Through this geographic expansion, D-Wave's 2000Q quantum computers, hybrid solvers and the application environment can be used via its cloud platform Leap to drive development of business-critical and in-production hybrid applications. The future of quantum computing is in the cloud and its latest launch in India comes about a year after the country's Department of Science and Technology (DST) chalked out plans to build its own quantum computers. In early 2019, DST launched a programme focused on quantum computing, called Quantum-Enabled Science and Technology (QuEST). As part of QuEST, India earmarked ₹80 Crore investments to be spent over a span of three years to facilitate research in setting up quantum computers.

India's first 700 MWe nuclear reactor goes critical

KAPP-3, located at Kakrapar, Gujarat State, which attained criticality on 22 July, is a landmark event in India's domestic civilian nuclear programme given that KAPP-3 is the country's first 700 MWe (megawatt electric) unit, and the biggest indigenously developed Pressurised Heavy Water Reactor (PHWR). The PHWRs, which use natural uranium as fuel and heavy water as moderator, are the mainstay of India's nuclear power programme. Until now, the biggest reactor size of indigenous design was the 540 MWe PHWR, two of which have been deployed in Tarapur, Maharashtra. The operationalisation of India's first

Rawatbhata (RAPS-7 and 8). Twelve new 700MWe reactors were approved in 2017. The next challenge is building a 900 MWe Pressurised Water Reactor (PWR) of indigenous design.

IN BRIEF

[Rethink for human brain project as it enters the final phase](#)

The EU-funded Human Brain Project (HBP) a €1B programme, launched in 2013 is now into its final phase. It is working to construct an open science resource, bringing all the research and tools developed by the initiative under one roof. The platform, Ebrains, will enable researchers to build upon the HBP's achievements, with services including data storage, brain modelling and simulation, neuromorphic computing and neurobotics. This final phase of the 10-year project has €150 million from the Horizon 2020 budget.

[New OLED technology speeds up data transfer](#)

An international research team, involving Newcastle University experts, developed visible light communication (VLC) setup capable of a data rate of 2.2 Mb/s by employing a new type of organic light-emitting diodes (OLEDs). To reach this speed, the scientists created new far-red/near-infrared, solution-processed OLEDs. And by extending the spectral range to 700-1000nm, they successfully expanded the bandwidth and achieved the fastest-ever data speed for solution-based OLEDs. The new OLEDs create opportunities for new internet-of-things (IoT) connectivity, as well as wearable and implantable biosensors technology. The research focused on the development of a real-time transmission of signals that transmit as quickly as possible, by using information modulation formats developed in-house, achieving approximately 2.2 Mb/s. The data rate the team achieved is high enough to support an indoor point-to-point link, with a view for IoT applications.

[Europe has become a global leader in 3D printing](#)

According to the European Patent Office's "[Patent and additive manufacturing: Trends in 3D printing technologies](#)" report, European countries now account for 47 per cent of all patent applications in 3D printing technologies, In second place is the US with 35 per cent of applications. Within Europe, Germany leads with 19.1 per cent of all patents, followed by Spain, Belgium, the UK, Switzerland and the Netherlands. EPO points to the exponential growth of the European 3D printing technology, with an average increase in the number of patents of 36 per cent every year from 2015 to 2018. The health, energy and transportation sector are the three industries with the highest number of patent applications, with rapid growth observed in other sectors such as industrial tools, electronics, construction and consumer goods, and the food sector.

RESOURCES AND EVENTS

[EU Leaders agree on slimmed-down €80.9B for Horizon Europe](#)

Commission. The Horizon budget was just one piece of a historically large pie that it took EU leaders a record five days to negotiate. The big picture: a total EU budget from 2021-27 of €1.82 trillion, including €750 billion in a special pandemic recovery fund. Horizon Europe funding from the pandemic fund, was cut down from €13.5 billion proposed earlier to only €5 billion while the core budget of Horizon Europe will remain at the pre-summit level of €75.9 billion (in 2018 prices). The European parliament will now have to discuss the budget.

High-level political forum on sustainable development (HLPF 2020) concludes

The virtual meeting of the 2020 High-level Political Forum on Sustainable Development (HLPF), concluded on 16 July. It was originally intended to initiate a new four-year cycle to review the implementation of the Sustainable Development Goals (SDGs) and assess progress towards achieving the 2030 Agenda for Sustainable Development (2030 Agenda) and to launch a “decade of action and delivery” after the 2019 HLPF found progress on the SDGs was lagging. The meeting’s agenda was adjusted by the Economic and Social Council (ECOSOC) Bureau to focus on the potential impact of the pandemic on implementation of the SDGs and the 2030 Agenda. The meeting ended without adopting a ministerial declaration, contrary to expectations. On 17 July, ECOSOC President circulated a revised draft ministerial declaration, noting that if Member States raise no objection before 22 July, the declaration will be considered as adopted. Voluntary national reviews (VNRs) were presented by 47 countries, with 26 presenting for the first time, 20 for the second time, and 1 for the third time. Countries were given the option of live-streaming their presentation, sending pre-recorded presentations, or mixing these two options.

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Research and Information System for Developing Countries

Core IV B 4th Floor, India Habitat Centre, Lodi Road, New Delhi 110003, India

Tel:-011- 24682176, E-mail: science.diplomacy@ris.org.in

Website: www.fisd.in

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