



NEWS ALERT

Forum for Indian Science Diplomacy

RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in science research, technological advancements, science diplomacy, policy and governance. The archives of this news alert are available at <http://fisd.in>. Please email your valuable feedback and comments to science.diplomacy@ris.org.in

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GLOBAL

[Precious metals from electronic waste in seconds](#)

Rice University researchers have developed a process to extract valuable metals from electronic waste which could use up to 500 times less energy than current methods and produce a byproduct clean enough for agricultural land. The process uses a modified flash Joule heating method to recover rhodium, palladium, gold and silver for reuse. Highly toxic heavy metals including chromium, arsenic, cadmium, mercury and lead can also be removed from the flashed materials, leaving a byproduct with minimal metal content. Instantly heating the waste to 3,400 Kelvin with a jolt of electricity vaporizes the precious metals, and the gases are vented away for separation, storage or disposal. The vapors are transported from the flash chamber under vacuum to another vessel, a cold trap, where they condense into their constituent metals. With more than 40 million tons of e-waste produced globally every year, there is good potential for recovery. One flash Joule reaction reduced the concentration of lead in the waste to below 0.05 parts per million, the level deemed safe for agricultural soils. Levels of arsenic, mercury and chromium were all further reduced by increasing the number of flashes. The scalable Rice process consumes about 939 kilowatt-hours per ton of material processed, 80 times less energy than commercial smelting furnaces and 500 times less than laboratory tube furnaces.

[Experimental vaccine shows promise in preventing rheumatoid arthritis](#)

Researchers at The University of Toledo have developed an experimental vaccine that shows significant promise in preventing rheumatoid arthritis, a painful autoimmune disease that cannot currently be cured and affects as much as 1 percent of the global population. The researchers discovered that the 14-3-3 zeta protein protects against rheumatoid arthritis, and developed a protein-based vaccine using purified 14-3-3 zeta protein grown in a bacterial cell. They found the vaccine promoted a strong and immediate; but long-lasting; response from the body's innate immune system, providing protection against the disease. In animal tests, the rheumatoid arthritis totally disappeared after administering the vaccine. The vaccine also significantly improved bone quality. The researchers have filed for a patent on their discovery and are seeking pharmaceutical industry partners to support safety and toxicity studies in hopes of establishing a preclinical trial.

[Comb breathalyzer is now a thousandfold more sensitive to disease biomarkers](#)

Scientists from the Joint Institute for Laboratory Astrophysics (JILA), University of Colorado Boulder, have boosted the sensitivity of their decade-old frequency comb breathalyzer a thousandfold and can detect four additional biomarkers of disease with the potential for six more. The comb system could offer real-time, noninvasive analysis of human breath to detect and monitor diseases. The JILA system "fingerprints" chemicals by measuring the colors and amounts of light absorbed as a laser frequency comb passes back and forth through breath samples loaded into a mirrored glass tube of 55 cm length. Recent upgrades include a shift to the mid-infrared band, where more molecules absorb light, and advances in optical coatings and several other technologies to achieve detection sensitivity up to the parts-per-trillion level. The team detected and monitored four biomarkers—methanol (CH₃OH), methane (CH₄), water (H₂O) and a form of heavy water (HDO)—in the breath of a volunteer. These are indicators of health conditions such as, in the case of methane, intestinal problems. The same apparatus

could detect six more chemicals like, formaldehyde, ethane, carbonyl sulfide, ethylene, carbon disulfide and ammonia. In addition, extending the comb lasers further into the infrared should greatly expand the detection capability and enable the identification of many hundreds of trace breath chemicals. The method offers high sensitivity, potential to detect tens of chemicals simultaneously and does not require chemical reagents and complex laboratory facilities.

[Very potent antiviral against dengue](#)

Researchers led by the KU Leuven Rega Institute have developed an ultra potent inhibitor of the dengue virus, which causes the tropical disease known as dengue. The antiviral molecule is exceptionally effective against all known dengue variants and could be used for therapeutic and prevention purposes. The inhibitor prevents the virus from copying its genetic material. Tests of the inhibitor in mice showed that even a low oral dose of the drug was very effective. The treatment is still effective when the infection is already at its peak and the number of virus particles in the blood dropped drastically within 24 hours after the start of the treatment. The inhibitor could also be used for prevention purposes. The antiviral drug will be developed in an easy-to-administer formulation that can be optimised for the treatment and prevention of the disease in dengue-endemic tropical and subtropical regions. This research has wider implications for finding broad spectrum antivirals.

[Hydrogel tablet can purify a litre of river water in an hour](#)

Scientists and engineers at The University of Texas at Austin have created a hydrogel tablet that can rapidly purify contaminated water. One tablet can disinfect a liter of river water and make it suitable for drinking in an hour or less. The special hydrogels called anti-bacterial hydrogels (ABHs) with catechol-enabled molecular-level hydrogen peroxide generators and quinone-anchored activated carbon particles can generate hydrogen peroxide to neutralize bacteria at an efficiency rate of more than 99.999%. The hydrogen peroxide works with activated carbon particles to attack essential cell components of bacteria and disrupt their metabolism. The process requires zero energy input and doesn't create harmful byproducts. The hydrogels can easily be removed, and they do not leave any residue. In addition to purifying water on their own, the hydrogels could also improve solar distillation, the use of sunlight to separate water from harmful contaminants via vaporization. The team is working to improve the hydrogels by increasing the different types of pathogens and viruses in water that they can neutralize. The team is also in the process of commercializing several prototypes. The hydrogels could be made from inexpensive materials and the synthesis processes are simple and scalable. The shape and size of the hydrogels can be controlled making them flexible for different types of uses.

[Novel, local treatment for chronic pain](#)

A team from the University at Buffalo has developed two sets of novel lipidated peptides - peptides modified with lipid molecules, that are injected at the site of injury and provide durable treatment for inflammatory pain that could be a promising alternative to opioids. The small peptides are able to penetrate nerve endings and provide long-lasting pain relief after a single administration. The small peptides disrupt a specific endocytosis subunit in pain neurons called AP2A2 when applied locally at pain nerve endings. This prevents pain-sensing neurons from relaying pain information to the central nervous system. The peptide decreased pain behaviors in multiple inflammatory pain models for up to six days. Local application enables most adverse side effects to be avoided, especially the risk of addiction. The new peptides remain in the nerve endings producing long-lasting reduction in pain. In animal studies the team found that females did not respond as well to the peptide compared to males. But if the peptide was administered right at the time of injury, females had a much better reduction in pain behavior than their male counterparts did. Further studies and tests are planned.

[Low-cost, portable device for rapid diagnosis of heart attacks](#)

Researchers from the University of Notre Dame and the University of Florida have

developed a sensor that could diagnose a heart attack in less than 30 minutes. By targeting three distinct types of microRNA or miRNA, the newly developed sensor can distinguish between an acute heart attack and a reperfusion - the restoration of blood flow, or reperfusion injury, and requires less blood than traditional diagnostic methods to do so. The ability to differentiate between someone with inadequate blood supply to an organ and someone with a reperfusion injury is an unmet, clinical need that this sensor addresses. The portability and cost efficiency of this device demonstrates the potential for it to improve how heart attacks and related issues are diagnosed in clinical settings and in developing countries. A patent application has been filed for the sensor and the researchers are working with Notre Dame's IDEA Center to potentially establish a startup company that would manufacture the device.

Game changer for large-scale biomedical research

Researchers from EPFL's Laboratory for Data Security, working with colleagues at Lausanne University Hospital (CHUV), MIT CSAIL, and the Broad Institute of MIT and Harvard, have developed 'FAMHE'. This federated analytics system enables different healthcare providers to collaboratively perform statistical analyses and develop machine learning models, all without exchanging the underlying datasets. This technology will not only revolutionize multi-site clinical research studies, but also enable and empower collaborations around sensitive personal data in many different fields such as insurance, financial services and cyberdefense. Using cutting-edge cryptographic techniques (multiparty homomorphic encryption), a new platform, FAMHE will act as a game-changer towards precision, personalized medicine.

Key stem cell population identified

Mesenchymal stem cells (MSCs) are thought to have great potential in the field of regenerative medicine, which restores damaged tissues. Researchers have identified a subpopulation of mesenchymal stem cells in the bone marrow that express the marker CD73. These cells have a higher potential for proliferation and differentiation, and play a significant role in bone healing, migrating to the site of a fracture and developing into cartilage and bone cells as part of the repair process. The identification of this subpopulation of MSCs could be of great benefit for regenerative medicine and the treatment of fractures.

Material protects against both biological and chemical threats

A Northwestern University research team has developed a versatile composite fabric that can deactivate both biological threats, such as the novel coronavirus that causes COVID-19, and chemical threats, such as those used in chemical warfare. The material also is reusable and can be restored to its original state by a simple bleach treatment. The promising fabric could be used in face masks and other protective clothing. The MOF/fiber composite builds on an earlier nanomaterial that deactivates toxic nerve agents. The researchers found that the MOF/fiber composite exhibited rapid activity against SARS-CoV-2 and both gram-negative bacteria (*E. coli*) and gram-positive bacteria (*S. aureus*). Also, the active chlorine-loaded MOF/fiber composite rapidly degraded sulfur mustard gas and its chemical simulant (2-chloroethyl ethyl sulfide, CEES). The nanopores of the MOF material coated on the textile are wide enough to allow sweat and water to escape. The composite material is scalable, and only requires basic textile processing equipment currently used by industry. When incorporated into a facemask, the material should be able to work both ways: protecting the mask wearer from virus in his or her vicinity as well as protecting individuals who come into contact with an infected person wearing the mask. A startup company has been formed to commercialize the material.

Method to extract and separate rare earth elements

A team led by Pennsylvania State University has developed a new rare earth extraction and separation method that relies on a protein called lanmodulin (LanM) which binds strongly to rare earth elements. The protein is first immobilized onto tiny beads within a column to which the liquid source material is added. The protein then binds to the rare earth elements in the sample, which allows only the rare earths to be retained in the

column and the remaining liquid drained off. Then, by changing the conditions, for example by changing the acidity or adding additional ingredients, the metals unbind from the protein and can be drained and collected. By carefully changing the conditions in sequence, individual rare earth elements could be separated. Even when a sample has very low levels of rare earth elements (less than 0.1 percent), this new procedure successfully extracts and separates heavy rare earth elements (a group of 17 elements) with high purity. The method could eventually be scaled up to help develop a domestic supply of rare earth metals from industrial waste and electronics due to be recycled. The lighter rare earths can also be separated from the heavier rare earths in one step with greater than 99% purity. The method is useful for the production of individual rare earths and especially the heavier elements. The researchers plan to optimize the method using derivatives of the lanmodulin protein with greater selectivity for specific elements, so that fewer cycles are required to obtain the highest-purity products and enable it to be scaled up for industrial use.

COVID-19

COVID-19 (WORLD)

[UV-C light is safe and effective way to kill SARS-CoV-2 virus](#)

University of Colorado Boulder researchers have found that a specific wavelength of ultraviolet (UV) light is not only extremely effective at killing the virus which causes COVID-19, but is also safer for use in public spaces. This could lead to new affordable, safe and highly effective systems for reducing viral spread in crowded public spaces like airports and concert venues. The researchers found that a specific wavelength of Far ultraviolet-C, at 222 nanometers wavelength, created by what's known as a krypton chloride excimer lamp, was particularly effective. This type of radiation is blocked by the very top layers of human skin and eyes and has limited or no detrimental health effects at doses that are capable of killing off viruses. This could lead to systems that could either cycle on and off in indoor spaces to routinely clean the air and surfaces, or create an ongoing, invisible barrier between teachers and students, customers and service workers, and people in spaces where social distancing is not possible, to disinfect the air. It can complement improved indoor ventilation by providing the equivalent protection in a much cheaper way.

[Capability to detect airborne SARS-CoV-2 RNA developed](#)

The COVID-19 Delta variant's rapid spread globally underlined the need for rapid identification of the presence of SARS-CoV-2 in the environment. A team of scientists and doctors from the Singapore Centre for Environmental Life Sciences Engineering (SCElse) at Nanyang Technological University, Singapore (NTU Singapore) and the NUS Yong Loo Lin School of Medicine have developed a capability to detect airborne SARS-CoV-2 RNA - the nucleic acid coding for the virus that causes COVID-19, indoors through air sampling. When trialed in two inpatient wards of a major Singaporean hospital caring for active COVID-19 patients the air surveillance approach produced a higher detection rate of environmental SARS-CoV-2 RNA (72 percent) compared to surface swab samples (9.6 percent) collected in the same area.

[Antiviral pill molnupiravir for COVID](#)

The pharmaceutical firm Merck announced an antiviral pill. It can cut hospitalizations and deaths among people with COVID-19 by half. The drug candidate, molnupiravir, is most effective when given to patients earlier on in their infection when symptoms have only just appeared and viral loads are high. Molnupiravir, like remdesivir, is a nucleoside analogue, which mimics some of the building blocks of RNA. Molnupiravir disrupts the replication of the SARS-CoV-2 RNA genome inside the cell and combats the virus growth through lethal mutagenesis. It is difficult for viruses to evolve resistance to balapiravir. However, its mutagenic potential in human cells poses risks. The United States has agreed to purchase 1.7 million courses of molnupiravir for US\$1.2 billion, which works out to about \$700 per 5-day course. Merck has signed licensing agreements with five Indian manufacturers of generic drugs. Deals allow the

manufacturers to set their own price in India and 100 other low- and lower-middle-income countries.

[New scientific group to study COVID origins & prevent future pandemics](#)

The World Health Organization (WHO) has launched an expert group, the WHO Scientific Advisory Group for the Origins of Novel Pathogens (SAGO) that will examine the origins of new pathogens, including SARS-CoV-2. The members of the group were selected for their expertise in areas such as epidemiology, animal health, clinical medicine, virology and genomics. SAGO will advise WHO on the development of a global framework to define and guide studies into the origins of emerging and re-emerging pathogens with epidemic and pandemic potential, including SARS-CoV-2. The 26 scientists come from several countries, and were selected from over 700 applications following a global call. A two-week public consultation period will take place for WHO to receive feedback on the proposed SAGO members. SAGO will recommend further studies in China, and potentially elsewhere, to understand the origins of the new coronavirus.

COVID-19 (INDIA)

[Drones to deliver COVID vaccines to remote places](#)

India has started delivering COVID-19 vaccines to tough and hard-to-reach places using locally made drones, a move that could help it achieve its ambitious target of full inoculation for its entire adult population. India's Health Minister launched the Indian Council of Medical Research's drone response, which is the first such initiative in South Asia. Soon after, one of the drones supplied COVID vaccines to the island of Karang in the middle of the region's largest freshwater lake, Loktak in Manipur state, making the 31-km trip in just 15 minutes. The technology may prove to be a game changer in addressing the challenges in health care delivery in difficult areas. Drones have been granted permission to deliver vaccines in the northeastern states of Manipur and Nagaland and the federally governed Andaman and Nicobar Islands.

INDIA – SCIENCE & TECHNOLOGY

[Heli-borne survey technology for groundwater management](#)

The CSIR-NGRI Hyderabad has launched a Heli-borne survey technology for groundwater management, covering the States of Rajasthan, Gujarat, Punjab and Haryana in the first phase. The technology enables mapping groundwater sources in arid regions and thus helps utilize groundwater for drinking purposes. The Heli-borne technique provides a high resolution 3D image of the subsurface up to a depth of 500 meters below the ground. The technology could benefit the 80 million population in the arid areas of north western India spread over nearly 12 percent of the total geographical area of India, with an annual rainfall in the range of less than 100 to 400 mm.

[Biodegradable polymer has potential for packaging material](#)

A team of Indian scientists have developed an environmentally friendly, non-toxic, biodegradable polymer using guar gum and chitosan, both of which are polysaccharides extracted from guar beans and shells of crab and shrimps. The researchers found that the fabricated cross-linked film did not dissolve in water even after 240 hours. In addition, the mechanical strength of crosslinked guar gum-chitosan composite film was higher compared to general biopolymers which possess poor strength. The cross-linked guar gum-chitosan composite film was also highly water repellent or hydrophobic due to its high contact angle of 92.8°. It had low water vapor permeability when compared with the film made only from chitosan. The fabricated guar gum-chitosan film having high water stability, high mechanical strength, and excellent resistance to harsh environmental conditions can potentially be used in packaging applications.

[Technology for synthesis of chiral molecules developed](#)

Researchers at Indian Institute of Technology (IIT) Delhi have developed a catalytic technology for the sustainable and economical synthesis of chiral molecules which are

essential building blocks to produce pharmaceuticals, agrochemicals and biologically active compounds. India is heavily dependent on importing (above 85 percent) Active Pharmaceutical Ingredients (APIs), and a significant proportion of those APIs are chiral molecules. The technology may play a crucial role in decreasing the country's dependence on the import of APIs, thus lowering the input cost for the industry.

Path breaking research in inflammatory diseases

IIT Kanpur and the University of Queensland have collaborated on research in chronic inflammatory disease. Researchers for the first time have identified key molecules within the immune system that may help fight inflammation that drives chronic inflammatory diseases. The findings of the research will help further research in novel drug molecules that can act on the receptors for C5a, a potent immune molecule that is linked to multiple immune-linked inflammatory diseases such as cancer, rheumatoid arthritis, sepsis and even COVID-19. The research throws new light on a protein receptor, C5aR2, that plays an important role in the moderation of many immune and inflammatory processes and explores its use as a potential therapeutic target for treating multiple chronic inflammatory diseases.

Formulation of thermo-stable Insulin injection discovered

Scientists from the Council of Scientific & Industrial Research (CSIR) - Indian Institute of Chemical Technology (IICT), Hyderabad and in collaboration with CSIR - Indian Institute of Chemical Biology (IICB) have discovered a novel formulation of thermo-stable insulin injection. The research identified a small peptide molecule which inhibits heat and storage insulin fibrillation. It is non-toxic, non-immunogenic, heat stable and can maintain insulin in active form at room temperature. It is cost-effective and very useful for diabetes patients staying at remote locations with no refrigerator facility.

Indian technology to replace costly imported electronic items in satellites

Scientists from the National Institute for Interdisciplinary Science and Technology (NIIST) have developed a toxic-free and superior multilayer technology that packages together electronic components to produce multilayer circuits. The technology has immense application in the strategic sector such as satellite communication and defence industry, which at present depends upon costly imports. Referred to as Low-Temperature Cofired Ceramic (LTCC) tapes and High-Temperature Cofired Ceramic (HTCC) substrates, the technology is being supplied to the Indian Space Research Organisation (ISRO) for tests. If the testing is successful, the technology can be employed in several microwave components like 'S' and 'C' band receivers in satellite transponders. Hybrid micro-systems based on LTCC technology that integrate components such as capacitor, resistor, inductor, resonator and filter into a multilayered ceramic module, are important for future communication satellites due to their outstanding performance and moderate cost. A patent has been filed on tape casting of HTCC substrate based on zircon. An aqueous tape casting technique has been developed, which is relatively free from health hazards, since it does not employ volatile organic components.

Producing hydrogen from agricultural waste

Researchers from Agharkar Research Institute (ARI), Pune have developed a unique technology for direct generation of Hydrogen from agricultural residue. The technology is 25 percent more efficient as compared to conventional anaerobic digestion processes used today. The two-stage process eliminates the pre-treatment of biomass, thus making the process economical and environment friendly. This process generates a digestate that is rich in nutrients, which can be used as an organic fertiliser. The hydrogen fuel generation process comprises the use of a specially developed microbial consortium that facilitates biodegradation of cellulose- and hemicellulose-rich agricultural residues, such as biomass of paddy, wheat, or maize, without thermo-chemical or enzymatic pre-treatment. This breakthrough will also add a major stream of revenue to the farmer community. An Indian patent application has been filed

[Non-toxic activated carbon using tea & banana wastes](#)

A team of scientists from the Institute of Advanced Study in Science and Technology (IASST), Guwahati, have used banana plant extract as an alternative activating agent for the preparation of non-toxic activated carbon from tea wastes, which is useful for several purposes like industrial pollution control, water purification, food and beverage processing and odour removal. Oxygenated potassium compounds contained in the banana plant extract help in activating the carbon prepared from tea waste. An Indian patent has recently been granted for this. The newly developed process avoids usage of any toxic agent for synthesizing activated carbon, thus making the product cost-effective as well as non-toxic. The processing of tea generates a lot of waste, generally in the form of tea dust. This could be converted to useful substances. The structure of tea was favourable for conversion to high-quality activated carbon. However, conversion to activated carbon involves use of strong acid and bases, making the product toxic and hence unsuitable for most uses. So a non-toxic method of conversion was needed to overcome this challenge.

[Screening test kit for early detection of silicosis](#)

The Indian Council for Medical Research, National Institute for Occupational Health, Ahmedabad and National Institute of Virology, Pune have jointly developed a screening test kit for early detection of silicosis and silico tuberculosis. Silicosis is usually diagnosed at an advanced stage, when nothing much can be done. Secondary prevention by early detection of silicosis could be an option for control of silicosis, provided a suitable predictor is available. The kit is the first of its kind in the Southeast Asia region. ICMR has transferred the technology to Axiva Scihem Biotech, Delhi and Acrannolife Genomic Pvt. Ltd., Chennai

IN BRIEF

[Innovative sensor specifically and precisely detects molecules](#)

Researchers of KIT and Technical University of Darmstadt have now succeeded in developing a new type of sensor for molecules in the gas phase. This new class of sensors is based on combining sensitive graphene transistors with customized metal-organic coatings enabling selective detection of molecules. A prototype ethanol sensor responds to neither alcohol nor humidity. The researchers developed a selective sensor platform by growing a surface-mounted metal-organic framework (SURMOF) directly on a graphene field effect transistor (GFET). Such a component profits from the high sensitivity and simple read-out of a GFET as well as from the high selectivity of a SURMOF. Combination of the unique electronic properties of graphene with the high chemical variability of MOFs opens up an entirely new class of sensors with a specifically adjusted selectivity and sensitivity, with numerous applications.

[Simple method for converting carbon dioxide into useful compounds](#)

Researchers in Japan have found an energy-efficient way to convert the chief greenhouse gas carbon dioxide (CO₂) into useful chemicals by transforming the CO₂ into structures called metal-organic frameworks (MOFs). The researchers bubbled CO₂ at a temperature of 25°C and a pressure of 0.1 MPa through a solution with an organic molecule called piperazine, in what chemists call a "one pot" procedure. The MOF emerged quickly as a white microcrystalline powder that could be collected and dried. Analysis of its structure using X-ray and nuclear magnetic resonance spectroscopy confirmed the conversion had taken place as planned. The MOFs had a high surface area even though they were made from more than 30 percent CO₂ by weight - properties that make them suitable as functional materials for many applications. The researchers now plan to see how they could use the reaction to convert CO₂ directly from industrial fumes, such as those released by coal and gas-fired power stations to cut down the emission of CO₂.

[New catalyst helps combine fuel cell & battery into one device](#)

Researchers from Washington University in St. Louis have developed a single device that both generates fuel and oxidant from water and, when a switch is flipped, converts the fuel and oxygen into electricity and water. This device has a host of benefits for

terrestrial, space and military applications. From low environmental impact to high energy density, developing efficient unitized regenerative fuel cells (URFC). The team developed Pt-Pyrochlore, a composite of platinum and a lead ruthenate pyrochlore, which yielded a high bifunctionality index of 0.56 volts. When used in a URFC device developed by the laboratory, the catalyst enabled a round-trip energy efficiency (RTE) of 75 percent. With such high efficiency, the URFCs developed are well suited for applications such as submersibles, drones, spacecrafts and space stations, as well as for off-grid energy storage.

[Personalized wireless wearables that never need a charge](#)

University of Arizona engineers have developed a type of wearable called a "biosymbiotic device," which has several unprecedented benefits. The devices can be custom 3D-printed and based on body scans of wearers, and can operate continuously using a combination of wireless power transfer and compact energy storage. These biosymbiotic devices are custom fitted to the wearer, and are highly sensitive. The device's ability to monitor parameters including temperature and strain while a person exercised were tested. The devices were accurate enough to detect body temperature changes induced by walking up a single flight of stairs. The biosymbiotic device uses no adhesive, and it receives its power from a wireless system with a range of several meters. The device also includes a small energy storage unit, so that it will function even if the wearer goes out of the system's range, including out of the house. The team is launching a startup to bring the technology to market.

RESOURCES AND EVENTS

[WHO endorses malaria vaccine for at-risk children](#)

The World Health Organization (WHO) has recommended widespread use of the world's first malaria vaccine for children, in sub-Saharan Africa and other regions with moderate to high transmission. The RTS,S vaccine, RTS,S/AS01 (trade name Mosquirix) is a recombinant protein-based malaria vaccine which has been used in an ongoing pilot programme set up by WHO and partners in Ghana, Kenya and Malawi, that has covered more than 800,000 children since 2019. More than 200 million malaria cases still occur each year, with deaths of more than 260,000 African children under the age of five annually. The vaccine is to be administered in regions with moderate to high transmission, in a schedule of four doses, in children from five months of age and up. More than 2.3 million doses of the vaccine have already been administered, showing a favorable safety profile. The vaccine showed a significant reduction (30 percent) in deadly severe malaria.

[Developing countries oppose net zero condition for accessing climate finance](#)

The UN's Green Climate Fund board is divided between members from large emerging economies and richer nations over whether decarbonisation conditions should be imposed on organisations from developing nations seeking to access funding. The renewal the GCF's partnership with the Development Bank of Southern Africa (DBSA) was blocked when some board members from rich countries added as a condition for DBSA to be re-accredited that the bank adopts a 2050 net zero emission target across its portfolio, and an intermediate 2030 target, within one year of the accreditation being approved. The move was strongly resisted by developing country members who accused developed nations of imposing a carbon-cutting pathway on poorer ones. They told the board the 2050 net zero goal was a global aspiration, not a prescription to every country, and particularly not for developing countries. The issue was postponed to a future meeting.

[Food 'Cubes' system for smart Food Production](#)

Biofilta, an Australian firm has developed an innovative farming system in Tuvalu, which faces challenges such as lack of access to land, lack of compost for growing food and, more so, with high tides and cyclones flooding the land with seawater. The new method uses specially designed boxes, known as 'food cubes', which give local food growers greater control over their harvests. A 'field' contains 80-100 cubes spread over

an area of 1.2 acres in which fruit and vegetables are being grown for more than 16 local households. Each 'food cube', which is one-metre square and 30 centimetres deep, is manufactured from 80 percent recycled food-grade plastic and designed with features that expose the plants grown within to oxygen and controlled irrigation. The food cubes can grow food in areas being flooded with seawater while maintaining soil fertility for more planting. At the same time, it saves water. The system is raised, so there is no risk of saltwater inundation, and the wicking technology used is extremely water-efficient, using only a fraction of the water needed in conventional agriculture. The 'food cubes' system is being tried in the Cook Islands and Fiji and could be used elsewhere where land is of poor quality and water is scarce.

Consortium on 'One Health' launched

The Department of Biotechnology has launched India's first mega consortium on 'One Health'. The Consortium consists of 27 organisations led by DBT-National Institute of Animal Biotechnology, Hyderabad. The programme envisages surveillance of important bacterial, viral and parasitic infections of zoonotic as well as transboundary pathogens across India. Use of existing diagnostic tests and development of additional methodologies when required are mandated for the surveillance and for understanding the spread of emerging diseases.

SCIENCE POLICY AND DIPLOMACY

Lab for Science in Diplomacy to be created by ETH Zurich-UNIGE

ETH Zurich and the University of Geneva (UNIGE) are creating a Lab for Science in Diplomacy (SiDLab). The two institutions aim to improve governance and respond effectively to global challenges such as health, politics or climate change. The work of the SiDLab will be based on the efforts of two chairs. The first chair at ETH Zurich will concentrate on negotiation engineering, scientification of negotiations and conflict analysis. The second chair, in Computational Diplomacy, developed jointly by the Global Studies Institute (GSI) and the Department of Computer Science of the Faculty of Science of the UNIGE, will bring together two complementary profiles. One specialised in data science, particularly machine learning, and the other focuses on data categorisation in relation to complexity theories and global studies.

China announces a biodiversity fund

China's President Xi Jin Ping announced the creation of an international fund to support biodiversity protection in developing countries, at the opening high-level session of UN biodiversity talks on 12 October. The ¥1.5 billion Kunming Biodiversity Fund to help implement a new framework for protecting nature this decade. He called on other countries to contribute to the fund. The UN Convention on Biological Diversity COP 15 meeting in Kunming is working on a set of targets and objectives to prevent the destruction of the Earth's plants and wildlife by 2030. The agreement is expected to be finalised in Kunming, China, in April-May 2022.

IEA calls for speeding up progress to net zero emissions by 2050

The International Energy Agency (IEA) World Energy Outlook 2021 says that progress to clean energy is still far too slow to meet the net zero emissions target by 2050. The Stated Policies Scenario indicates that global average temperatures rise will reach 2.6 °C above pre-industrial levels by 2100. Under the more ambitious Announced Pledges Scenario the global average temperature rise by 2100 is held to around 2.1 °C. The report stresses that some 40 percent extra investment to reach net zero by 2050 could pay for themselves, such as improving efficiency, limiting gas leakage, or installing wind or solar in places where they are now the most competitive electricity generation technologies. These investments also create huge economic opportunities. Successfully pursuing net zero would create a market for wind turbines, solar panels, lithium-ion batteries, electrolyzers and fuel cells of well over USD 1 trillion a year by 2050, comparable in size to the current oil market. Even in a much more electrified energy system, major opportunities remain for fuel suppliers to produce and deliver low-carbon gases. Just in the Announced Pledges Scenario, an additional 13 million workers would

be employed in clean energy and related sectors by 2030, while that number doubles in the Net Zero Emissions by 2050 Scenario. See the report at <https://www.iea.org/reports/world-energy-outlook-2021> for more details.

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