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NEWS ALERT

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World's first high-level science initiative dedicated to the survival of the Amazon

Spurred by the growing urgency of catastrophic environmental threats to the Amazon, a group of 150 renowned scientists from eight Amazonian countries, French Guiana and global partners launched a scientific initiative that is tasked with delivering the first scientific assessment of the state of the Amazon Basin. The initiative will suggest a blueprint for policy making in a vulnerable region whose leaders have promised to save the world's largest and most biodiverse rainforest. The Science Panel for the Amazon (SPA) is sponsored by the United Nations Sustainable Development Solutions Network (UNSDSN) and will produce the first scientific review to cover the entire Amazon basin and its biomes, to be released in 2021. The agreement commits the governments of the seven nations to protect the Amazon and its biodiverse treasures, to respect the rights of the region's traditional peoples and to explore innovative ways to sustainably develop the region, while keeping the forests standing.

New X-ray detection technology developed

Florida State University researchers have developed a new material that could be used to make flexible X-ray detectors that are less harmful to the environment and cost less than existing technologies. Developing low-cost scintillation materials that can be easily manufactured and that perform has been a great challenge and the new research paves the way for exploring new approaches to create these important devices. Various materials have been used to make X-ray scintillators, but they can be difficult or expensive to manufacture. Some recent developments use compounds that include lead, but the toxicity of lead could be a concern. The research team found a different solution. They used the compound organic manganese halide to create scintillators that don't use lead or heavy metals. The compound can be combined with a polymer to create a flexible composite that can be used as a scintillator. That flexibility broadens the potential use of this technology.

Scientists develop first drug-like compounds to inhibit elusive cancer-linked enzymes

A team of scientists from the University of Michigan Rogel Cancer Center has developed the first drug-like compounds to inhibit a key family of enzymes whose malfunction is associated with several types of cancer, including an aggressive form of childhood leukaemia. The enzymes -- known as the nuclear receptor-binding SET domain (NSD) family of histone methyltransferases -- have long been an attractive drug target, but efforts to attack them have previously proved elusive. The team's lead compound -- known as BT5 -- showed promising activity in leukaemia cells with the NUP98-NSD1 chromosomal translocation that is seen in a subset of pediatricleukemia patients. The study demonstrates that targeting this key enzyme with small-molecule inhibitors is a feasible approach and will facilitate the development of the next generation of potent and selective inhibitors of these enzymes, which are overexpressed, mutated or undergo translocations in several types of cancer.

technologies, which is demanding greater attention to ethical aspects, the interdisciplinary team at the Technical University of Munich (TUM) has advocated the integration of ethics from the very beginning of the development process of new technologies. Alena Buyx, Professor of Ethics in Medicine and Health Technologies has developed an embedded ethics approach. The idea is to make ethics an integral part of the research process by integrating ethicists into the AI development team from day one i.e. attending team meetings on a regular basis and creating a sort of "ethical awareness" for certain issues. A practical example of embedded ethics involves developing robot assistants to enable people to live independently in old age. The centre's initiatives will include the construction of model apartments designed to try out residential concepts where seniors share their living space with robots.

New technology lets quantum bits hold information for 10,000 times longer

The efforts by an international research team have made it possible for quantum bits, or qubits, to hold quantum information much longer now. The researchers have increased the retention time, or coherence time, to 10 milliseconds -- 10,000 times longer than the previous record -- by combining the orbital motion and spinning inside an atom. Such a boost in information retention has major implications for information technology developments since the longer coherence time makes spin-orbit qubits the ideal candidate for building large quantum computers. In this work, researchers engineered sensitivity to the electric field of our spin-orbit qubit by stretching the silicon crystal like a rubber band. This mechanical engineering of the spin-orbit qubit allowed remarkably extending its coherence time, while still retaining moderate electrical sensitivity to control the spin-orbit qubit. These results open a pathway to develop new artificial quantum systems and to improve the functionality and scalability of spin-based quantum technologies.

COVID-19

COVID-19 (WORLD)

Face shield or face mask to stop the spread of COVID-19

To increase public awareness about the effectiveness of face shields alone as well as face masks with exhalation valves, researchers from Florida Atlantic University researchers used qualitative visualizations to test how face shields and masks with valves perform in impeding the spread of aerosol-sized droplets. Using employed flow visualization in a laboratory setting using a laser light sheet and a mixture of distilled water and glycerine to generate the synthetic fog that made up the content of a cough-jet. Results of the study show that although face shields block the initial forward motion of the jet, the expelled droplets move around the visor with relative ease and spread out over a large area depending on light ambient disturbances. The study illustrates that face shields and masks with exhale valves may not be as effective as regular face masks in restricting the spread of aerosolized droplets. This latest research provides important evidence to further support CDC guidelines and inform the public to make better selections in their choice for face coverings.

A COVID-19 vaccine distribution strategy

When effective COVID-19 vaccines are developed, their supply will inevitably be scarce. The World Health Organization (WHO), global leaders, and vaccine producers are already facing the question of how to appropriately allocate them across countries. And while there is vocal commitment to "fair and equitable" distribution, what exactly does "fair and equitable" look like in practice? Nineteen global health experts from around the world have proposed a "Fair Priority Model" – in which the authors point to three fundamental values that must be considered when distributing a COVID-19 vaccine among countries: Benefiting

all individuals. While, it will be up to political leaders, the WHO, and manufacturers to implement this model, according to authors, the model mitigates three types of harms caused by COVID-19: death and permanent organ damage, indirect health consequences, such as health care system strain and stress, as well as economic destruction.

UNCTAD Report Details Economic, Social Impacts of COVID-19

A report titled, 'International Trade and Development,' from the UN Conference on Trade and Development (UNCTAD) Secretariat finds that the COVID-19 pandemic is likely to reverse much of the economic and social progress already made towards SDG achievement. The report finds that economic and social disruptions caused by COVID-19 have resulted in about USD 6 trillion in losses in global trade, approximately 50% larger than the decline in trade that occurred during the 2008 recession. Economic disruptions have especially affected the automotive, textiles and apparel sectors, the tourism sector, and various machinery sectors and has exacerbated inequalities (SDG 10) and significantly affected female-intensive economic sectors (SDG 5). On the environment-related SDGs, the pandemic has had "observable positive effects" on the quality of air, soil, and water. The COVID-19 crisis has accelerated the uptake of digital technologies, as a "critical tool in maintaining business and life continuity" and allowed for increases in telework, telemedicine, and online education.

Antibody responses in COVID-19 patients could guide vaccine design

A comprehensive analysis of antibody responses in coronavirus disease 2019 (COVID-19) patients shows that the neutralizing activity of antibodies from recovered patients is typically not strong and declines sharply within one month after hospital discharge. In the new study, researchers continuously monitored SARS-CoV-2-specific antibody responses in 19 non-severe and seven severe COVID-19 patients for seven weeks from disease onset. Most patients generated antibody responses against SARS-CoV-2, including the viral nucleoprotein and three parts of the spike protein: the receptor-binding domain, S1 protein, and ectodomain. This result highlights the importance of carefully selecting blood samples from recovered patients using antibody neutralization assays prior to transfusion into other COVID-19 patients. In addition, severe COVID-19 patients had a large amount of non-neutralizing antibodies, which may contribute to antibody-dependent enhancement of infection. According to the authors, the study provides important insights for serological testing, antibody-based intervention, and vaccine design.

COVID-19 (INDIA)

Portable Sterilization unit for decontaminating PPEs rapidly

IIT Tirupati (IITT) and IISER Tirupati have jointly developed a portable sterilisation unit using a new technology called the hybrid sterilization system that can decontaminate personal protective equipment (PPE) necessary for combating COVID 19, easily and rapidly, allowing them to be used multiple times. Sterilization UV radiation is a proven method for sterilization. However, the lower penetration depth of UV-C and faster divergence from the source can result in nonuniform treatment. Researchers from IITT have developed the hybrid sterilization system consisting of a UV radiation cavity, cold plasma, and H2O2 spray. The system confines the UV radiation and enhances photon-flux and sterilization efficacy. The coherent operation of UV-C, cold plasma, and H2O2 spray further strengthens the sterilization efficiency due to more hydroxyl radical production. The proposed unit shall also find application in the sterilization of other items such as packed and unpacked food, currency, and other household items.

Women in R&D: Private sector outshines PSUs

According to latest Science and Technology Indicators (STI-2019-20) compiled by the department of science and technology, which was released earlier this month, research and development (R&D) activity in India's private sector has a larger proportion of women compared to government-supported agencies even as men continue to dominate the sector overwhelmingly. While the employment data is for 2017-18, investment data is up to 2018-19, and is the latest available on the subject. While at least seven of every 10 women employed by private R&D facilities are actually doing research and development, not even half of the women hired by major scientific agencies are directly involved in research. Of the more than 20,000 women employed in private R&D companies, more than 15,000 were involved in R&D activities, while about 2,800 and 2,500 were in auxiliary and administrative activities.

India among top 50 nations in Global Innovation Index

India has entered the group of top 50 countries in the global innovation index for the first time, moving up four places to the 48th rank and keeping the top position among the nations in central and southern Asia. The Global Innovation Index (GII) list, 2020 released jointly by the World Intellectual Property Organization (WIPO), Cornell University and INSEAD Business School rankings show that Asian economies like China, India, the Philippines and Vietnam have advanced considerably in the innovation ranking over the years. Switzerland, Sweden, the US, the UK and the Netherlands lead the innovation ranking, and the top 10 positions are dominated by high-income countries.A total of 131 countries were analysed under the GII before arriving at the rankings.

IIT Bombay students develop AIR Scanner

A team of final year undergraduate students of IIT Bombay have developed AIR Scanner, an Artificial Intelligence, AI-based Reading Assistant and Document Scanner application. It includes all the ideal Document Scanner features such as scanning, organizing and sharing documents. The AI Reading assistant is powered by AI technology which understands words in a page and just a single tap on word boxes can provide the user with its meaning, related examples, synonyms, pronunciation details and translation in more than forty languages. One can import eBooks or capture newspaper snippets with the AI Narrator reading it aloud.

Machine learning solution can make exploring geo-resources simpler

Scientists from Wadia Institute of Himalayan Geology (WIHG), have developed a neural-based (machine learning-based) practical approach for automatic interpretation of 3D seismic data. Instead of manual interpretation of growing seismic data to explore causes of earthquake, the new approach now uses machine learning-based solution for automatic interpretation of this data. Effective detection of subsurface geologic features from surface seismic data is very important for understanding the geotectonic, basin evolution, resource exploration, and process that causes earthquakes (seismogenesis) of an area. The high-performance computing systems have allowed analysis of such voluminous data within a reasonable time after receiving guidance and inputs from interpreters. Such an interpretational approach is automated and effectively narrates subsurface magmatic activities from 3D seismic data and marks an important step forward towards application of machine learning to address geological problems in an active mountain belt such as the Himalaya.

Agriculture, which consumes around 70% of water, for irrigation purpose, is the most vulnerable to water scarcity. To address this issue there has been discussion on implementing solar pump in almost every farmland. To make efficient sprayer, there is need to understand science of surface tension, viscosity, wettability, air drag, dynamic pressure, particle size, etc. CSIR-CMERI developed two variants of battery-operated spray systems one for "marginal famers" and other for "small farmers". Back Pack Sprayer, having capacity of 5 litres, is made for "marginal farmers", while the Compact Trolley Sprayer having capacity of 10 litres, is made for "small farmers". The systems functions on Solar-Powered batteries, thus enabling its usage even in energy and power deprived agricultural regions of the Nation. The CSIR-CMERI developed sprayers with affordable pricing profile helps to provide opportunities to cottage and micro-industries in furthering the outreach factor of the technology widely.

India, Israel and US cooperating on digital leadership and innovation

A top American official informed that India, Israel and the US have earnestly begun trilateral cooperation on digital leadership and innovation and are playing a key role in delivering the next generation 5G technology in a way that is "open, interoperable, reliable and secure." According to the United States Agency for International Development (USAID) Deputy Administrator, Bonnie Glick, the 5G collaboration is the first step and just the tip of the iceberg. The US-India-Israel forum on strategic, tech and development/water cooperation met last week in which three countries agree to collaborate in science, research and development in coming up with the next generations of technologies. The US enjoys a strong relationship with both the countries, based on shared democratic and free-market principles and intends to solve the world's development challenges. The virtual US-India-Israel summit focused on trilateral partnerships in the strategic, technology and development arenas.

DRDO successfully flight tests Hypersonic Technology Demonstrator Vehicle

Defence Research and Development Organisation (DRDO) has successfully demonstrated the hypersonic air-breathing scramjet technology with the flight test of Hypersonic Technology Demonstration Vehicle (HSTDV) from Dr APJ Abdul Kalam Launch Complex at Wheeler Island, off the coast of Odisha on 7 September. The hypersonic cruise vehicle was launched using a proven solid rocket motor, which took it to an altitude of 30 kilometres (km), where the cruise vehicle separated from the launch vehicle and the air intake opened and the cruise vehicle continued on its desired flight path at a velocity of Mach 6. The critical events like fuel injection and auto ignition and performance of the scramjet engine were satisfactory.The scramjet engine worked at high dynamic pressure and at very high temperature. With this successful demonstration, many critical technologies such as aerodynamic configuration for hypersonic manoeuvers, use of scramjet propulsion for ignition and sustained combustion at hypersonic flow, thermo-structural characterisation of high temperature materials, separation mechanism at hypersonic velocities etc. were proven.

Report on DST's journey of catalyzing innovation, entrepreneurship and incubation

Secretary Department of Science and Technology, Professor Ashutosh Sharma launched a report on the journey of the National Science and Technology Entrepreneurship Development Board (NSTEDB) in catalyzing innovation, entrepreneurship, and incubation. The report documents a significant role DST has played in fostering and nurturing the fledgling start-up ecosystem by steering it through its strong network of Incubators through the National Science and Technology Entrepreneurship Development Board (NSTEDB). Programs like National Initiative for Developing and Harnessing Innovation (NIDHI) initiated by NSTEDB, aligning its activities with the National Initiative of Start-up India and

ecosystem in the country in last 5 years. This activation process included a range of measures like establishments of a network of technology business incubators, scouting innovations, supporting ideas to prototypes, and so on.

JNCASR researchers develop diagnostic therapy for Lung Cancer

Researchers from Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) have developed a theranostics (diagnostic therapy) drug candidate for lung cancer. The selective recognition and imaging of oncogene specific non-canonical DNA secondary structures (G-quadruplex-GQ structures) holds great promise in the development of diagnostic therapy (theranostics) for cancer and has been challenging due to their structural dynamics and diversity. The JNCASR team developed a small molecule for selective recognition of BCL-2 GQ through unique hybrid loop stacking and groove binding mode with turn on far-red fluorescence response and anticancer activity demonstrating the potential as GQ-targeted lung cancer theranostics. The therapeutic agent TGP18 was found to reach the target tumour site as monitored by its far-red imaging of the tumour tissue. This methodology can be further exploited to develop cancer-type specific theranostic drugs with tremendous implications in personalized medicine. A patent application has been already filed for this invention.

IN BRIEF

Terahertz receiver for 6G wireless communications

Researchers at Karlsruhe Institute of Technology (KIT) have now developed a novel concept for low-cost terahertz receivers that consist of a single diode in combination with a dedicated signal processing technique. In a proof-of-concept experiment, the team demonstrated transmission at a data rate of 115 Gbit/s and a carrier frequency of 300 GHz over a distance of 110 meters. The receiver consists of a Schottky barrier diode, with digital signal processing. The terahertz receiver developed by KIT stands out due to its technical simplicity and lends itself to cost-efficient mass production and use in 6G systems.

China develops a reusable spacecraft

China announced the successful test of a “reusable spacecraft”, widely believed to be a space plane that could enable frequent and low-cost access to space.The vehicle had returned to its “scheduled landing site” following a two-day mission in orbit. It had launched on a Long March 2F rocket on September 4 from the Jiuquan Satellite Launch Center in the Gobi Desert.The vehicle reached an altitude of about 350 kilometers. It was initially launched at an orbital inclination of about 45 degrees, but then performed a manoeuvre to change its inclination to 50 degrees shortly after launching. This makes China the third nation to have successful sent such a vehicle into orbit after the U.S. and the Soviet Union.

Artificial intelligence aids gene activation discovery

With the help of artificial intelligence, researchers at the University of California San Diego have identified a DNA activation code that is used at least as frequently as the TATA box in humans. Nearly 25% of our genes are widely known to be transcribed by sequences that resemble TATAAA, which is called the ‘TATA box’. Their discovery, which they termed the downstream core promoter region (DPR), is being used to control gene activation in biotechnology and biomedical applications. According to researchers, the identification of the DPR reveals a key step in the activation of about a quarter to a third of our genes. Using machine learning, the researchers established the existence of the DPR motif in human genes. This knowledge will likely be useful in biotechnology and in the biomedical sciences.

Researchers have developed a new compact and ultrafast, high-power yellow laser. The tunable laser exhibits excellent beam quality and helps fill the need for a practical yellow light source emitting ultrafast pulses of light. The yellow-orange spectral range is highly absorbed by hemoglobin in the blood, making lasers with these wavelengths particularly useful for biomedical applications, dermatology treatments and eye surgery. Researchers have described how they used an optical phenomenon known as nonlinear frequency conversion to convert mid-infrared laser light into yellow light that can be tuned from 570 nm to 596 nm. In addition to biomedical applications, this is a sought-after wavelength range for full-colour video projection and could be used for a variety of spectral applications. The researchers plan to further improve the laser's pulse duration, efficiency and compactness.

Ultra-simple inexpensive method to fabricate optical fiber

A novel process to fabricate special optical fiber that is far simpler, faster and cheaper than the conventional method has been developed at the University of Campinas's Physics Institute (IFGW-Unicamp) in Brazil. The procedure roughly resembles the extrusion method inwhich pressure is brought to bear on a ductile material so as to force it through a titanium die, producing fiber with the appropriate inner structure. The new method simplifies the process at an enormously reduced cost and carries out a single continuous process starting with polymer pellets and ending with the finished fiber. The procedure can fabricate all-solid fiber, and also micro structuredfiber containing an array of longitudinal holes, which enhances optical properties control and brings an increase in functionality.

Lab-on-paper strip: Small, inexpensive platform for diagnosing tropical fevers

Scientists from the Gwangju Institute of Science and Technology in Korea have developed a compact, fully automatic, and inexpensive tool that can identify the presence of these viruses from a blood serum sample. The device, named LAMDA (stands for lab-on-paper for all-in-one molecular diagnostics) by the scientists, is essentially a mini laboratory on a paper strip. To use LAMDA, one has to simply place a drop of blood serum and some drops of distilled water on two pads. LAMDA can correctly diagnose any of the three mosquito-borne diseases zika, dengue, and chikungunya in less than an hour. LAMDA could be an excellent option for resource-limited clinics and hospitals. It could also bolster future research in the field of diagnostics for other infectious diseases.

New vaccine design reduces inflammation, enhances protection

Researchers at the Pritzker School of Molecular Engineering (PME) at the University of Chicago have discovered a new way to limit inflammation from adjuvants: by adding a molecule that disrupts certain pathways in cells. Adjuvants are a key ingredient of many modern vaccines, working to unleash an immune response that helps protect the body from disease. But adjuvants can cause inflammation at the injection site, as well as side effects from an over-stimulated immune system, which prohibits many promising new adjuvant candidates from being integrated into vaccines. The new design not only reduces inflammatory vulnerability, the molecule also appears to have an additional benefit of increasing the protective response against viruses like the flu, dengue, and even HIV. The research could lead to a new way of designing vaccines and goes against the traditional view that increased inflammation is necessary, and in doing so it provides even more protection.

RESOURCES AND EVENTS

Why Europe is helping to build a 'bus stop' in space

Europe is building a "bus stop in space" to give astronauts a pit stop during their history-

around the moon by NASA and ESA in the 2020s, will provide a staging post for astronauts going to the Earth's celestial companion, and eventually Mars. The station will serve as a half-way house between the Earth and the moon, acting as a place of shelter and a launch pad for missions further out into the solar system. ESA is working with the Americans, and Canadian and Japanese space agencies, to mine the moon's reserves of water ice – a potential drinking source for future astronauts. The success of the mission could be the first step towards a sustainable human presence in space.

Heritable genome editing not yet ready to be tried safely

A new report by an international commission of the U.S. National Academy of Medicine, U.S. National Academy of Sciences, and the U.K.'s Royal Society says that human embryos whose genomes have been edited should not be used to create a pregnancy until it is established that precise genomic changes can be made reliably without introducing undesired changes. If heritable human genome editing (HHGE) is permissible, initial uses should be limited to the prevention of serious monogenic diseases, which result from the mutation of one or both copies of a single gene - for example, cystic fibrosis, thalassemia, sickle cell anaemia, and Tay-Sachs disease, the report says. The international commission was formed in 2018 after a researcher from China announced that twins had been born following editing he had performed on early embryos.

United in Science report: Climate Change continues despite COVID19

A new multi-agency report from leading science organizations, United in Science 2020. states that Climate change has not stopped for COVID19. Greenhouse gas concentrations in the atmosphere are at record levels and continue to increase. The world is not on track to meet agreed targets to keep global temperature increase well below 2 °C or at 1.5 °C above pre-industrial levels. It highlights the increasing and irreversible impacts of climate change, which affects glaciers, oceans, nature, economies and human living conditions and is often felt through water-related hazards like drought or flooding. It also documents how COVID-19 has impeded our ability to monitor these changes through the global observing system. Atmospheric CO2 concentrations showed no signs of peaking and have continued to increase to new records reaching above 410 parts per million (ppm) during the first half of 2020.Transformational action can no longer be postponed if the Paris Agreement targets are to be met. It is still possible to bridge the emissions gap, but this will require urgent and concerted action by all countries and across all sectors.

World Solar Technology Summit - Technology to scale up the use of solar energy

Prime Minister Shri Narendra Modi in a message to the First World SolarTechnology Summit held virtually, said that technology holds the key to scale up the use of solar energy. India has enhanced its installed renewable capacity by 2.5 times and increased our solar installed capacity by more than 13 times.Prime Minister also informed that India has increased non-fossil fuel-based power generation to 134GW, which is about 35 % of total power generation and would increase it to 220 GW by 2022. India is providing capacity building support to ISA member countries through its ITEC training programme and a Project Preparation Facility. In 2018, India had announced about US $1.4 Billion worth of lines of credit (LOCs) for covering 27 solar projects across 15 countries. These projects are in various stages of implementation. The International Solar Alliance (ISA) is a treaty-based international intergovernmental organization headquartered at Gurugram in Haryana, India.

The Belfer National Cyber Power Index (NCPI) Released

with evidence collected from publicly available data. The report argues that there is no single measure of cyber power, which is made up of multiple components and should be considered in the context of a country's national objectives. The NCPI takes an all-of-country approach to measuring cyber power. The NCPI measures government strategies, capabilities for defence and offense, resource allocation, the private sector, workforce, and innovation. The assessment is both a measurement of proven power and potential, where the final score assumes that the government of that country can wield these capabilities effectively. India is ranked at 21 out of the 30 countries surveyed.

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