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NEWS ALERT

Forum for Indian Science Diplomacy

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GLOBAL

New Chip can decode any type of Data

Researchers at MIT, Boston University and Maynooth University in Ireland have created a silicon chip that is able to decode any code, regardless of its structure, with maximum accuracy, using a universal decoding algorithm called Guessing Random Additive Noise Decoding (GRAND). GRAND enables increased efficiency that could have applications in augmented and virtual reality, gaming, 5G networks, and connected devices that rely on processing a high volume of data with minimal delay. It works by guessing the noise that affected the message, and uses the noise pattern to deduce the original information. The GRAND chip uses a three-tiered structure, starting with the simplest possible solutions in the first stage and working up to longer and more complex noise patterns in the two subsequent stages. Each stage operates independently, which increases the throughput of the system and saves power. The device is also designed to switch seamlessly between two codebooks. The researchers tested the GRAND chip and found that it could effectively decode any moderate redundancy code up to 128 bits in length, with only about a microsecond of latency.

Life-saving water technology may help to alleviate global water crisis

A patent has been filed by University of New South Wales Sydney for life-saving water technology that could save drought-stricken communities and those living in water stressed areas around the world. The research team has developed a nanomaterial with desiccant qualities, which can be used to create air-to-water generators, harvesting clean water from airborne humidity. The focus is to alleviate the global water crisis by delivering efficient air-to-water technology across multiple applications. With a low

environmental impact, this nanotechnology is more competitive than other air-to-water technologies, with financial projections estimating extracted water costs of around $16 per kilolitre.

Lipid nanoparticle suppress resistance to cancer immunotherapy

Hokkaido University scientists have found a way that could help some patients overcome resistance to an immunotherapy treatment for cancer. A specially designed lipid nanoparticle could deliver immune-signaling molecules into liver macrophage cells to overcome resistance to anti-tumor immunotherapy. The activation of checkpoint proteins on the surfaces of immune cells help regulate the immune response by preventing them from indiscriminately attacking the body's other cells. But some cancer cells are able to hijack this mechanism, preventing an immune response against them as well. Scientists have recently developed immune checkpoint inhibitors that can counteract this strategy, but some people are resistant to the treatments.

Artificial intelligence helps diagnose leukemia

Researchers at the University of Bonn had already shown in 2020 that artificial intelligence can help diagnose such lymphomas and leukemias. The technology utilizes the potential of all measurement values and increases the speed as well as the objectivity of the analyses compared to established processes. The method has now been further developed so that even smaller laboratories can benefit from this freely accessible machine learning method, which is an important step towards clinical practice. The team sees huge potential in this technology. Researchers also want to collaborate with major manufacturers of analytics equipment and software to further advance the use of artificial intelligence.

Novel Light-emitting plants created

MIT engineers have created a light-emitting plant that can be charged by an LED, using specialized nanoparticles embedded in plant leaves. After 10 seconds of charging, plants glow brightly for several minutes, and they can be recharged repeatedly. Creating ambient light with the renewable chemical energy of living plants is seen as a big step toward plant-based lighting. These particles can also boost the light production of any other type of light-emitting plant. They use nanoparticles containing the enzyme luciferase, which is found in fireflies, to produce light. Researchers also found that over a 10-day period, the plants were able to photosynthesise normally and to evaporate water through their stomata. Combining two technologies i.e. phosphor light capacitor particles with the luciferase nanoparticles will enable plants to produce brighter light, for longer periods of time.

Reversible system can flip magnetic orientation of particles

Researchers have developed a method to rapidly switch the magnetic polarity of a ferrimagnet 180 degrees, using just a small applied voltage. The discovery could usher in a new era of ferrimagnetic logic and data storage devices. The technology could lead to faster data storage and smaller sensors. The new system uses a film of material called

gadolinium cobalt, part of a class of materials known as rare earth transition metal ferrimagnets. In it, the two elements form interlocking lattices of atoms, and the gadolinium atoms preferentially have their magnetic axes aligned in one direction, while the cobalt atoms point the opposite way. The balance between the two in the composition of the alloy determines the material's overall magnetization.

Fruit leftovers transformed into antibacterial bandages

Scientists at Nanyang Technological University (NTU) in Singapore aim to tackle food waste by turning discarded durian husks into antibacterial gel bandages. The process extracts cellulose powder from fruit's husks after they are sliced and freeze-dried, then mixes it with glycerol. This mixture becomes a soft hydrogel, which is then cut into bandage strips. Researchers say using waste materials and yeast for the antimicrobial bandages is more cost effective than the production of conventional bandages, whose antimicrobial properties come from more expensive metallic compounds like silver or copper ions. Compared to conventional bandages, the organo-hydrogel bandages also keep wound areas cooler and moist, which can help accelerate healing.

Unique optical amplifier can revolutionise space and fiber communication

Researchers at Chalmers University of Technology, Sweden, have developed a novel, unique optical amplifier which could revolutionize both space and fiber communication. The new amplifier offers high performance, is compact enough to integrate into a chip just millimeters in size, compared to previous amplifiers that have been several thousand times larger, and does not generate excess noise. The technology is useful in a range of applications, such as space communication and in fiber optic cables for internet traffic. This is an important step towards practical use, not only in communication, but in areas including quantum computers, various sensor systems and in metrology when making atmospheric measurements from satellites for Earth monitoring.

AI tool accelerates discovery of new materials

University of Liverpool researchers created a collaborative artificial intelligence tool that reduces the time and effort required to discover new materials. The tool has already led to the discovery of four new materials including a new family of solid state electrolyte materials. Such solid electrolytes will be key to the development of solid state batteries offering longer range and increased safety for electric vehicles. The tool brings together artificial intelligence with human knowledge to prioritize those parts of unexplored chemical space where new functional materials are most likely to be found. These new materials could lead to new technologies to tackle global challenges.

Potential new treatment for Parkinson's disease developed

Researchers at Rush University Medical Center have developed a new potential treatment for Parkinson's disease. Their findings show successful slowing of progression of the disease in mice. They have found that two different peptides (chains of amino acids) helped slow the spread of alpha-synuclein, a protein that occurs in abnormal protein deposits called Lewy bodies in the brain. The drugs, which were

delivered through the nose, were found to slow inflammation in the brain and stop the spread of alpha-synuclein in mice with Parkinson's disease. The treatments also improved the mice's gait, balance, and other motor functions. Replication of these in patients would be a remarkable advance in the treatment of devastating neurological disorders.

Biosensors to measure antibiotic levels in breath

A team of engineers and biotechnologists at the University of Freiburg have shown that the concentration of antibiotics in the body can be determined using breath samples in mammals. The breath measurements also corresponded to the antibiotic concentrations in the blood. The team's biosensor – a multiplex chip that allows simultaneous measurement of several specimens and test substances – will in future enable personalized dosing of medicines against infectious diseases on-site and help to minimize the development of resistant strains of bacteria. The sensor is based on synthetic proteins that react to antibiotics and thus generate a current change. Previously, researchers could only detect traces of antibiotics in the breath. Sensors will help to keep antibiotic levels stable in severely ill patients.

Low-cost, energy-efficient method to treat contaminated water

Engineers at MIT have designed a relatively low-cost, energy-efficient approach to treating water contaminated with heavy metals. It could be used to treat lead-contaminated water supplies at homes, or to treat contaminated water from some chemical or industrial plants. The new method uses a process called shock electrodialysis, in which an electric field is used to produce a shockwave inside a pipe carrying the contaminated water. The shockwave separates the liquid into two streams, selectively pulling certain electrically charged atoms, or ions, toward one side of the flow by tuning the properties of the shockwave to match the target ions, while leaving a stream of relatively pure water on the other side. The stream containing the concentrated lead ions can then be easily separated out using a mechanical barrier in the pipe.

Cornell University researchers create cell-size robots

Researchers at Cornell University have created cell-size robots that can be powered and steered by ultrasound waves. Despite their tiny size, these micro-robotic swimmers could be a formidable new tool for targeted drug delivery. The goal was to create a remotely controlled micro-robot that could navigate in the human body. The challenge ahead will be to make the swimmers biocompatible, so that they can navigate among blood cells that are roughly the size as they are. Future micro-swimmers will also need to consist of biodegradable material, so that many bots can be dispatched at once.

COVID-19

COVID-19 (WORLD)

Effective COVID-19 nasal vaccine candidate

Researchers at University of Houston have developed an intranasal subunit vaccine that

provides durable local immunity against inhaled pathogens. The team used liposomal particles to make an adjuvant named NanoSTING with a small particle size around 100 nanometers which exhibits significantly different physical and chemical properties to the conventional adjuvant. They used NanoSTING as the adjuvant for intranasal vaccination and found that the candidate vaccine formulation is safe, produces rapid immune responses and mucosal immunity in the nose within seven days, and elicits comprehensive immunity against SARS-CoV-2. The nasal vaccine will also serve to equitably distribute vaccines worldwide. The vaccine components, the protein (lyophilized) and the adjuvant (NanoSTING) are stable for over 11 months and can be stored and shipped without the need for freezing. AuraVax Therapeutics Inc., a pioneering biotech company is developing the manufacturing process and plans to engage the FDA later this year.

AI and machine learning predicts oxygen demand for COVID-19 patients

Researchers from Cambridge along with 20 other hospitals from across the world have used artificial intelligence (AI) to predict Covid patients' oxygen needs on a global scale. The AI tool can predict how much extra oxygen a Covid-19 patient may need in the first days of hospital care. It uses an algorithm to analyze chest x-rays and electronic health data from hospital patients with Covid symptoms to build an AI tool. The tool called EXAM (for EMR CXR AI Model), predicted the oxygen needed within 24 hours of a patient's arrival in the emergency department, with a sensitivity of 95 per cent and a specificity of over 88 per cent. Bringing together collaborators across North and South America, Europe and Asia, the EXAM study took two weeks of AI 'learning' to achieve high-quality predictions.

Allergic reactions to the new mRNA-based COVID-19 vaccines are rare

According to researchers at the Stanford University School of Medicine, allergies to mRNA-based COVID-19 vaccines are rare, generally mild, and treatable, and they should not deter people from becoming vaccinated. The study analyzed 22 potential allergic reactions to the first 39,000 doses of Pfizer and Moderna COVID-19 vaccines given to health care providers at Stanford soon after the vaccines received emergency use authorization from the Food and Drug Administration. Most of those in the study who developed reactions were allergic to an ingredient that helps stabilize the COVID-19 vaccines; they did not show allergies to the vaccine components that provide immunity to the SARS-CoV-2 virus. Furthermore, these allergic reactions occurred via an indirect activation of allergy pathways, which makes them easier to mitigate than many allergic responses.

Severe COVID-19 can lead to delirium

A study of 150 patients hospitalised for COVID in the US at the beginning of the pandemic found that 73 per cent had delirium, a serious disturbance in a mental state wherein a person is confused, agitated and unable to think clearly. It was found that patients with delirium tended to be sicker, with more comorbidities like hypertension and diabetes, and appeared to have more severe COVID-related illness. Researchers noted that the disease itself can lead to reduced oxygen to the brain as well as the

development of blood clots and stroke, resulting in cognitive impairment. Inflammatory markers were greatly increased in patients with delirium.

'Ultra-potent' antibody against SARS-CoV-2 variants isolated

The Vanderbilt University Medical Center has developed a technology which led to the discovery of an 'ultra-potent' monoclonal antibody against multiple variants of SARS-CoV-2, including the delta variant. The technology, called LIBRA-seq, has helped to speed up the discovery of antibodies that can neutralize SARS-CoV-2. It also enables researchers to screen antibodies against other viruses that have not yet caused human disease but which have a high potential of doing so. The antibody discovered has rare characteristics that make it a valuable addition to the limited set of broadly reactive antibody therapeutic candidates. The antibody has uncommon genetic and structural characteristics that distinguish it from other monoclonal antibodies commonly used to treat COVID-19.

DNA sensor detects infectious viruses

Researchers at the University of Illinois Urbana-Champaign and collaborators have developed a sensor, which integrates specially designed DNA fragments and nanopore structures, to target and detect infectious viruses in minutes without the need to pre-treat samples. They demonstrated the sensor's power with two key viruses that cause infections worldwide - the human adenovirus and the SARS-COV2 virus. The infectivity status can tell if patients are contagious or if an environmental disinfection method works. PCR tests detect viral genetic material but cannot distinguish whether a sample is infectious or determine whether a person is contagious. The sensing technique could be applied to other viruses by tweaking the DNA to target different pathogens.

COVID-19 (INDIA)

IIT develops diagnostic kit to measure COVID severity

Currently, there is no way to predict how severe the symptoms of an infected person could become. The RT-PCR test can only tell whether a person is infected or not, but not the severity of the infection. The team at IIT Mumbai has identified six proteins (out of a list of 25 potential indicator proteins) that could differentiate severe COVID-19 patients from non-severe ones. They also developed a mass spectrometry test to determine the presence of such proteins in swab samples. The team is collaborating with Merck to develop a simple diagnostic kit using this patented technology since mass spectrometers are expensive

India to resume COVID vaccine exports

Union Health Minister Mansukh Mandaviya informed that India will resume export of vaccines against Coronavirus disease under the government's 'Vaccine Maitri' initiative from October. India will also be resuming export of vaccines in order to fulfil the commitment of India towards COVAX. The surplus supply of vaccines will be used to fulfil India's commitment to the global fight against Covid-19. The Health Minister also

highlighted the importance of indigenous research and production of Covid vaccines in India

INDIA – SCIENCE & TECHNOLOGY

Low carbon bricks developed for energy-efficient walling envelopes

Scientists of the Indian Institute of Science (IISc) Bengaluru have developed a technology for producing alkali-activated bricks/blocks by utilising fly ash and furnace slag. The team developed low embodied carbon bricks from construction and demolition (CDW) waste through an alkali activation process using fly ash and ground slag and characterising the thermal, structural, and durability characteristics of Low-C bricks and their masonry. After ascertaining the optimum mix ratios of the materials, the production process was evolved to produce low-C bricks and the compressed bricks were manufactured. The technology produces energy-efficient walling materials using CDW and alkali-activated binders. These are called low-C bricks, do not require high-temperature firing, and avoid the use of high-energy materials such as Portland cement. It will also solve the disposal problems associated with CDW..

First pilot plant to convert high ash Indian coal to methanol

India has developed technology to convert high ash Indian coal to methanol and has established the first pilot plant in Hyderabad. This technology will help move towards the adoption of clean technology and promote the use of methanol as a transportation fuel (blending with petrol), thus reducing crude oil imports. The broad process consists of conversion of coal to synthesis (syngas) gas, syngas cleaning and conditioning, syngas to methanol conversion, and methanol purification. Coal to methanol plants in most countries are operated with low ash coals. Handling of high ash and heat required to melt this high amount of ash is a challenge in the case of Indian coal, which generally has high ash content. Currently, the pilot plant is producing methanol with a purity of more than 99%. Scaling it up will help in optimum utilization of the energy reserves and accelerate India’s journey towards self-reliance.

Generating electricity from raindrops, ocean waves

Researchers at the Indian Institute of Technology (IIT) Delhi have designed a device that can generate electricity from water drops, raindrops, water streams, and even from ocean waves using the "triboelectric effect" and "electrostatic induction". The device consists of specially designed nanocomposite polymers and contact electrodes and can generate a few milliwatt (mW) power, which is sufficient to power small electronic devices like watches, digital thermometers, radio frequency transmitters, healthcare sensors and pedometers. The group has filed an Indian patent on the various aspects of the use of ferroelectric polymer for harvesting mechanical energy including the present device.

Turning poultry feather & animal hair to fertiliser

A team from the Institute of Chemical Technology Mumbai have developed a process for converting keratin waste from animal hair, poultry feathers etc. to fertilisers and

animal feeds. The team used advanced oxidation for the conversion of the waste to marketable fertilisers and animal feed using pre-treatment followed by hydrolysis of keratin using a technique called Hydrodynamic Cavitation. The cost of isolating protein that can be used as protein supplement for human consumption is about Rs. 120-150 per kg. This novel technology is patented, easily scalable, environment-friendly, energy-efficient, and will make amino acid-rich liquid fertilisers more economical as compared to currently marketed products. The team is currently implementing this technology in collaboration with Revoltech Technologies Private Limited, Gujarat.

Data-processing technique to measure low amounts of soot developed

Researchers from IIT-Bombay have developed a new data-processing technique to measure low amounts of soot accurately. They analysed digital camera pictures of burning fuel to guess the temperature of the fuel and use the information to estimate the soot volume. Researchers passed a beam of red laser light of a specific frequency, through a droplet of burning fuel and took images as it burnt. The light falling on the camera also contains the light from the burning fuel. They used a narrow band filter to filter out only the laser light from light emitted by the burning fuel. The researchers have demonstrated the new technique to effectively reduce measurement errors when soot is present in low amounts.

Biodegradable, multi-use polymer sheets may substitute single-use plastic

Researchers at Indian Institute of Science (IISc) Bengaluru have developed a low-cost environment friendly alternative to single-use plastics. The substitute was designed by the team by using agricultural stubble that could abate the air pollution crisis of Northern India. The polymer is made using agricultural stubble and an inexpensive and easily available non-edible oil that also contains cellulosic material derived from agricultural stubble. The polymer is biodegradable, non-hazardous and leak-proof. It is non-toxic, therefore it can be used in various sectors. The team has already created products like bags, cutlery and tumblers that would normally be made of plastic. A patent has been filed for the invention. The team intends to market the product and is looking forward to its varied applications.

Super-hydrophobic cotton developed at IIT-Guwahati

Researchers at the Indian Institute of Technology (IIT), Guwahati, have developed a new class of super-hydrophobic cotton composite with Metal-Organic Framework (MOF) that could help clean up marine oil-spills in future. This novel, highly porous and water-repellent material can absorb oil selectively from an oil-water mixture. The composite is able to absorb large volumes of oils and can be reused for at least 10 times so that it can provide more recovery of spilled oil. Both heavy and light oils can be effectively absorbed by the material, which is easy to prepare, cost-effective and recyclable. The research team has also demonstrated the separation of oil from oil / water mixture by simple gravity-directed filtration and also a collection of underwater oil.

Indian scientists isolate new bacterial strain

Researchers at the Banaras Hindu University (BHU) have isolated a new bacterial strain from a contaminated site that can remove a potentially cancer-causing toxic agent, known as hexavalent chromium, from waste water effectively in an eco-friendly manner. Hexavalent chromium can cause cancers, infertility, kidney and liver malfunctioning in humans. The new strain named Microbacterium paraoxydans could tolerate large concentrations of hexavalent chromium and does not require an extra separation process after removal. This bacteria mediated wastewater treatment process is very inexpensive and non-toxic.

Plant-based Microbial Fuel Cells to generate power from wastewater

Researchers from the Indian Institute of Technology, Jodhpur (IIT-J) have demonstrated that plant-based microbial fuel cells (MFCs) can generate power profitably from wastewater. Photosynthetic MFCs use algae or plants to generate oxygen from waste at the cathode of the fuel cell. Plant systems are slower to build and have lower efficiencies than algae-based MFCs but are more robust, stable, and achieve high power output. Plant-based microbial fuel cells can be easily installed in natural wetland systems for in-situ bioremediation of waste and power generation. Such fuel cells can be easily installed as artificial wetlands at any location where wastewater is collected, and the power generated can be used to power small devices such as LEDs in remote locations.

India develops charger for electric vehicles

The Automotive Research Association of India (ARAI) has developed a charger for electric vehicles to give a push to the EV ecosystem in the country, be cost-effective and boost the local economy, and promote EVs, which are dependent on infrastructure for charging. ARAI has developed the EV charger AC001, which has been taken up for manufacturing and promotion by Bharat Electronics. The AC001 charging points will be set by Bharat Electronics and parts for EV charger systems -0 Type 1, Type 2, CCS and CHAdeMO will be built locally. The cost of the 10KW Bharat AC001 EV Charger (https://indiaesa.info/products/charging-infrastructure/10kw-bharat-ac001-ev-charger) is expected to be around INR 55000.

Successful flight test of Akash Prime Missile

A new version of the Akash Missile – 'Akash Prime' has been successfully flight tested on 27 September 2021. The missile intercepted and destroyed an unmanned aerial target mimicking enemy aircrafts. Akash Prime is an improved version of the Akash missile, equipped with an indigenous active Radio Frequency (RF) seeker for improved accuracy. Other improvements also ensure more reliable performance under low temperature environments at higher altitudes. Modified ground system of the existing Akash weapon system has been used for the current flight test.

Large-scale reactor developed for cost-effective production of hydrogen

A team of scientists from the Institute of Nano Science and Technology (INST), Mohali

have developed a large-scale reactor which produces a substantial amount of hydrogen using sustainable sources like sunlight and water. The prototype reactor operates under natural sunlight and uses photocatalytic water splitting to generate hydrogen at a larger scale (around 6.1 L in 8 hours). It uses a catalyst made of low-cost organic semiconductor of carbon nitrides which can be prepared using cheaper precursors like urea and melamine. The team is in the process of obtaining a patent for the technology. The reactor is about 1 metre square, and the photocatalyst was coated in the form of panels where water flow is maintained. Upon natural sunlight irradiation, hydrogen production occurs and is quantified through gas chromatography. The team is in the process of optimizing the hydrogen production with effective sunlight hours in addition to the purity of the hydrogen, moisture traps, and gas separation membranes so as to be usable for fuel cells.

IN BRIEF

Clean Energy Hydrogen Fuel from Seawater

Researchers at the University of Central Florida have designed a nanoscale material that can efficiently split seawater into oxygen and a clean energy fuel — hydrogen. They used a stable, and long-lasting nanoscale material to catalyze the reaction. The researchers developed a thin-film material with nanostructures on the surface made of nickel selenide with added, or "doped," iron and phosphor. This combination offers the high performance and stability that are needed for industrial-scale electrolysis. Using their design, the researchers achieved high efficiency and long-term stability for more than 200 hours. The team will work to continue to improve the electrical efficiency of the materials and is looking for opportunities and funding to accelerate and help commercialize the work.

Retina scan could enable early detection of Alzheimer's Disease

A team led by University of California San Diego School of Medicine, compared tests of retinal and brain amyloids in patients and found that the presence of retinal spots in the eyes correlated with brain scans showing higher levels of cerebral amyloid. The finding suggests that non-invasive retinal imaging may be useful as a biomarker for detecting early-stage AD risk, rather than more difficult and costly brain scans. The team is working on additional time point retinal scans and the impact of solanezumab (a monoclonal antibody) on retinal imaging and to conducting a larger study to fully document and ascertain the relationship between retinal amyloid and cerebral amyloid, both cross-sectionally and over time.

Healing chronic wounds with nanochemistry

A team of Chinese researchers has been able to deactivate wound-infecting bacteria using a solution of nanocapsules that alter the wound environment and unleash reactive oxygen species. They created nanozymes of platinum nanoparticles with aptamers attached to them to stick to the bacteria , and attached glucose oxidase to the nanozymes, then embedded the whole system in a protective shell of hyaluronic acid. The shell allowed the nanozyme particles to grow approximately five-fold to 0.1 micrometers and kept them stable and unaltered in solution for more than 30 days. The

nanocapsule solution was tested on Staphylococcus aureus, and killed the bacteria within a few hours. Chronic infected wounds in diabetic mice, when treated with the nanocapsule solution healed completely and quickly. This work also suggests that modifications of this type would be suitable for other nanozyme systems.

Coconut tree cloning breakthrough

Researchers led by KU Leuven have developed a method to multiply coconut trees faster and store them more efficiently in gene banks. Thousands of new specimens of a single coconut plant can be obtained that share the mother plant's exact same genetic profile. This offers enormous potential for coconut plantations worldwide. The team is seeking to safeguard the coconut tree's genetic diversity and preserve as many varieties of the coconut plant. The new technique allows the shoots of the coconut plant to be preserved for eternity by cryopreservation, in liquid nitrogen at a temperature of -196°C. This technique can meet the great demand for healthy plant material. The researchers have submitted a patent application and will license the technology subject to small farmers getting the plant material at a reasonable price.

Microneedles for more effective topical delivery of antibiotics to infected wounds

A Purdue University scientist has developed a flexible patch of a polymer composite microneedle array that can overcome the physicochemical bacterial biofilm present in chronic, nonhealing wounds and deliver both oxygen and bactericidal agents simultaneously to the ulcerated cells and tissues. In less than five minutes, microneedles dissolve, antibiotic is delivered and the patch can be removed. The next step to developing the microneedles beyond the proof-of-concept stage is to find partners to conduct human tests. A patent application has been filed. The innovation is available for licensing.

RESOURCES AND EVENTS

EU per capita government spending on R&D rises by 22% since 2010

In 2020, EU member states allocated a total €100.8 billion for R&D, equivalent to 0.8% of the EU's gross domestic product, according to Eurostat. Spending per head on R&D was €225 per person, a 22% increase compared to 2010, when it was €184 per person. The highest per head spending was in Luxembourg, at €648, followed at a distance by Denmark on €519 and Germany, €443 per head. EU countries with the lowest levels of public investment were Romania, at €15 per person, Bulgaria €21, Hungary €39 and Latvia €4.

World Conservation Congress meets in Marseille

The 2021 World Conservation Congress organized by the International Union for Conservation of Nature was held in a hybrid format at Marseille, France during 3-10 September with around 6,000 participants on site in Marseille, France, and 3,500 more people attending online. The Congress highlighted the crises of climate change and

biodiversity collapse and adopted the Marseille Manifesto, which highlights the need to respond to the interlinked climate and biodiversity emergencies. The Congress also resulted in the adoption of 28 resolutions on conservation and sustainable development issues. Topics that required intense negotiations were climate change, biodiversity, rights, oceans, health, and synthetic biology.

Innovation continues despite COVID-19

In its latest Global Innovation Index 2021 report (GII) (https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf) WIPO said that governments and enterprises in many parts of the world had scaled up investments in innovation despite the pandemic. However the impact of the crisis has been highly uneven across industries and countries. The GII showed that only a few economies, mostly high income, consistently dominate the ranks. The Republic of Korea (5) joined Switzerland (1), Sweden (2), the United States (3), and Britain (4), to make the top 5 of the GII for the first time in 2021, while four other Asian economies feature in the top 15: Singapore (8), China (12), Japan (13) and Hong Kong, China (14). Several middle-income economies, including Turkey (41) , Vietnam (44), India (46), and the Philippines, are also catching up. The Global Innovation Tracker showed that technology, pharmaceuticals and biotech industries boosted their investments during the pandemic and increased their research and development (R&D) efforts.

NASA launches powerful Landsat 9 satellite

NASA launched Landsat 9 on 27 September, to be operated by the United States Geological Survey for monitoring and managing land resources. Landsat 9 will replace the aging Landsat 7 satellite, which has been in orbit since 1999, and will work in tandem with Landsat 8, which was launched in 2013. Together, the duo will image the entire Earth every eight days. Landsat 9's planned orbit altitude is at 705 km over the planet's poles. The satellite carries two scientific instruments — the Operational Land Imager 2 (OLI-2) and the Thermal Infrared Sensor 2 (TIRS-2) — that can detect minute changes in the world's lakes, rivers and forests by analyzing light reflected from the planet in multiple wavelengths. Landsat 8 and Landsat 9, working in tandem, will help track urban sprawl, forest cover and the retreat of glaciers, among other features and phenomena.

SCIENCE POLICY AND DIPLOMACY

Switzerland backs science project in the Western Balkans

Drawing on its science diplomacy experience, Switzerland seeks to help steer the construction and governance of the South East European International Institute for Sustainable Technologies (SEEIIST), the first large research infrastructure in the Western Balkans. Seven countries in the Balkans and Kosovo have teamed up to deliver the €200 million research lab that would apply advances in particle physics to medical technologies and use proton or ion beams to deliver precision treatment of tumours, sparing healthy tissue. The design phase of the project is completed, but it now needs a long-term legal entity, and agreement on where the facility will be built, to move

forward. Switzerland is stepping in to play an active role in helping SEEIST establish a governance structure and to oversee an international competition for the location of the new facility. The move comes as the country launches a new foreign affairs strategy, which includes science diplomacy as one of its key pillars.

THSTI, DBT, MoS&T sign MoU with Vietnamese pharmaceutical company

Translational Health Science and Technology Institute (THSTI), Department of Biotechnology, Ministry of Science & Technology, Government of India entered into a research collaboration with Nanogen Pharmaceutical Biotechnology JSC, a Vietnamese pharmaceutical company which is developing a new vaccine for COVID-19. His Excellency Pham Sanh Chau, the Ambassador of Vietnam to India, led a team that visited THSTI on 23rd September 2021, to sign MoU between THSTI and the Nanogen Pharmaceutical Biotechnology JSC.

Quad Leaders' Summit strengthens technology cooperation

The Leaders from India, USA, Japan, Australia met on 24 September for the first-ever in-person Leaders' Summit of the Quad. They agreed on ambitious initiatives on 21st-century challenges: ending the COVID-19 pandemic, including by increasing production and access to safe and effective vaccines; promoting high-standards infrastructure; combatting the climate crisis; partnering on emerging technologies, space, and cybersecurity; and cultivating next-generation talent in all four countries.The initiatives agreed included (1) a Quad Shipping Taskforce and a network dedicated to greening and decarbonizing the shipping value chain; (2) clean-hydrogen partnership to strengthen and reduce costs across all elements of the clean-hydrogen value chain; (3) A Climate & Information Services Task Force and a new technical facility through the Coalition for Disaster Resilient Infrastructure; (4) Quad Graduate fellowships for talented STEM students (25 per year from each country) to study in the USA; (5) Work on a Statement of principles on Technology, Technical standards contact groups, semiconductor supply chain security, 5G industry Track 1.5 dialogue; (6) Cybersecurity senior group; (7) Sharing of satellite data, capacity building, and cooperation on principles and guidelines for outer space.

Two Non-EU countries associate to Horizon Europe

Norway and Iceland have become the first non-EU countries to formally associate to Horizon Europe, with their inclusion confirmed by the joint committee of the European Economic Area (EEA). Another 16 countries are on the association list. Negotiations have been successfully completed for the six Western Balkans countries of Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Kosovo and Serbia, and with Turkey, Armenia, Georgia, Moldova and Ukraine. The Commission previously said it wants to complete all Horizon Europe association agreements by the end of the year. Switzerland is presently out of Horizon Europe and has established a national scheme to fill the R&D funding gap. The UK has agreed to terms of the association, but still needs final confirmation. Plans of countries like Canada, Australia, New Zealand, South Korea and Japan to join Horizon Europe are yet to materialise, despite public overtures

from the Commission. Also, access of non-EU countries to the governance structure of the revamped European Research Area (ERA) is yet to be decided.

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