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NEWS ALERT

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CORONAVIRUS PANDEMIC

Mass testing and data gathering at the core of EU COVID-19 exit plan

In a 15-page exit strategy, the European Commission has called 27 member states to move cautiously as they plan to reopen businesses gradually while scaling up tracing and testing resources as a way of controlling COVID-19. Special-purpose mobile apps are recommended for tracking the virus, but they should be voluntary for the public. EU states are recommended to expand their ability to test for the virus, enabling health services to adequately prepare for it. The availability of large-scale testing is a precondition for lifting social distancing measures in the future. Governments are recommended to align testing



under the most optimistic scenarios. Both the EU and European Medicines Agency will streamline regulatory steps for the vaccine, from clinical trials to marketing authorisations, to ensure the process goes as fast as possible.

[Inexpensive, portable detector identifies pathogens in minutes](#)

Researchers from the University of Illinois have demonstrated an inexpensive yet sensitive smartphone-based testing device for viral and bacterial pathogens that takes about 30 minutes to complete. The roughly \$50 smartphone accessory is composed of a small cartridge containing testing reagents and a port to insert a nasal extract or blood sample, the researchers said. The whole unit clips to a smartphone. Inside the cartridge, the reagents break open a pathogen's outer shell to gain access to its RNA. A primer molecule then amplifies the genetic material into many millions of copies in about 10 or 15 minutes, the researchers said. A fluorescent dye stains the copies and glows green when illuminated by blue LED light, which is then detected by the smartphone's camera. The team is working on a cartridge that has all of the reagents needed to be a fully integrated system. The technology is licensed by Reliant Immune Diagnostics.

[Researchers identify cells likely targeted by COVID-19 virus](#)

Researchers have identified specific types of cells that appear to be the targets of the SARS-Cov-2 coronavirus that is causing the Covid-19 pandemic. They looked at likely target cells for infection in the nasal passages, lungs, and intestine. In their data, the researchers also saw the expression of the ACE2 gene appeared to be correlated with activation of genes that are known to be turned on by interferon, a protein that the body produces in response to viral infection. The finding suggests that coronaviruses may have evolved to take advantage of host cells' natural defences, hijacking some proteins for their own use. The researchers hope that their findings will help guide scientists who are working on developing new drug treatments or testing existing drugs that could be repurposed for treating Covid-19.

[New test for COVID-19 may deliver faster results to more people](#)

Scientists have developed a novel assay capable of detecting the causative viral pathogen of COVID-19 that can be run in decentralized test facilities. The investigators first designed LAMP primer sets targeting genomic regions specific to SARS-CoV-2 compared to other human pathogenic coronaviruses. The RT-LAMP assays in this study were able to detect as low as 100 copies of SARS-CoV-2 RNA. Cross-reactivity of RT-LAMP assays to other human coronaviruses was not observed. This novel method may enable decentralized facilities to deliver faster test services for COVID-19 to more people.

[Call for new €3B EU funding scheme to deliver COVID-19 vaccine](#)



proposed scheme would issue a series of grants, as part of an open, continuous competition, until the critical number of projects is reached. To save time, the organisation of the scheme should be handled by an existing EU agency. There are currently too few promising projects in the clinical trial pipeline. The authors suggested raising money through so-called 'coronabonds', which would act as a vehicle to borrow funds on the market and leverage them for large-scale investments. The report also calls for an international research moonshot to meet the challenge of future pandemics.

[First clinical tests on COVID-19 vaccine to begin in Germany](#)

Paul-Ehrlich-Institut, Germany has authorised the first phase I/II clinical trial of a vaccine against COVID-19 in Germany. The German-based company, BioNTech and Pfizer, has developed the RNA vaccine, containing the genetic information for the construction of spike protein of CoV-2. In the first part of the authorised clinical trial, 200 healthy volunteers between 18-55 years of age will be vaccinated with one or more variants of the vaccine. Further clinical trials in Germany will proceed in the coming three-five months.

[Tel Aviv Professor receives US Patent for Technology in Vaccine Design](#)

The School of Molecular Cell Biology and Biotechnology at Tel Aviv University's (TAU) has been granted a US patent for innovative vaccine design for the corona family of viruses. The vaccine targets the most vulnerable point of the novel coronavirus - the Receptor Binding Motif (RBM), a critical structure that enables the virus to bind to and infect a target cell. The team has developed a method of reconstructing and reconstituting the new SARS-CoV-2's RBM. The reconstitution of the new RBM and its use as the basis for a new vaccine is covered by an additional patent application which is pending at the USPTO. The development of RBM-based vaccine could take months and its phased clinical trials would then take up to a year.

[Covid-19 Field Ventilators developed by UK Team](#)

The UK team of clinicians, academic and industrial engineers and manufacturers developed a low-cost Covid-19 field ventilator to treat patients in poor and remote areas of the world. The project was led by Brian Back, founder and CEO of Radio Data Networks and the not-for-profit Zero Pollution Network. These ventilators use a windscreen wiper motor, cam and lever system and a standard Ambulance Bag to ventilate the patient. It is also designed to run on battery, solar panels, wind turbines. It is designed to function and withstand a harsher environment found outside any hospital in any field hospital or rural community health service.

[Scientists are working on 115 possible COVID-19 vaccines around the world](#)

Around the world, scientists are working on 115 possible COVID-19 vaccines. Public



for Epidemic Preparedness Innovations (CEPI) is funding as many as eight vaccine efforts. Five candidates have recently moved into clinical development, including test vaccines by US-based companies Moderna and Inovio, and China's CanSino Biologicals and Shenzhen Geno-Immune Medical Institute. Of the active vaccine candidates, CEPI counts 36 developers in the US and Canada, 14 in China, 14 in Asia (excluding China) and Australia, and 14 in Europe.

Novel coronavirus mutation found in India

New research shows that the novel coronavirus is undergoing mutations that could make it challenging to develop a vaccine. Scientists isolated samples of the virus from India and found a mutation that led to a weaker "receptor binding capacity" of the virus. This sample was collected from India on 27th January 2020 from the state of Kerala and was analyzed in March 2020. It was taken from a medical student who had returned from Wuhan China, where the disease had initially started. The researchers noted that the Indian strain had a removal of a hydrogen bond from the spike protein. This made the virus less adherent to the ACE2 receptors on the host cells of the body. The study can be accessed at <https://www.biorxiv.org/content/10.1101/2020.04.09.034942v1>. This finding could have important implications for the progression of Covid-19 in Indian patients, including susceptibility and mortality rates.

A high level task force to oversee COVID-19 related research and vaccine development

India has set up high-level multi agency task force on 19 April, for COVID-19 related work in the fields of science and vaccine development. It is co-chaired by Member, Niti Aayog and Principal Scientific Adviser to the Government of India. The aim of this task force is to enable COVID-19 related research by academia, industry and the international community. The Task Force has made DBT a central coordinating authority for vaccine development and their main work will be to identify a pathway for vaccine development. Clinical teams will be focussing on long term follow-up of people for better understanding of the disease and its management will be worked upon. Also, bio-specimens will be collected which will form the basis for further trials of drugs and vaccines.

Trivandrum-based institute develops novel Covid-19 test kits

Sree Chitra Tirunal Institute for Medical Science and Technology has developed a low cost diagnostic test kit that can confirm in two hours the presence of COVID-19 infection. A total of 30 samples can be tested in a single batch on a single machine. The new diagnostic kit is cost-effective as each test will cost the lab ₹1,000, which is less than the minimum cost of COVID-19 tests being carried out at present. The test kit called Chitra GeneLAMP-N is highly specific for SARS-CoV-2 N-gene and can detect two regions of the gene which



and matches with test results using RT-PCR. The kit uses magnetic nanoparticles to capture and concentrate the RNA from the patient sample. The Institute has filed for a patent for this technology, which is simpler than in imported kits. The test kits are now being validated in larger test samples for ICMR approval, followed by a commercial manufacturing license from DCGI.

[Central government expects to produce 1 million RT-PCR kits by May](#)

The Union Health Ministry said that by next month, 1 million indigenously developed RT-PCR kits would be manufactured. By May, the country can produce around 1 million kits and also working to manufacture 1 million rapid antibody detection kits. The real time reverse transcription polymerase chain reaction (real time RT-PCR) test is considered one of the most accurate lab methods to detect, track and study coronavirus. The ministry has prioritized the indigenous manufacturing of new rapid and accurate diagnostic kits, which can provide results in 30 minutes. Strategies being followed include pooling of testing to increase coverage, and on increasing the indigenous synthesis of critical components for domestic kit production.

[Govt Approves Funding of 3 Companies for Developing COVID-19 Vaccine](#)

The Department of Biotechnology has short-listed three companies for funding the development of a vaccine for COVID-19, besides 13 other proposals it received for diagnostics, therapeutics and other interventions to fight coronavirus. The three companies are Cadila Healthcare Ltd, Bharat Biotech International Ltd, and Serum Institute of India Private Limited. The DBT said a multifaceted approach is being adopted to ensure that vaccine companies utilising different platforms and at different stages of development are fast-tracked through a research consortium under funding from the National Biopharma Mission. Cadila Healthcare Ltd is developing a DNA Vaccine candidate against novel coronavirus SARS-CoV-2 and Bharat Biotech International Ltd is developing a vaccine candidate utilising the inactivated rabies vector platform. The DBT has been designated the central coordination agency for the development of a vaccine for COVID-19.

[Indian Solutions Dominate Global Hackathon to Combat COVID-19](#)

At the recently concluded Global Hackathon, Hack the Crisis-India, where nations competed to share the best solutions to overcome COVID-19 and its aftermath, Indian solutions received unanimous appreciation. India was invited to lead in the three large categories – as track lead in Crisis-Management, Healthcare-Wellness & Mental Health. In Crisis Response, India's idea-Autonomous UV Disinfectant Robot and PAVAN-Portable and affordable ventilator ranked 1st and 2nd respectively. In Mental Health category, the ASHA-Connect ranked 2nd. In the Health & Wellness category, COVID Care-AI powered Digital Hospital & Coronavirus laboratory ranked 2nd. In Governance, India



[UV disinfection trolley can effectively clean up hospital spaces in combating COVID-19](#)

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), has developed a UVC based disinfection trolley to fight against COVID-19 by rapid cleaning of hospital environment. UV light in the range of wavelengths between 200 and 300 nm is capable of inactivating microorganisms, such as bacteria and viruses, thus disinfecting both air and solid surfaces. Rapid decontamination of the used patient-care beds and hospital rooms before admission of subsequent occupants is a major requirement in hospitals. The UVC disinfection trolley is moved around in the room by an operator in a protective suit and UV resistant goggles to disinfected hospital rooms. The present system is the first prototype is deployed at Employee's State Insurance Corporation hospital in Hyderabad for field trials. It is readily usable in hospitals and railway coaches that are also being planned for the treatment of COVID-19 patients.

[Digital surveillance to monitor and control COVID-19 spread](#)

The Centre for Cellular and Molecular Biology (CCMB) and the Institute of Genetics and Integrated Biology (IGIB), and other institutions, are working for the digital and molecular surveillance of the spread of novel coronavirus to understand the biology, epidemiology and disease impact. The special lab would be established at IGIB where all the labs, research centres and hospitals will share their data through cloud sharing. The surveillance will be done at three levels: the virus, the patient and the clinical course of the patient. The lab will provide information on genome sequencing and sample testing for understanding the spread, the isolates, and a variety of related information. The second part deals with the patient data to monitor the population in which the spread is virulent and the population in which the spread is controlled.

[Inactivated virus vaccine in focus for novel coronavirus](#)

Researchers from the Centre for Cellular and Molecular Biology (CCMB) have embarked upon developing an inactivated virus vaccine for novel coronavirus. The important technological challenge is culturing the virus outside of the human host. Finding the right cell culture technology for the novel coronavirus will also help in drug development. Once a virus infects the cells, the potential drug candidate can be tested against the same.

[Another CSIR lab to start genome sequencing of novel coronavirus](#)

Chandigarh-based Institute of Microbial Technology (IMTech) has taken up the task of large-scale genome sequencing of the coronavirus. These genome sequencing samples will be submitted to the international recognised repository. The complete genome sequence information will enable researchers to gain insights about the origins of the virus, the different



resource obtained from this sequencing will also allow the identification of new targets for diagnosis and drugs for COVID-19.

Indian Initiative to Fight COVID-19, Enhancing Natural Defense

Natural defence mechanism of the body (innate immunity) plays a key role in the fight against COVID-19 and other viral infections. The Council of Scientific and Industrial Research (CSIR) has decided to develop/repurpose an approved immune-modulator, Sepsivac®, to enhance innate immunity of the body to limit the spread of COVID-19 and fasten the recovery of the patients of COVID-19. Sepsivac is expected to protect the close contacts of COVID-19 patients and health care staff by boosting their innate response and thereby preventing them from acquiring the disease and to provide quicker recovery to the hospitalized COVID-19 patients, who are not critically ill. It will also prevent the progression of disease wherein patients will need ICU management. Both these new clinical trials are now approved by the Drugs Controller General of India (DCGI). Sepsivac® was also developed under the NMITLI program of CSIR and is manufactured by Cadila Pharmaceuticals Ltd., Ahmedabad.

TDB approves support for ramping up production of COVID-19 diagnostic kits

MyLab Discovery Solutions is the first indigenous company to develop real-time PCR based molecular diagnostic kit that screens and detects COVID 19 from samples. The Technology Development Board (TDB) under the Department of Science and Technology (DST) has approved financial support to MyLab Discovery Solutions, Pune, for ramping up production of their COVID-19 diagnostic kits through automation of the facility, thereby increasing its current capacity from 30000 test kits per day to 100,000 test kits per day. This kit has been approved by ICMR and CDSCO. MyLab was one of the companies responding to the invitation and its proposal was finalised after a stringent evaluation process involving experts from government and academic institutions.

India's Serum Institute to make millions of doses of potential COVID-19 vaccine

The Serum Institute of India plans to start manufacturing Oxford University's COVID-19 vaccine in 3 weeks to get a head start on production. The (COVID-19) vaccine is expected to be out in the market by September - October, subject to successful trials with the requisite safety and assured efficacy. Trials in India for this vaccine are expected to start over the next 2-3 weeks' time. Serum Institute of India is also collaborating with Codagenix, an American biotech company, for a live attenuated vaccine candidate. . Serum Institute is partnering with Oxford in the mass production of the new engineered chimp-virus-based COVID-19 vaccine being developed by the latter. Serum Institute would not patent any vaccine it was likely to develop, making it free for global producers to manufacture and sell. This would speed up the process of production, allowing billions of doses to be produced



[PM interacts with CMs to plan ahead for tackling COVID-19](#)

Prime Minister Shri Narendra Modi on 27 April interacted with Chief Ministers of states via video conferencing to discuss the emerging situation and plan ahead for tackling the COVID-19 pandemic. Prime Minister underlined that the Lockdown has yielded positive results as the country has managed to save thousands of lives in the past one and a half months. He, however, forewarned that the danger of the virus is far from over and constant vigilance is of paramount importance. Reiterating the mantra of 'do gaz doori', he said that masks and face covers will become part of our lives in the days ahead. He highlighted the importance for states to enforce guidelines strictly in the hotspots i.e. the red zone areas and take steps to convert them into orange and thereafter to green zones. The Chief Ministers praised the leadership of the Prime Minister and stressed on addressing the economic challenge and ways to further boost health infrastructure. The leaders expressed gratitude towards the police force and medical staff for the exemplary work done by them in the fight against COVID-19.

GLOBAL

[Nanoparticles triggered by pH changes](#)

Researchers of Ludwig-Maximilians-Universitaet (LMU) in Munich have synthesized nanoparticles that can be induced by a change in pH to release a deadly dose of ionized iron within cells. This mechanism could potentially open up new approaches to the targeted elimination of malignant tumours. The large-scale release of ionic iron within cells in a controlled manner precipitates a form of inflammatory cell death known as pyroptosis, a type of reaction that is specific to cells of the innate immune system. This could in principle be utilized to eliminate malignant cells and to trigger an immune reaction that is specifically directed against cancers. The nanoparticles belong to a class of substances known as metal-organic frameworks (MOFs). Once inside the cell, the nanoparticles are transported into organelles called lysosomes, where they are degraded. These nanoparticles have great potential as therapeutic agents, particularly in the treatment of malignant tumours since the extracellular medium within tumours is more acidic than that associated with normal cells and this pH difference could be exploited for the targeted release of the iron within the tumour environment.

[Researchers develop new microneedle array combination vaccine delivery system](#)

Researchers at the University of Pittsburgh School of Medicine have developed a new vaccine delivery system for vaccines using live or attenuated viral vectors: a finger-tip sized patch that contains 400 tiny needles, each just half of one millimetre. The needles, made from sugar and the specific cargo being delivered, comprise a three-dimensional (3D), multi-component dissolving micro-needle array (MNA). While feeling like having Velcro



system to make antibodies to attack the virus. Dissolvable MNAs are designed to mechanically penetrate the superficial cutaneous layers, rapidly dissolve upon insertion into the skin, and deliver uniform quantities of biocargo to a defined 3D space within the skin. This enables localized delivery of low amounts of drugs or vaccines to achieve high concentrations in this specific skin microenvironment. Using in vivo mouse models, investigators generated the 3D multi-component dissolvable vaccine platform and successfully induced both antibody responses and stronger cellular immune responses.

[Fracking wells in the US are leaking methane](#)

Satellites have revealed the fracking heartland of the US is leaking methane, a powerful greenhouse gas at a record-breaking rate. The methane escaping from the oil and gas wells of the Permian Basin, which straddles Texas and New Mexico, has the potential to warm the atmosphere by almost as much as the carbon dioxide released by all homes in the US annually. Satellite analysis has shown the leakage rate is more than twice that assumed by the US Environmental Protection Agency, well above the average 1.9 per cent for 11 other major US basins, and higher than that recorded in any US oil and gas field before. The new research, led by Harvard University, analysed data taken over 11 months during 2018 and 2019 by the satellite-based TROPOMI system. The high leakage rates were due to excessive burning and venting of methane to the atmosphere.

[A cheap organic steam generator to purify water](#)

Researchers at Linköping University have developed a cheap and eco-friendly steam generator to desalinate and purify water using sunlight. The steam generator consists of an aerogel that contains a cellulose-based structure decorated with the organic conjugated polymer PEDOT: PSS. The polymer has the ability to absorb the energy in sunlight, especially in the infrared part of the spectrum where much of the sun's heat is transported. The aerogel has a porous nanostructure, capable of absorbing large quantities of water. A 2 mm layer of this material can absorb 99% of the energy in the sun's spectrum. A porous and insulating floating foam is also located between the water and the aerogel, such that the steam generator is kept afloat. The heat from the sun vaporises the water, while salt and other materials remain behind. The aerogel is durable and can be cleaned in, for example, salt water such that it can be repeatedly used again immediately. The water that passes through the system by evaporation becomes very high-quality drinking water. All the materials are eco-friendly nano-cellulose and a polymer that has a very low impact on the environment and people. It also uses very small amounts of material: the aerogel is made up of 90% air. The technology could millions of people who don't have access to clean water.

[New hybrid material improves the performance of silicon in Li-ion batteries](#)

According to researchers at the University of Eastern Finland, a new hybrid material of



rates on the capacity of silicon anodes, the hybrid material of mesoporous silicon (PSi) microparticles and carbon nanotubes (CNTs) is a great solution. Further, the PSi microparticles used in the hybrid material were produced from barley husk ash to minimise the carbon footprint of the anode material and to support its sustainability. Silicon was produced through a simple magnesiothermic reduction process applied to the phytoliths that are amorphous porous silica structures found in abundance in husk ash. Next, the researchers are aiming to produce a full silicon anode with a solid electrolyte to address the challenges related to the safety of LIBs and to the unstable solid electrolyte interface (SEI).

[**A new tool for developing gene therapies against cancer and genetic disorders**](#)

A UCLA-led research team has developed a new method for delivering DNA into stem cells and immune cells safely, rapidly and economically. The technique uses high-frequency acoustic waves coupled with millions of cells that flow through an "acoustofluidic device" in a cell culture liquid which has tiny speakers inside that convert electrical signals to mechanical vibrations that are used to manipulate the cells. That procedure opens up pores along the cells' membranes that allow DNA and other biological cargo to enter the cells, and it enables the researchers to insert the cargo without the risk of damaging the cells by contacting them directly. The researchers delivered short strands of DNA called plasmids into human blood cells and blood-forming stem cells that were intended specifically for laboratory research, and pumped millions of such cells through the acoustofluidic device. Once inside a cell, a plasmid can be made into a protein that may be missing or damaged, or it can give the cell new capabilities. When combined with new gene-editing approaches, the method enables correction of a DNA sequence that is miscoded in a disease. The viability is very high compared with other techniques. The research has the potential to benefit adults and children with cancer, immune system disorders and genetic diseases.

INDIA

[**Stable material for organic pseudocapacitor to offer a low-cost scalable energy storage**](#)

Scientists at the Institute of Nano Science and Technology (INST), Mohali have developed a stable material for pseudocapacitors or supercapacitors which store electrical energy by electron charge transfer. The material can offer a low-cost scalable energy storage solution as an alternative to batteries. The hybrid xerogel structure (a solid formed from a gel by drying with unhindered shrinkage), made for the very first time, was fabricated by the integration of dopamine onto a conductive matrix, like graphene. The INST team used a unique two-step synthesis procedure - first, they followed a hydrothermal synthesis method for the anchoring of the redox moiety on the carbon support. However, they introduced a unique in situ electrochemical polymerization approach, in the second step of the synthesis.



1.7 Volt commercial LED bulbs. The novel synthesis approach will offer new insights into improving the stability and inferior power output of pseudocapacitors.

IN BRIEF

[Gas storage method could help next-generation clean energy vehicles](#)

A research team led by Northwestern University has designed and synthesized new materials with ultra-high porosity and surface area for the storage of hydrogen and methane for fuel cell-powered vehicles. The materials, a type of a metal-organic framework (MOF), can store significantly more hydrogen and methane than conventional adsorbent materials at much safer pressures and at much lower costs. The ultra porous MOFs, named NU-1501, are built from organic molecules and metal ions or clusters which self-assemble to form multidimensional, highly crystalline, porous frameworks. These materials could open the door to the next generation of clean energy automobiles by storing large amounts of hydrogen and methane within the pores of the MOFs and delivering them to the engine of the vehicle at lower pressures than needed for current fuel cell vehicles.

[High-capacity battery material using salmon DNA developed](#)

A Korean research team has succeeded in developing next-generation high-capacity cathode material for lithium-ion batteries by stabilizing the surface of over-lithiated layered oxides (OLO), using the DNA of salmon. The team used the DNA of a salmon, which has a strong affinity with lithium ions, to control the OLO's surface structure, which was the cause of the material degradation. The research team synthesized the composite coating material that combined carbon nanotubes (CNT) and the salmon DNA. The DNA/CNT mixture was uniformly arranged and attached to the surface of the OLO, resulting in the development of new cathode material. X-ray based analysis for the developed OLO confirmed that the structural degradation was suppressed during charge/discharge cycling and the thermal stability was improved. The team will make further efforts to develop a new material that can replace existing commercialized materials.

[Micro-device to detect bacteria, viruses](#)

Scientists designed a next-generation miniature lab device that uses magnetic nano-beads to isolate minute bacterial particles that cause diseases. The new system, a microfluidic device, is essentially a lab-on-a-chip. Using this device, the researchers were able to successfully isolate bacteria from various fluids with a microparticle-based matrix filter. The filter trapped particles in small voids in the device, providing a larger concentration of bacteria for analysis. An added advantage of a smaller device such as this allows for multiple samples to be tested at the same time. The future research direction includes not only isolating and detecting bacteria in water and human plasma, but also to work with whole blood samples



[Tiny sensors fit 30,000 to a penny, transmit data from living tissue](#)

Cornell University researchers have developed microsensors so tiny; they can fit 30,000 on one side of a penny. They are equipped with an integrated circuit, solar cells and light-emitting diodes (LEDs) that enable them to harness light for power and communication. And because they are mass fabricated, with up to 1 million sitting on an 8-inch wafer, each device costs a fraction of that same penny. The sensors can be used to measure inputs like voltage and temperature in hard-to-reach environments, such as inside living tissue and microfluidic systems. For example, when rigged with a neural sensor, they would be able to noninvasively record nerve signals in the body and transmit findings by blinking a coded signal via the LED. As a proof of concept, the team successfully embedded a sensor in brain tissue and wirelessly relayed the results. They devised a platform for parallel production of their optical wireless integrated circuits (OWICs) -- microsensors the size of 100 microns. The OWICS are essentially tiny-size smartphones that can be specialized with apps using light as a potential power source and communication medium. A company, OWiC Technologies, has been launched to commercialize the microsensors. The first application is the creation of e-tags that can be attached to products to help identify them.

[Optimizing a new spraying method for ceramic coatings](#)

Scientists from the University of Bayreuth have found a novel spraying method, Powder Aerosol Deposition (PAD), for production of ceramic coatings at normal room temperatures which is highly attractive for industrial applications. With PAD, dense ceramic films can be applied to very different types of materials, such as steel, glass, silicon, or even plastic. To achieve this, a dry ceramic powder is first converted into an aerosol, i.e. a mixture of gas and solid particles, with the aid of carrier gas. The aerosol is then transported into a vacuum chamber, and accelerated to several 100 meters per second through a nozzle and directed onto the material to be coated. On impact, the tiny ceramic particles fracture. The resulting fragments, only a few nanometers in size, feature fresh, active surfaces. They form tightly adhering, dense coatings with a thickness of between 1 and 100 micrometres. Thanks to their dense microstructure, the coatings already exhibit excellent mechanical properties even directly after the deposition. They are extraordinarily hard and have good chemical resistance. This technology offers a very high industrial potential, especially where high-quality ceramic coatings are required, such as Dielectric ceramics for capacitors, electrically conductive functional ceramics for sensors, and yttrium-stabilized zirconium oxide for high-temperature fuel cells.

[Study shows glaucoma could be successfully treated with gene therapy](#)

A new study led by the University of Bristol has shown a common eye condition, glaucoma could be successfully treated with a single injection using gene therapy, which would improve treatment options, effectiveness and quality of life for many patients. The research



part of the eye called the ciliary body, which produces the fluid that maintains pressure within the eye. Using the latest gene-editing technology called CRISPR; a gene called Aquaporin 1 in the ciliary body was inactivated leading to reduced eye pressure. Clinical trials are planned on this new treatment in the near future. If it is successful it could allow a long-term treatment of glaucoma with a single eye injection, which would improve the quality of life for some 64 million patients globally.

[Windows will soon generate electricity, following solar cell breakthrough](#)

Researchers from Australia have succeeded in producing next-gen perovskite solar cells that generate electricity while allowing light to pass through. This technology will transform windows into active power generators, potentially revolutionising building design. Two square metres of the solar window, the researchers say, will generate about as much electricity as a standard rooftop solar panel. They used an organic semiconductor that can be made into a polymer to make semi-transparent cells with a conversion efficiency of 17%, while still transmitting more than 10% of the incoming light. The solar cells can be made more, or less, transparent. The more transparent they are, the less electricity they generate, so that becomes something for architects to consider. Solar windows tinted to the same degree as current glazed commercial windows would generate about 140 watts of electricity per square metre. The first application is likely to be in multi-storey buildings.

RESOURCES AND EVENTS

[Aquaponics presents a new way to grow sustainable fish and vegetables](#)

One of the newer innovations in food production is a closed-loop system called aquaponics, where fish and vegetables are grown together using recirculated water. Aquaponics uses no soil, and instead, the plants sit in floating foam rafts with roots hanging down into water-filled tubs. Fish excrement acts as a natural fertilizer, and in turn, the plants purify the water in this mutually beneficial system. The third player in the system is the extremely important beneficial bacteria that break down fish waste into a form of nitrogen that plants can use to grow. Two inputs power the system: fish feed and energy and both can be sustainable if sourced properly. Aquaponics systems are largely self-regulating, with no need for chemical additives or fertilizers and 90% reduction in water use. Aquaponics systems can be set up anywhere and may be the next big thing in the sustainable food movement.

[Co-facilitators release elements paper for un75 declaration](#)

The co-facilitators overseeing negotiations on the Declaration for the Commemoration of the 75th Anniversary of the UN shared an elements paper elaborating points raised during a virtual consultation in February 2020. The elements paper proposes a Declaration, composed of three sections and recommends focusing on concrete action points related to



technologies. Further on action points, the elements paper identifies 11 topics including recovery from COVID-19, preparedness, Decade of Action for the SDGs, and financing for development (FfD); climate change, oceans, and sustainable consumption; new technologies and digitalization. The co-facilitators plan to share a zero draft by the beginning of May 2020 and convene a virtual informal consultation. The results will be presented at the anniversary commemoration planned for 21 September.

We welcome your comments and valuable suggestions. Please write to us for receiving publications, updates and notices regarding seminars, conferences etc.



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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