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NEWS ALERT

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CORONAVIRUS PANDEMIC

Treatment with interferon-a2b speeds up recovery of COVID-19 patients

Researchers conducting an exploratory study on a group of 77 confirmed COVID-19 cases at Wuhan between January 16th and February 20th 2020, found that treatment with interferon (IFN)-a2b significantly reduced the duration of detectable virus in the upper respiratory tract and reduced blood levels of interleukin (IL)-6 and C-reactive protein (CRP), two inflammatory proteins found in the human body. The individuals evaluated in this study consisted of only moderate cases of COVID-19, as none of the patients required intensive care or oxygen supplementation or intubation. Patients were either treated with IFN-a2b, arbidol (ARB), which is a broad-spectrum antiviral, or a combination of IFN-a2b plus ARB, and viral clearance was defined as two consecutive negative tests for virus at least 24 hours apart, from throat swab samples. The researchers found that IFN-a2b treatment accelerated viral clearance by approximately 7 days. IFN treatment was also demonstrated to significantly reduce circulating levels of IL-6 and CRP. The influence of age, co-morbidities and sex did not negate the effects of IFN treatment on viral clearance times or on the reduction in the inflammatory proteins IL-6 and CRP. The findings show potential for the development of an effective antiviral intervention for COVID-19 and also reducing



Cuban interferon proven effective against COVID-19

Cuba's Ministry of Public Health (Minsap) has reported that the inclusion of Recombinant Human Interferon Alpha 2b in treatment protocols for Covid-19 patients has shown positive results. The treatment protocol uses this product in combination with other drugs, as soon as a case is confirmed, and not with patients in serious or critical condition. 93.4% of patients testing positive for SARS-COV-2 had been treated with Heberon (the commercial name of Recombinant Human Interferon Alpha 2b). Only 5.5% reached serious condition. The mortality rate reported by Minsap on that date was 2.7%, while for patients with whom the drug was used, the rate was 0.9%. At this time, more than 80 countries have expressed interest in acquiring Heberon.

Extension of Lockdown up to May 31, 2020

Lockdown measures in place since March 24, 2020 have helped considerably in containing the spread of COVID-19. The Government of India has decided to further extend the lockdown till May 31, 2020. The Ministry of Home Affairs (MHA), Government of India (GoI) issued an order, on 17 May, under the Disaster Management (DM) Act, 2005, in this regard. The salient features of the new guidelines are as follows: States and Union Territories (UTs) will now delineate Red, Green and Orange zones taking into consideration the parameters shared by the Health Ministry. The zones can be a district, or a municipal corporation/ municipality or even smaller administrative units such as sub-divisions, etc, as decided by States and UTs. Within the red and orange zones, containment and buffer zones will be demarcated by the local authorities. Within the containment zones, only essential activities shall be allowed. Strict perimeter control shall be maintained, and no movement of persons would be allowed, except for medical emergencies and for maintaining supply of essential goods and services. Buffer zones are areas adjoining each containment zone, where new cases are more likely to appear. In the buffer zones, more caution needs to be exercised. A limited number of activities will continue to remain prohibited throughout the country. These include all domestic and international air travel of passengers, except for domestic medical services, domestic air ambulance and for security purposes or purposes as permitted by MHA; metro rail services; running of educational institutions; hotels, restaurants and other hospitality services, except for the running of canteens in bus depots, railway stations and airports; places of large public gatherings such as cinemas, shopping malls, gymnasiums entertainment parks, etc.; social, political, cultural and similar gatherings and other large congregations; and, access to religious places/ places of worship for public. Under these guidelines, wearing of face covers is compulsory; spitting will be punishable with fine and social distancing is to be followed by all persons in public places and in transport.

A New PPE provides enhanced comfort in the Indian climate

Institute of Naval Medicine Mumbai has developed NavRakshak PPE with its innovative



technique. The unique character of the fabric used is its strong uniform structure which can act as an excellent barrier for liquids, particles, blood and body fluids. Intellectual Property Facilitation Cell (IPFC) of the Ministry of Defence has already filed a patent for the innovative cost-effective PPE developed by Indian Navy, to enable rapid mass production of NavRakshak PPE. The new technology has already been tested by INMAS (Institute of Nuclear Medicine and Allied Sciences) Delhi, a DRDO organization tasked with the testing and certification of PPE. The PPE passed with 6/6 Synthetic blood penetration resistance test pressure (Government of India mandates minimum 3/6 and above level as per ISO 16603 standard). It is thus certified to be mass produced and used in clinical COVID situations. It has been made by adhering to the benchmark standards for PPE fixed by the Indian Council of Medical Research (ICMR) and Ministry of Health & Family Welfare (MoHFW), which has been promulgated based on WHO's international standards. It enhances the user comfort even under prolonged use in hot and humid conditions and is extremely economical.

[Itolizumab monoclonal antibody in the COVID-19 battle](#)

Itolizumab was developed at the Centre Molecular Immunology (CIM), Cuba for the treatment of lymphomas and leukemia and also for rheumatoid arthritis and psoriasis. This antibody is able to block the proliferation and activation of t-lymphocytes, acting as an immunomodulator, reducing the secretion of pro-inflammatory cytokines. Some COVID patients develop an overactive immune reaction with a large outflow of substances and fluid in the lungs and drop in blood pressure, provoking a coagulation cascade, resulting in the obstruction of blood vessels in the lungs. This causes the patient to go into hypoxia ensues, and many patients die as a result of cardio-respiratory complications. If other organs do not receive enough oxygen, permanent damage or even death may follow. The monoclonal antibody Itolizumab acts in the disease phase, reducing the secretion of inflammatory cytokines, which cause the massive flow of substances and liquid in the lungs. The monoclonal antibody has been used as part of an expanded protocol, approved by the regulatory agencies in Cuba. Thus far, more than 70 patients with the virus have been treated, in nine hospitals in Cuba especially patients in critical, serious and cautionary condition, at high risk for further complications. The best results have been seen in critically ill and cautionary patients, where the consequences of the cytokine storm are stopped in time. In many cases there is clinical and imaging evidence of improvement in respiratory distress.

[Nano based RNA extraction kit detection of COVID 19 commercialised](#)

Agappe Chitra Magna, a magnetic nanoparticle-based RNA extraction kit developed by Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) has been commercially launched. The technology for Chitra Magna, an innovative RNA extraction kit



has been independently validated at National Institute of Virology for Covid19 RNA isolation. Central Drugs Standard Control Organisation (CDSCO) has given approval for the commercialization of this kit. The kit can be used for RNA extraction for RT-LAMP, RT-qPCR, RT-PCR and other isothermal and PCR based protocols for the detection of SARS-COV-2. It uses an innovative technology for isolating RNA using magnetic nanoparticles to capture the RNA from the patient sample. The magnetic nanoparticle beads bind to the viral RNA and, when exposed to a magnetic field, give a highly purified and concentrated RNA. As the sensitivity of the detection method is dependent on getting an adequate quantity of viral RNA, this innovation enhances the chances of identifying positive cases. It is estimated that India would require about 800,000 RNA extraction kits per month during the next six months, and Agappe Chitra Magna RNA Isolation Kit priced around Rs. 150 per kit is expected to reduce the cost of testing and the country's dependence on imported kits which cost around Rs 300.

[Bharat Biotech ties up with US varsity for Covid vaccine](#)

Bharat Biotech has partnered with the US-based Thomas Jefferson University (TJU) to develop its experimental vaccine Coravax against Covid-19 under the accelerated development programme. This is the third vaccine candidate that the Hyderabad-based vaccine major is working on using two different platforms - a nasal backbone to deliver Sars-CoV2 genetic material to produce an immune response, and use of the deactivated rabies vaccine as a vector. The new viral-vector vaccine candidate, which was developed by TJU researchers in January, has recently completed preliminary trials in animal models that show a strong antibody response in vaccinated mice. The vaccine uses a proven deactivated rabies vaccine as a carrier for the genetic code of the Sars-CoV-2 spike protein, which the virus uses to enter human cells and cause infection. Bharat Biotech is the world's largest supplier of rabies vaccines and the rabies carrier vaccine being used is approved for use in the whole population, including children and pregnant women. With support from the Department of Biotechnology under the Ministry of Science and Technology, the company plans to begin human trials by December 2020. Under the licence agreement, Bharat Biotech gains exclusive rights to develop, market and deliver Jefferson's vaccine across the world, excluding in the US, Europe, and Japan, where Jefferson continues to seek partners.

[TDB approves technologies to augment India's efforts to combat COVID 19](#)

Technology Development Board (TDB), a statutory body of the Department of Science and Technology (DST), is scouting for novel solutions for supporting the country's efforts in tackling the health care emergency that the world is facing. The TDB, through its evaluation process, has processed a large number of applications under various domains. Till date, TDB has approved six projects towards commercialization, which include thermal scanners, medical devices, masks, and diagnostic kits. Cocoslabs Innovation Solutions Private Limited



identified persons to authorities on their phones and laptops. Advance Mechanical Services Private Limited plans to commercialize Infrared Thermography-based Temperature Scanner for Rapid Measurement and Real-Time Decision Making using an uncooled microbolometer and video analytics platform. Latome Electric India Private Limited, Coimbatore envisages commercialization of battery-powered portable X-ray machines with digital display as standalone medical radiography equipment suitable for ICU & Isolation Wards. Thincr Technologies India Pvt. Ltd, Pune is providing coating and 3D printing of anti-viral agents on the masks as a preventive measure against COVID-19. Medzome Life Sciencez, New Delhi is currently manufactures rapid diagnostic kits for Malaria, Dengue, Pregnancy, Typhoid, etc. and intends to manufacture fluorescence-based Rapid COVID-19 Detection Kit. It targets to deploy them commercially in 2-3 months.

[CSIR collaborates with Intel & IIT-Hyderabad to develop COVID-19 solutions](#)

CSIR is working with Intel India and International Institute of Information Technology (IIIT), Hyderabad to help achieve faster and less expensive COVID-19 testing and coronavirus genome sequencing to understand epidemiology and AI-based risk stratification for patients with comorbidities. As part of the initiative, Intel India is developing an end-to-end system that consists of multiple applications, testing devices, data collection/aggregation gateways, a data exchange SDK and an AI model-hub platform. CSIR constituent labs such as CSIR-IGIB, CSIR-CCMB, CSIR-IMTECH, CSIR-IIP, CSIR-CLRI and others will work with various hospitals and diagnostic chains in carrying out comprehensive diagnostics. IIIT-Hyderabad will develop risk stratification algorithms that can help in drug and vaccine discovery for long term preparedness to combat the epidemic. The initiative exemplifies the focus on deploying advanced technology to find effective and scalable solutions for urgent local needs and enables development of diagnostics, drug and vaccine discovery with higher predictability, speed and accuracy.

[Scientists develop mobile indoor disinfection sprayer to combat COVID-19](#)

Scientists at CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur, have developed two mobile indoor Disinfection Sprayer units. These units can be used for cleaning and disinfecting pathogenic micro-organism effectively, especially in hospitals. Called Battery Powered Disinfectant Sprayer (BPDS) and Pneumatically Operated Mobile Indoor Disinfection (POMID), these units can be used to clean and disinfect frequently touched surfaces such as tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, sinks, and cardboards. Intermittent usage of these disinfecting units can help minimize the risk of transmitting coronavirus to people who inadvertently come in contact with those surfaces. The sprayer systems in both BPDS and POMID are designed with two-stage spraying units and separate storage tanks to clean and disinfect the indoor areas by the numbers of fixed and flexible nozzles set in the lower and



dual-chamber storage for disinfectants and cleaning and have better nozzle design, better arrangement of nozzles and lesser droplet sizes. The sprayed disinfectant can thus cover a greater surface area for the specified volume of liquid. The technology for BPDS is transferred to Power Tech Mining Pvt. Ltd. on the same day for commercialization.

[NIF's COVID-19 Competition \(C3\) leads innovative solutions by common people](#)

The National Innovation Foundation – India (NIF), an autonomous body of the Department of Science and Technology (DST) has identified several S&T based innovative solutions through the Challenge COVID-19 Competition (C3), a campaign which was running from 31st March to 10th May 2020 for engaging innovative citizens to come up with ideas and innovations to tackle the pandemic. NIF is providing incubation and mentoring support for further dissemination to the generator of the ideas. A foot-operated device for hand sanitization and washing and an innovative sprayer for sanitization are the two recently supported innovations under the campaign. It facilitates dispensing of soap and water by way of operating the device by foot, and not hands. NIF has extended support to the innovator for value addition and in meeting the production commitments. The other supported innovation is an innovative sprayer capable of sanitizing or washing large areas like roads, societies, doors, compounds, walls, etc. Unleashing the partnership, ownership and creativity potential of our citizens in COVID-19 solutions and actions is a huge opportunity which is made visible by the NIF challenge. A large number of citizens have participated in the Challenge COVID-19 Competition (C3) and helping the country come out of this crisis through Science and Technology based innovative solutions.

[SCTIMST launches Agappe Chitra Magna for detection of COVID 19](#)

On May 21, 2020, a magnetic nanoparticle-based RNA extraction kit called Agappe Chitra Magna was launched commercially for use during testing for detection of COVID-19. The kit is developed by Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) along with Agappe Diagnostics Ltd, an in vitro diagnostics manufacturing company. Inexpensive, fast, and accurate testing for COVID-19 virus is the cornerstone of containing its spread and providing appropriate help to the infected. Developed by SCTIMST was transferred to Agappe Diagnostics in April 2020, and is now available in the market as Agappe Chitra Magna RNA Isolation Kit. This product has been independently validated at National Institute of Virology for Covid-19 RNA isolation. Central Drugs Standard Control Organisation (CDSCO) has given approval for the commercialization of this kit. The kit can be used for RNA extraction for RT-LAMP, RT-qPCR, RT-PCR and other isothermal and PCR based protocols for the detection of SARS-COV-2. It uses an innovative technology for isolating RNA using magnetic nanoparticles to capture the RNA from the patient sample. It is estimated that India would require about 8 lakh RNA extraction kits per month during the next six months, and Agappe Chitra Magna RNA



[Huge opportunity for India to step up vaccine production](#)

According to Dr. Gagandeep Kang, Clinical Scientist and Executive Director of the Translational Health Science and Technology Institute, the Coalition for Epidemic Preparedness Innovation (CEPI) is working towards its goal of accelerating vaccine development and ensuring equitable access. It is playing an important role in supporting vaccine development for SARS-CoV-2 or Covid-19. Vaccines have a very high safety requirement as they are given to healthy people and vulnerable groups. Apart from just eliminating the disease, vaccines help in improving health and productivity. Dr.Kang stressed the need to deeply understand immune responses against new vaccines to ensure that people were protected against increased future risk. Highlighting the example of Serum Institute of India's meningococcal vaccine for African countries, Dr. Kang emphasised the opportunity that India has to step up vaccine production and contribute to global public health.

[No evidence of benefit for chloroquine and hydroxychloroquine in COVID-19](#)

A large observational study suggests that treatment with the antimalarial drug chloroquine or its analogue hydroxychloroquine (taken with or without the antibiotics azithromycin or clarithromycin) offers no benefit for patients with COVID-19. The study analysed data from nearly 15,000 patients with COVID-19 receiving a combination of any of the four drug regimens and 81,000 controls. Treatment with these medications among patients with COVID-19, either alone or in combination with macrolide antibiotics, was linked to an increased risk of serious heart rhythm complications in these patients. Researchers suggest these treatment regimens should not be used to treat COVID-19 outside of clinical trials until results from randomised clinical trials are available to confirm the safety and efficacy of these medications for COVID-19 patients. This is the first large scale study to find statistically robust evidence that treatment with chloroquine or hydroxychloroquine does not benefit patients with COVID-19. Instead, the findings suggest it may be associated with an increased risk of serious heart problems and increased risk of death. Randomised clinical trials are essential to confirm any harms or benefits associated with these agents and therefore these drugs should not be used as treatments for COVID-19 outside of clinical trials.

[First human trial of COVID-19 vaccine shows safe and rapid immune response](#)

According to new research published in The Lancet, the first COVID-19 vaccine to reach phase 1 clinical trial has been found to be safe, well-tolerated, and able to generate an immune response against SARS-CoV-2 in humans. The open-label trial in 108 healthy adults demonstrates promising results after 28 days -- the final results will be evaluated in six months. Further trials are needed to tell whether the immune response it elicits effectively protects against SARS-CoV-2 infection. These results represent an important milestone



potential candidate for further investigation. However, these results should be interpreted cautiously. The challenges in the development of a COVID-19 vaccine are unprecedented, and the ability to trigger these immune responses does not necessarily indicate that the vaccine will protect humans from COVID-19. This result shows a promising vision for the development of COVID-19 vaccines, but we are still a long way from this vaccine being available to all. The authors note that the main limitations of the trial are its small sample size, relatively short duration, and lack of randomised control group, which limits the ability to pick up rarer adverse reactions to the vaccine or provide robust evidence for its ability to generate an immune reaction. Further research will be needed before this trial vaccine becomes available to all.

[Researchers culture novel coronavirus for drug testing and vaccine development](#)

The Centre for Cellular and Molecular Biology (CCMB) has established stable cultures of coronavirus (SARS-CoV-2) from patients' samples. The ability to culture the virus in lab enables CCMB to work towards vaccine development and testing of potential drugs to fight COVID-19. Novel coronavirus enters human cell by binding with the ACE-2 receptor on the cell surface. Not all cells have ACE-2 receptors. Human epithelial cells in the respiratory tract copiously express ACE-2 receptors, causing respiratory disease in the infected patient. However, human epithelial cells cannot be grown in lab. Therefore, the labs use Vero cells (kidney epithelial cell lines from green African monkey), which express ACE-2 proteins and carry a cell division that allows them to proliferate indefinitely. A dreadful germ is cultivated in large amount and inactivated so that it can be used as inactivated virus vaccine. The inactivated virus can trigger antibody response, but does not infect and make us sick as they cannot reproduce. Such antibodies generated in these non-human hosts can be purified, processed and collected. The antibodies can be used as therapeutic intervention for patients suffering from the infection. Using the Vero cell lines to grow the coronavirus, the CCMB is working towards producing viruses in huge quantities that can be inactivated, and used in vaccine development and antibody production for therapeutic purposes.

GLOBAL

[Australia record world's fastest internet speed from a single optical chip](#)

Researchers from Monash, Swinburne and RMIT universities have successfully tested and recorded Australia's fastest internet data speed, and that of the world, from a single optical chip, able to achieve a data speed of 44.2 Terabits per second (Tbps) from a single light source. They achieved these quick speeds using existing communications infrastructure where they were able to efficiently load-test the network. They used a new device that replaces 80 lasers with one single piece of equipment known as a micro-comb, which is smaller and lighter than existing telecommunications hardware. To illustrate the impact optical



up of hundreds of high quality infrared lasers from a single chip. Each 'laser' has the capacity to be used as a separate communications channel. Researchers were able to send maximum data down each channel, simulating peak internet usage, across 4THz of bandwidth. The future ambition of the project is to scale up the current transmitters to tens of terabytes per second without increasing size, weight or cost.

Metamaterials production breakthrough

A South Korean research team developed moldable nanomaterials and a printing technology using metamaterials, allowing the commercialization of inexpensive and thin VR and AR devices. The research findings solve the issue of device size and high production costs that were problematic in previous researches. Metamaterials are substances made from artificial atoms that do not exist in nature but they freely control the properties of light. In order to make meta-materials, artificial atoms smaller than the wavelengths of light must be meticulously constructed and arranged. Until now, metamaterials have been produced through a method called electron beam lithography (EBL). The team developed a new nano-material based on nano-particle composite that can be molded freely while having optical characteristics suitable for fabricating metamaterials. The team also succeeded in developing a one-step printing technique that can shape the materials in a single-step process and in producing an ultrathin metalens that is 100 times thinner than the strand of a human hair. Meta-materials can be made into one-thousandth of thickness of heavy glass or plastic lenses. This is the first time in the world such ultrathin metalens was produced in a single-step printing. This technology enables the production at about 1/100 the cost and 1/10,000 the thickness in a simplified process. This technology could open up the use of metamaterials at low cost.

Researchers breaking new ground in materials science

A study by a team of researchers from Canada and Italy recently published in Nature Materials could usher in a revolutionary development in materials science, leading to big changes in the way companies create modern electronics. The goal was to develop two-dimensional materials, which are a single atomic layer thick, with added functionality to extend the revolutionary developments in materials science that started with the discovery of graphene in 2004. This work opens exciting new directions, both theoretical and experimental. The integration of this system into a device (e.g. transistors) may lead to outstanding performances. In addition, these results will foster more studies on a wide range of two-dimensional conjugated polymers with different lattice symmetries, thereby gaining further insights into the structure vs. properties of these systems. The Italian/Canadian team demonstrated the synthesis of large-scale two-dimensional conjugated polymers, also thoroughly characterizing their electronic properties. They achieved success by combining the complementary expertise of organic chemists and surface scientists. Structurally



mechanisms of surface reactions at a fundamental level and simultaneously yield a novel material with outstanding properties, whose existence had only been predicted theoretically until now.

[Next-generation solar cells pass strict international tests](#)

Australian scientists have for the first time produced a new generation of experimental solar energy cells that pass strict International Electrotechnical Commission testing standards for heat and humidity. The research findings, an important step towards commercial viability of perovskite solar cells, are published today in the journal Science. Solar energy systems are now widespread in both industry and domestic housing. Most current systems rely on silicon to convert sunlight into useful energy. However, the energy conversion rate of silicon in solar panels is close to reaching its natural limits. So, scientists have been exploring new materials that can be stacked on top of silicon in order to improve energy conversion rates. One of the most promising materials to date is a metal halide perovskite, which may even outperform silicon on its own. Perovskites are a really promising prospect for solar energy systems and they are a very inexpensive, 500 times thinner than silicon and are therefore flexible and ultra-lightweight. They also have tremendous energy enabling properties and high solar conversion rates. In experimental form, the past 10 years has seen the performance of perovskites cells improve from low levels to being able to convert 25.2 percent of energy from the Sun into electricity, comparable to silicon-cell conversion rates, which took 40 years to achieve. However, unprotected perovskite cells do not have the durability of silicon-based cells, so they are not yet commercially viable.

[Bricks made from plastic, organic waste](#)

Revolutionary 'green' types of bricks and construction materials could be made from recycled PVC, waste plant fibres or sand with the help of a remarkable new kind of rubber polymer discovered by Australian scientists. The rubber polymer, itself made from sulfur and canola oil, can be compressed and heated with fillers to create construction materials of the future. The powdered rubber can potentially be used as tubing, rubber coatings or bumpers, or compressed, heated then mixed with other fillers to form entirely new composites, including more sustainable building blocks, concrete replacement or insulation. This new recycling method and new composites are an important step forward in making sustainable construction materials, and the rubber material can be repeatedly ground up and recycled. The rubber particles also can be first used to purify water and then repurposed into a rubber mat or tubing. The new manufacturing and recycling technique, labelled 'reactive compression molding,' applies to rubber material that can be compressed and stretched, but one that doesn't melt. The unique chemical structure of the sulfur backbone in the novel rubber allows for multiple pieces of the rubber to bond together.



[India appeals G-20 nations to ensure access to essential medicines, and vaccines](#)

India has called upon the G-20 nations to ensure access to essential medicines, treatments and vaccines at affordable prices. Commerce and Industry Minister Shri Piyush Goyal speaking at the 2nd G20 Virtual Trade & Investment Ministers Meeting, asked the G20 members to first focus on immediate and concrete actions that can ease the distress being faced by people all over the world due to the Corona pandemic. He strongly called for agreement to enable the use of TRIPs flexibilities to ensure access to essential medicines, treatments and vaccines at affordable prices. He also called upon the G-20 nations to also agree to provide diagnostic and protective equipment, and healthcare professionals across borders where they are most needed. Shri Goyal said that doing away with the policy instrument of export restrictions will not guarantee access to medical products and food for all, but could lead to a flight of these critical products to the highest bidder, making them inaccessible to the resource-poor. He called for eliminating the historic asymmetries in the Agreement on Agriculture, and delivering on the long-standing Ministerial mandate to establish permanent, adequate and accessible disciplines on Public Stockholding for food security purposes by the 12th Ministerial Conference of the WTO.

[Indian Railways rolls out its most powerful 12000 HP made in India locomotive](#)

The first 12000 horsepower made in India Locomotive, manufactured by Madhepura Electric Loco Factory situated in Bihar, was put into operation by Indian Railways, the world's largest railway enterprise on 18 May. The WAG12 class locomotive makes India the 6th country in the world to join the elite club of producing high horsepower locomotives indigenously. The Madhepura factory is the largest integrated Green Field facility built to the highest standards of quality and safety with production capacity of 120 locomotives and spread across a massive 250 acres. These locomotives are state of art IGBT based, 3 phase drive, 9000 KW (12000 horsepower) electric locomotive, capable of maximum tractive effort of 706 kN, which is capable of starting and running a 6000 Tonne train on a gradient of 1 in 150. The locomotive has a design speed of 120 kmph and can be tracked through GPS for its strategic use through embedded software and microwave links. The locomotive is equipped with a regenerative braking system which provides substantial energy savings during operations. These high horsepower locomotives will help to decongest the saturated tracks by improving average speed of freight trains. Madhepura Electric Locomotive Pvt. Ltd. (MELPL) will manufacture 800 of these 12000 HP Electric Freight Locomotives in 11 years with capacity to manufacture 120 locomotives per year. The project will create more than 10,000 direct and indirect jobs in the country. More than Rs 20 billion has already been invested in the project by the company.

[IASST's electrochemical platform to detect carcinogenic compounds in food](#)



nitrosodimethylamine (NDMA) and N-nitrosodiethanolamine (NDEA) sometimes found in food items like cured meat, bacon, some cheese, and low-fat milk. It was achieved by developing a modified electrode by immobilizing carbon nanomaterials (carbon dots) in DNA. The scientists have fabricated an electrochemical biosensor using DNA immobilized on the surface of carbon dots for sensitive and selective detection of N-nitrosamine. The detection limit was determined to be 9.9×10^{-9} M and 9.6×10^{-9} M for NDMA and NDEA, respectively, far greater than conventional methods. The electrochemical biosensor platform was developed using the ability of NDMA and NDEA, to alter the DNA. Carbon dots (CDs), a carbon-based nanomaterial, was used, which is already established as a biocompatible and environmentally friendly material. Naturally derived chitosan, (natural biopolymer obtained from the shells of shrimp, lobster, and crabs) is an environment-friendly sustainable material that was used to synthesize CDs. As this is an electrochemical sensor, electrode were developed by depositing carbon dots (carbon nanoparticles) and then immobilizing bacterial DNA on them.

[Karnataka launches first accelerator for cyber security start-ups](#)

Karnataka's centre of excellence in cyber security (CySecK) has launched an accelerator programme for cyber security start-ups. Branded as H.A.C.K, it is the State's first cyber security-specific accelerator. The programme has 21 start-ups on board across three cohorts: 10x cohort, 0-1 cohort and virtual cohort. Cyber security start-ups are typically deep-tech start-ups innovating in highly specialised technical areas. Such start-ups from India have special challenges in addition to the ones that start-ups generally face, primarily due to lack of market maturity and availability of skilled talent. This has resulted in India relying primarily on global companies for cyber security products. It is important for the nation to achieve higher self-reliance in the critical domain of cyber security. This programme will support mature Indian start-ups to accelerate their growth through government and market connections, and nascent start-ups to mature through an innovative incubation ecosystem and marquee mentorship. CySecK is housed on the campus of Indian Institute of Science, which is the anchor institute. The key objectives of the centre of excellence are to promote a cyber-safe and conducive environment for industry collaboration, address skills gap, build awareness and foster innovation in the emerging technology field of cyber security.

[A giant leap! Boost to private participation in space programme](#)

In an effort to promote Make in India in the space sector, the government has decided to open it up for private participation. In April the Indian Space Research Organization (ISRO) came out with the Announcement of Opportunity (AO) document where Human Space Program innovations and creative technologies for space explorations are required. The idea behind this is to ensure widening of scientific knowledge, economic growth, value addition to the quality of life of a common man and thus national development. ISRO has detailed



prohibited by the COSPAR (Committee on Space Research) guidelines on planetary protection. It shall be the responsibility of participating Organisation to ensure that payloads shall not result in any harmful contamination of the outer space environment. Some restrictions have been put on the selected developmental Organisation such as the developed the proposal shall not be allowed to be used for marketing or business purposes without prior permission from Government of India. The Intellectual Property Rights (IPR) such as patents, design rights etc. acquired shall be jointly owned by ISRO and the Research institute under all circumstances, irrespective of workshare or budget share.

IN BRIEF

[Fast-charging supercapacitor technology](#)

Experts from the University of Surrey a novel supercapacitor technology that is able to store and deliver electricity at high power rates, particularly for mobile applications. The new technology which has the potential to revolutionise energy use in electric vehicles and reduce renewable based energy loss in the national grid and push forward the advancement of wind, wave and solar energy by smoothing out the intermittent nature of the energy sources. The ATI's super-capacitor technology is based on a material called Polyaniline (PANI), which stores energy through a mechanism known as "pseudocapacitance". This cheap polymer material is conductive and can be used as the electrode in a supercapacitor device. The team developed a new three-layer composite using carbon nanotubes, PANI, and hydrothermal carbon that demonstrate remarkable rate-capability at high energy densities, independent of the power use. The as prepared CNT/PANI/HTC composite exhibited a high specific capacitance of 571 F/g at 1 A/g, and 557 F/g and 100 A/g., demonstrating a record rate capability of 98% capacitance retention, when the current density is increased 100 fold.

[New tool developed to sequence circular DNA](#)

University of Alberta biologists have invented a new way for sequencing circular DNA, according to a new study. The tool--called CIDER-Seq--will give other scientists rich, accurate data on circular DNA in any type of cell. While our own DNA is linear,, circular DNA is common in the genomes of bacteria and viruses. Scientists have also discovered circular DNA within the nuclei of human and plant cells, called extra-chromosomal circular DNA (eccDNA). Recently, research has begun to investigate the role of eccDNA in human cancer--but progress has been hampered due to the lack of effective methods for studying and sequencing eccDNA. The new method enables an unbiased, high-resolution understanding of circular DNA in any type of cell. With our invention of CIDER-Seq, one can start to begin to understand the function of these mysterious circular DNAs in human and plant cells. CIDER-Seq uses DNA sequencing technology called PacBio. The method includes a web-lab protocol, as well as a new computational pipeline. It is optimized to



finally obtain full length sequences of eccDNA, enabling complete sequencing of these molecules and gives a tool to better understand what they actually do in the cell.

[A spreadable interlayer could make solid state batteries more stable](#)

Scientists at Chalmers University of Technology, Sweden, and Xi'an Jiaotong University, China have developed an interlayer, made of a spreadable, 'butter-like' material helps improve the current density of batteries tenfold, while also increasing performance and safety. The material is a soft, spreadable, 'butter-like' substance, made of nanoparticles of the ceramic electrolyte, LAGP, mixed with an ionic liquid. The liquid encapsulates the LAGP particles and makes the interlayer soft and protective. The material, which has a similar texture to butter, fills several functions and can be spread easily. Although the potential of solid-state batteries is very well known, there is as yet no established way of making them sufficiently stable, especially at high current densities, when a lot of energy is extracted from a battery cell very quickly, that is at fast charge or discharge. The Chalmers researchers see great potential in the development of this new interlayer in enabling the manufacture of large-scale, cost-effective, safe and environmentally friendly batteries that deliver high capacity and can be charged and discharged at a high rate.

RESOURCES AND EVENTS

[NASA releases the Artemis Accords - Guidelines For Human activity in Space](#)

NASA has just released a set of agreements called the Artemis Accords (<https://www.nasa.gov/specials/artemis-accords/index.html>) for other international space agencies and private companies to abide by given the increase in operations in cislunar space. NASA is inviting International space agencies to join in the Artemis program by executing bilateral Artemis Accords agreements, which will describe a shared vision for principles, grounded in the Outer Space Treaty of 1967, to create a safe and transparent environment which facilitates exploration, science, and commercial activities for all of humanity to enjoy. These Accords include peace, transparency, interoperability (the ability of products or systems to work with different products or systems). NASA is requesting all international partners agree to share their scientific data publicly, as well as register all space objects. About 87 percent of all satellites, probes, landers, and other launched space objects have been registered with the United Nations Register of Objects Launched into Outer Space. There are agreements on space resources, and information about orbital debris and disposal, but many of these are similar to the Outer Space Treaty - a document by the United Nations that came into effect in 1967.

[World Health Assembly Commits to Work Together to Combat COVID-19](#)

The 73rd WHA convened virtually on 18-19 May 2020, bringing together 14 Heads of



Xi Jinping highlighted China's provision of USD 2 billion over two years to help with the COVID-19 response, particularly in developing countries. The resolution adopted during the Assembly session calls on countries to, inter alia: (1) implement a whole-of-government and whole-of-society response to the pandemic; (2) provide reliable and comprehensive information on COVID-19; (3) take measures to counter misinformation and disinformation as well as malicious cyber activities; (4) provide access to safe testing, treatment, and palliative care for COVID-19; (6) leverage digital technologies for the response to COVID-19; (7) provide the WHO with timely, accurate, and sufficiently detailed public health information related to COVID-19; (8) promote both private sector and government-funded research and development, particularly on vaccines, diagnostics, and therapeutics, and to share relevant information with the WHO; and (9) provide sustainable funding to the WHO so it can respond to public health needs in the global response to COVID-19. It calls on international organizations and other stakeholders to work collaboratively to develop, test, and scale-up production of safe, effective, and affordable diagnostics, therapeutics, medicines, and vaccines.

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