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SCIENCE & TECHNOLOGY

GLOBAL

[Stronger, Stretchier, Self-healing Plastic](#)

Researchers at the University of Tokyo have developed an innovative plastic, stronger and stretchier than the current standard type and which can be healed with heat, remembers its shape and is partially biodegradable. They created it by adding the molecule polyrotaxane to an epoxy resin vitrimer, a type of plastic. Named VPR, the material can hold its form and has strong internal chemical bonds at low temperatures. However, at temperatures above 150 degrees Celsius, those bonds recombine and the material can be reformed into different shapes. Applying heat and a solvent breaks VPR down into its raw components. Submerging it in seawater for 30 days also resulted in 25% biodegradation, with the polyrotaxane breaking down into a food source for marine life. This new material could have wide-reaching applications for a more circular economy to recirculate resources and reduce waste, from engineering and manufacturing, to medicine and sustainable fashion. The new material has many potential applications.

[New Blood Test Could Detect Common Deadly Cancers Sooner](#)

An international research team led by Rockefeller University has developed a cost-effective, multi-cancer blood test that can detect a protein, LINE-1-ORF1p, produced by cancer cells, potentially leading to early detection. This protein is elevated in many cancers and the test's ability to spot it early can save lives. This new method is a low-cost, multi-cancer detector that can pick up the presence of the telltale protein, known as LINE-1-ORF1p, in a tiny amount of blood in less than two hours. LINE-1 is a retrotransposon, a virus-like element present in every human cell that replicates through a copy-and-paste mechanism, resulting in a new copy in a new position in the genome. ORF1p is a protein it produces at high levels in cancer. Most of the time, the body keeps LINE-1 in check. "There are layers of mechanisms that prevent LINE-1 from being expressed and producing ORF1p, so the presence of the protein can be a warning sign. The new method uses a single-molecule-based detection technology known as Simoa. The Rockefeller team contributed custom nanobodies derived and engineered from llamas to act as capture

reagents that ensnare the ORF1p protein and as sensitive probes to detect it. The researchers found that the assay was highly accurate at detecting ORF1p in the blood samples of patients with a variety of cancers, including ovarian, gastroesophageal, and colorectal cancers. It costs less than \$3 to produce and returns fast results. The researchers also analyzed the plasma of 400 healthy people aged 20–90 who had donated blood. ORF1p was undetectable in 97–99 per cent of them. Of the five people who did have detectable ORF1p, the person with the highest level was found six months later to have advanced prostate cancer. Another potential use of the assay is monitoring how a patient is responding to cancer therapy. If a treatment is effective, the ORF1p level in the patient's blood should drop. Tracking the protein could potentially be incorporated into routine healthcare.

Lab on a Chip Device can Identify Viruses within Three Minutes

A research team, based at the University of Bath has developed a virus diagnosis device that gives lab-quality results within just three minutes. The prototype LoCKAmp device uses innovative 'lab on a chip' technology. It uses a process known as RT-LAMP (reverse transcription loop-mediated isothermal amplification) to multiply specific sequences of RNA, meaning it can quickly detect the particular virus it is looking for. Processing takes place at a single stable temperature of 65°, instead of needing the three thermal cycles a PCR test requires. This means the device can be made easier at a portable size, and with lower power consumption. A further benefit of the design is that no pre-processing of the nasal swab samples is required. Once a nasal swab sample is added to the device, the LoCKAmp pumps the liquid through tiny transparent 'microfluidic' channels layered onto the circuit board, above copper heaters just 0.017mm thick. These heat the sample, releasing the RNA genetic material from the virus. This is then further heated and treated with RT-LAMP chemicals to encourage multiplication. If the specific virus RNA is present in the amplified sample, it fluoresces under light -- this signal is then used to denote a positive test. As well as proving the system's capability in analysing nasal swab samples, the LoCKAmp could also be used to carry out anonymised community-level monitoring and detection of viruses like Covid, by testing wastewater and could allow public health bodies to quickly detect the spread of viruses like Covid, or other infectious diseases. The prototype device could be made on a mass scale quickly and at low cost, as a small, portable device -- with great potential for use in remote healthcare settings.

Synthetic Yeast Project Unveils Cells with 50 Per cent Artificial DNA

A 17-year project to craft a synthetic genome for yeast cells has reached a watershed. Researchers revealed this week in 10 new papers that they have created designer versions of all yeast chromosomes and incorporated almost half of them into cells that can survive and reproduce. Developing synthetic genomes may also make it easier to upgrade the many organisms that are crucial for industry, agriculture, and medicine. Yeast, for example, not only keeps breweries and wineries in business, but also churns out a variety of chemicals and drugs, including insulin. Launched in 2006, the Synthetic Yeast Genome Project enlisted scientists at more than a dozen institutions worldwide to tackle the problem. The researchers revised the native yeast genome, adding thousands of modifications that simplify its structure, boost its stability, and make it easier to study. For instance, they carved out the transposons, itinerant stretches of DNA that can leap from location to location in the genome, disrupting DNA sequences. They also pruned the genome by excising many of the introns, segments of DNA that don't code for portions of proteins. And to make the new yeast genome easier to manipulate in

future experiments, the team included several hundred short DNA sequences that can prompt sections of chromosomes to rearrange. In most cases, the researchers left genes on their original chromosomes. But a team created a new, 17th chromosome to house yeast's 275 tRNA genes. They code for RNA molecules that transport amino acids, the building blocks of proteins. The teams eventually produced yeast with more than 50 per cent of synthetic DNA. The team is now working to develop a yeast with a fully synthetic genome to debut in about a year.

Novel Method to Produce Intense, Ultrafast Lasers

Scientists led by Nanyang Technological University, Singapore have developed a novel method to produce intense and ultra-fast lasers, which holds promise for making precise devices that can speed up how quickly trace amounts of pollutants and hazardous gases can be sniffed out. The researchers used specially created optical fibers with hollow cores, tweaking the thickness of sub-structures in the fibers to produce very bright lasers in the mid-infrared range. Their method paves the way for developing portable, powerful and fast mid-infrared laser generators that don't need well-controlled and vibration-free environments to work.

INDIA

Rice Crop Management with Satellite Technology

Arya.ag is working with Fortune Rice Limited aimed at advancing crop monitoring capabilities for the agricultural industry. This collaboration will use Arya.ag's cutting-edge satellite surveillance product, combined with Fortune Rice's expertise in agriculture, to enhance the monitoring and growth of paddy crops. Fortune Rice Limited will provide 2000 acres of farmland for monitoring. Arya.ag will provide comprehensive insights into crop health and growth patterns, empowering farmers, and agribusinesses with data-driven decision-making tools. Arya.ag's Artificial Intelligence and satellite surveillance solutions enable access to rich datasets, detailed maps, and a secure application programming interface (API) can facilitate real-time monitoring and analysis of target districts, villages and blocks, ensuring a deeper understanding of crop performance. This will enable early detection of anomalies in the monitored farmland and the required active measures in irrigation fertilisation and pest control to increase the operational efficiency and increased yield of the crop. Furthermore, this will be done through a user-friendly mobile.

Ericsson Initiates "India 6G" Program in India

Ericsson announced the launch of its 'India 6G' program with the formation of an India 6G Research team in its Chennai R&D Center. This 'India 6G' team comprises of senior research leaders and a team of experienced researchers across Radio, Networks, AI and Cloud, who have been entrusted with developing fundamental solutions for the future of telecommunications. Together with Ericsson research teams in Sweden and the US, the India Research team will work collaboratively to develop the technology which will help to deliver a cyber-physical continuum where networks will deliver critical services, immersive communications, omnipresent IoT while ensuring the integrity of the delivered information. Some of the projects where the teams will be working include Channel Modelling and Hybrid Beamforming, Low energy Networks, Cloud evolution & Sustainable compute, Trustworthy, Explainable and bias-free AI algorithms, Autonomous agents for Intent Management Functions, Integrated sensing and communication functions for man-machine continuum and Compute offload to Edge-Computing cloud amongst

others. Ericsson has a 5-year partnership with Indian Institute of Technology Madras' (IIT Madras) Centre for Responsible AI (CeRAI) that was signed in September 2023.

Technology for Converting CO₂ to CO Holds Potential

The National Centre of Excellence in Carbon Capture and Utilisation (NCoE-CCU), IIT Bombay is actively working towards developing novel, scalable and affordable pathways on capturing CO₂ from various emission sources, and converting it into usable chemicals or permanent storage, representing a crucial pathway for greenhouse gas mitigation. The team has been granted a patent for CO₂ to carbon monoxide (CO) conversion technology. The newly developed process by NCoE-CCU requires only minimal energy as it can proceed under ambient temperatures (25-40 °C) in the presence of water. The energy required for this electrocatalysis reaction can be harnessed directly from a renewable energy source (in the form of a solar panel or windmill), which ensures a carbon-neutral operating scenario for a facile CO₂ to CO conversion. The technology is being scaled up through the recently incubated start-up UrjanovaC Private Limited for potential application in the steel sector. In addition, another aqueous-based CO₂ capture and conversion to calcium carbonate technology developed by NCoE-CCU is also licensed to UrjanovaC Private Limited.

Research Shows Intensification of Hydroclimate Extremes in Indian River Basins

A research by the Mahamana Centre of Excellence in Climate Change Research (DST-MCECCR) at Banaras Hindu University (BHU), used high-resolution simulated precipitation from Coupled Model Intercomparison Project-6 (CMIP6) experiments to examine the future hydroclimate extremes over the different River Basins of India. The study has projected intense precipitation especially over the Western Ghats and Northeast river basins, and an increase in heavy rainfall intensity (14.3 per cent) over the upper Ganga and Indus basins as well as intensification of severe droughts. The study highlights an agricultural drought in the lower Ganga basin due to a decline in mean rainfall. The research elaborated that approximately 4 per cent to 10 per cent of the heavy rainfall is projected to increase over the western part of Indian River basins. In the mid-future, under certain carbon emission scenarios, a significant increasing change of about 30 per cent precipitation per day was likely over the West flowing River Kutch & Saurashtra, including Luni, Indus, and Upper Ganga River Basins. The results also showed that the significant changes in the frequency of hydro-climate extreme events may have a considerable impact on agriculture, health, and other socio-economic conditions of the society.

IISER Bhopal Develops Synthetic Biomedical Adhesives to Repair Injured Tissues

Indian Institute of Science Education and Research Bhopal (IISER Bhopal) researchers have developed a clear synthetic biomedical adhesive that can effectively seal and repair injured and dissected tissues. The adhesive, which is biodegradable and biocompatible, is capable of binding different surfaces such as tissues, bones, eggshells, and wood in both air and underwater and requires no additional crosslinking agents or metal ions. They have applications in medicine, dentistry, drug delivery, and tissue engineering. These are also used in orthopedic procedures to enhance bone repair and can even be used as an alternative to sutures, staples, and wires, in wound closures. They could also be used in eco-friendly packaging applications and products, contributing to sustainable practices in various industries.

IISc and JNCASR Design Micro Heat Engine

Bengaluru physicists have developed a “heat engine” that generates high-power with high-efficiency, overcoming a “trade-off” associated with all types of engines, from cars and aeroplanes to nuclear reactors. The research opens up the door to design fundamentally new engines using the novel concept, and can be translated into developing tiny microscopic engines for targeted drug delivery inside cells. The microscopic engine was exposed to a rapidly-fluctuating electrical field, because of which the engine’s efficiency reached close to the Carnot’s limit. Researchers indicated that an immediate translation could be developing micro or nano-scale engines to deliver a cargo inside a cell, such as targeted therapies for cancer.

Affordable Radiative Paint to Reduce Electricity Consumption Developed

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) in Bengaluru, researchers, have developed a radiative cooling paint. It is made from a novel MgO-PVDF polymer nanocomposite, this low-cost, solution-processed paint demonstrates significant cooling capabilities with a high solar reflectivity and infrared thermal emissivity. Researchers have shown that the surface temperature of a treated paver decreases by approximately 10°C under intense sunlight-- almost double of the reduction that conventional white paints give. The researchers developed polymer nanocomposite paint by using a simple solution-processed technique. They used ultra-white and ultra-emissive magnesium oxide (MgO)-polyvinylidene fluoride (PVDF) nano-composite prepared from materials that are earth abundant, cheap, non-toxic and non-harmful. Initially, polymer powders were transformed into a solution using solvent and then, dielectric nanoparticles were dispersed inside the polymer matrix. After preparation, different spectroscopic techniques were used to characterize the optical properties of the prepared polymer nanocomposite paint. By measuring the temperature of the paint using a thermocouple, excellent cooling performance was demonstrated under hot sunlight.

New Centre to Foster Cancer Research at IISc

A Centre to foster groundbreaking cancer research was launched at the Indian Institute of Science (IISc), Bengaluru on November 2. The Param Hansa Centre for Computational Oncology (PHCCO) will foster research in predictive and quantitative mathematical models of cancer progression, metastasis, and tumor relapse, to identify the underlying fundamental dynamics of these multi-scale processes and to eventually improve patient outcomes in the clinic. The centre aims to nurture an active community of future leaders in computational oncology in India, through inter-institutional and cross-disciplinary collaborations among researchers in academia, medicine, and industry.

IIT Madras Zanzibar campus inaugurated

The President of Zanzibar Hussein Ali Mwinyi on Monday inaugurated the IIT Madras Zanzibar, the first-ever international campus of an IIT. The first batch commenced with about 40 per cent of the total students, comprising women from Zanzibar, mainland Tanzania, Nepal, and India, admitted to the BS and MTech programmes in Data Science and Artificial Intelligence. The programmes at IIT-M Zanzibar are open to students of all nationalities, including Indians. The existing campus in Bweleo district, located approximately 15 km south of Zanzibar Town, is equipped with international amenities designed to meet the current needs of students. A permanent campus will be built soon jointly by the Governments of Zanzibar and India. A total of 45 students have been admitted for a four-year Bachelor of Science degree in Data Science and AI and a two-year Master of Technology degree in Data Science and AI.

'Dronaid' for Doorstep Delivery of Medicines Developed

A team of the Manipal Institute of Technology and Kasturba Medical College has developed a drone which can be used for the delivery of emergency medicines to people's doorsteps by placing orders through an app. The drone with a payload capacity of 3 kg can deliver the medicine within a radius of 15 km in about 10 to 12 minutes. The app can be used for placing orders for medicines. Through the integration of Artificial Intelligence into unmanned aerial vehicles and the development of corresponding applications, the aim of the team is to facilitate practical clinical applications and emergency services at the community level.

G-20 AND GLOBAL CHALLENGES

Workshop on Green Development Pact for a Sustainable Future

NITI Aayog organised a workshop on "Green Development Pact for a Sustainable Future " on 9 November, structured around the G20 New Delhi Leaders' Declaration (NDLD), which includes the Green Development Pact. The workshop was aimed at discussing implementation strategies for the Green Development Pact in India, aligning with the G20 NDLD and encouraging India's leadership role for the global advancement of pathways laid out in the Green Development Pact. The event saw participation from stakeholders from across the country, including think tanks, educational institutions, industry, state governments and central government. Approximately, 4600 participants joined the event online. Indian policy initiatives include Production Linked Incentives (PLI) scheme for high efficiency solar PV modules, Renewable Purchase Obligations and Carbon Credit Trading Scheme. During the workshop, three separate sessions were held for discussing wide range of issues. The first session focused on Implementing Clean, Sustainable, Just, Affordable & Inclusive Energy Transition. The second session was oriented on Restoring, Conserving and Sustainably Using Ecosystems. The third session on Adaptation and Disaster Resilient Infrastructure was focused on building resilient infrastructure against the climate risks.

G20 Workshop on Harnessing Data for Development

Key think tanks, academics and multilateral organizations came together in New Delhi to mark a successful discourse on the theme of - Harnessing Data for Development for Accelerating Progress on the SDGs, emanating from the New Delhi Leaders' Declaration 2023 (NDLD 2023). The workshop discussed 4 key themes spanning the seven principles of Data for Development (D4D) and ways of implementing the G20 Principles of Harnessing Data for Development (D4D) in the Indian context. The workshop will produce an outcome document that discusses the way forward for Harnessing Data for Development for Accelerating Progress on the SDGs in India's context. This document serves as an input to the forthcoming national workshop.

IN BRIEF

Plastic-eating Bacteria Turn Waste into Useful Materials

Researchers from the University of Edinburgh have developed a plastic-eating E. coli bacteria that can efficiently turn polyethylene terephthalate (PET) waste into adipic acid, which is used to make nylon materials, drugs and fragrances. The new E. coli strain produced enzymes that could transform terephthalic acid into compounds such as muconic acid and adipic acid. Then, to

transform the muconic acid into adipic acid, they used a second type of *E. coli*, which produced hydrogen gas, and a palladium catalyst. The team found that attaching the engineered microbial cells to alginate hydrogel beads improved their efficiency, and up to 79 per cent of the terephthalic acid was converted into adipic acid. Using real-world samples of terephthalic acid from a discarded bottle and a coating taken from waste packaging labels, the engineered *E. coli* system efficiently produced adipic acid. In the future, the researchers say they will look for pathways to biosynthesize additional higher-value products.

India-Finland Radar Satellite Imagery Contract

India's growing software and geospatial intelligence company Suhora Technologies has announced a partnership with Finland based ICEYE, a global leader in synthetic-aperture radar (SAR) technology. Suhora specializes in offering integrative, real time, actionable solutions by integrating Synthetic Aperture Radar (SAR), Optical and Thermal data to provide Day and night, all-weather continuous monitoring. Suhora is focused on innovations in spatial science, earth data and artificial intelligence to provide solutions for several industry sectors such as defense, agriculture, environment and infrastructure. The partnership empowers Suhora to access ICEYE's high-quality SAR satellite imagery of any location on the planet, providing Suhora's users with advanced monitoring and analytical geospatial solutions. ICEYE owns and operates the world's largest SAR satellite constellation, providing customers with reliable and frequent high-resolution imagery collections, enabling rapid detection and tracking of changes on the Earth's surface, regardless of time of day, or weather conditions. This capability is vital for situational awareness and timely decision-making in diverse sectors, such as, insurance, national security, natural catastrophe response and recovery, humanitarian relief and climate change monitoring.

Experimental Therapy Reduces Heart Disease Risk

Researchers from Cleveland Clinic have found that a single dose of an experimental therapy produced greater than 94 per cent reductions in blood levels of lipoprotein(a), a key driver of heart disease risk, with the results lasting for nearly a year. Lipoprotein(a), often shortened to just Lp(a), is made in the liver and has similarities to LDL, and are largely genetically determined. The structure of the Lp(a) particle causes the accumulation of plaque in arteries which greatly increases the risk of heart attacks and strokes. Since Lp(a) levels are determined by a person's genes, lifestyle changes (diet or exercise) have no effect. Researchers carried out a trial on 48 participants who received an injection of lepodisiran, a small interfering RNA (siRNA) therapeutic that blocks the messenger RNA needed to manufacture a key component of lipoprotein(a) in the liver. Maximum Lp(a) plasma concentrations were reduced by 49 per cent from baseline levels for the 4 mg dose and up to 96 per cent for the 608 mg dose vs. a 5 per cent decrease for the placebo. No safety issues were observed, and the only tolerability issue was mild injection site reactions. The levels remained reduced after 48 weeks. This approach to treatment could benefit 20 per cent of the world's population who have elevated Lp(a) levels. A phase 2 trial studying lepodisiran is currently underway. The trial was sponsored by Eli Lilly and Company (Lilly), the company developing lepodisiran.

Graphene Sensor Could Enable Early and Fast Detection of Pancreatic Cancer

Researchers at Imperial College, UK have developed a graphene platform which could support the rapid and early diagnosis of pancreatic cancer, which is the second most fatal cancer and the seventh-leading cause of cancer deaths worldwide. The novel graphene sensor platform detects

exosomes, nanoscale vesicles secreted by all cells, including cancer cells. Exosomes can be isolated from a variety of bodily fluids, such as blood, urine, and saliva. Researchers successfully engineered a novel sensor platform that can distinguish unique characteristics in pancreatic cancer exosomes, enabling the detection of these exosomes in patient blood plasma samples in a mere 45 minutes. The sensor is made up of an array of graphene sensors, each of which is coated with a different antibody specific for a different protein or other molecule found on pancreatic cancer exosomes. The antibodies on the sensor bind to proteins and other molecules on the pancreatic cancer exosomes, causing a change in the electrical conductivity of the graphene sensor which can be measured and used to identify the presence of pancreatic cancer exosomes in the blood plasma sample. They were able to test the graphene sensor array using blood plasma samples from 18 pancreatic cancer patients and eight people who did not have cancer. They found the platform was able to accurately discriminate between the two groups in one hundred percent of cases. The platform array was also able to detect pancreatic cancer exosomes at the early stages, including stages one and two. The development of the graphene sensor platform could be a significant step forward in the fight against pancreatic cancer.

Sensor Technology to Combat Water Contamination

A team of researchers led by the U.S. Department of Energy's Argonne National Laboratory, has devised a method for the mass manufacture of sensors able to simultaneously detect lead, mercury and E. coli. in flowing tap water. The team's innovation promises to help safeguard public health by providing early warning for contamination. The sensors use a one-nanometer-thick layer of carbon and oxygen atoms, a form of graphene, which is coated on a silicon substrate. Gold electrodes are then imprinted onto the graphene surface, followed by a nanometer-thick insulating layer of aluminum oxide. Each sensor is tailored to detect one of the three toxins: lead, mercury or E. coli. The researchers found a screening method to identify defective devices before mass production. The team evaluated a three-sensor array able to simultaneously detect lead, mercury and E. coli in flowing tap water. Using machine learning algorithms to analyze the results, they were able to quantify toxin levels down to the parts per billion, even in the presence of interfering elements. The sensor can be used in any form of water, and can be combination of multiple sensors, with each tailored to detect different constituents, including heavy metals, bacteria, pharmaceuticals, pesticides, coronaviruses and a common contaminant in water, per- and polyfluoroalkyl substances. They might also include critical resources, such as cobalt for batteries and nitrogen and phosphorus as nutrients for plants and animals. The sensors can be used to assess the cleanliness of treated water, including for potable use, agriculture and irrigation, groundwater replenishment and industrial processes.

RESOURCES & EVENTS

US Issues Executive Order on Artificial Intelligence

US President Biden has issued an Executive Order to establish new standards for AI safety and security, protect privacy, advance equity and civil rights, rights of consumers and workers, and promote innovation and competition. The Order builds on previous actions including voluntary commitments from 15 leading companies to drive safe, secure, and trustworthy development of AI. The main features are (1) developers of the most powerful AI systems share their safety test results and other critical information with the U.S. government. (2) Develop standards, tools, and tests to help ensure that AI systems are safe, secure, and trustworthy. (3) Protect against the risks

of using AI to engineer dangerous biological materials (4) Protect citizens from AI-enabled fraud and deception (5) Establish an advanced cybersecurity program to fix vulnerabilities in critical software. The order also asks for Order the development of a National Security Memorandum that directs further actions on AI and security, to be developed by the National Security Council and White House Chief of Staff. This document will ensure that the United States military and intelligence community use AI safely, ethically, and effectively in their missions, and will direct actions to counter adversaries' military use of AI. [The full text of the order is here.](#)

WHO Report on World Pandemic Preparedness

In its 2023 Report on the State of the World's Preparedness, an annual overview of how well United Nations member countries are faring when it comes to getting ready for the next pandemic, the WHO's Global Preparedness Monitoring Board, or GPMB, noted that the vast majority of biomedical research, development and manufacturing takes place in a handful of wealthy countries. The report pointed to problems of limited national and regional R&D and weak global coordination of pandemic-related R&D. The GPMB measures progress using 30 indicators linked with pandemic response. Global R&D coordination was one of the weakest areas of pandemic preparedness overall, the report said. Just 10 countries account for 80 per cent of the nearly \$1.7 trillion invested in R and D and only 3 per cent of that spending is going to pathogens that pose a serious public health risk. Philanthropic and government funders are unwilling to share resources, even in a crisis. Vaccine manufacturing is concentrated in only a few regions, with low capacity in Africa and the Middle East. The report called on nations and institutions to boost regional ecosystems for research and development, including manufacturing capabilities for vaccines, therapies, oxygen and diagnostic tools as well as surveillance systems.

AI Safety Summit Adopts Declaration

Tech experts, global leaders and representatives from 27 countries and the European Union participated in the AI Safety Summit, at Bletchley Park, UK, 1-2 November 2023. [The Bletchley Declaration on AI safety](#) is a statement signed by representatives and companies of 28 countries, including the US, China, India, and the EU. It aims to tackle the risks of so-called frontier AI models - the large language models developed by companies such as OpenAI. The UK government called it a "world-first" agreement between the signatories, which aims to identify the "AI safety risks of shared concern" and build "respective risk-based policies across countries". It warns frontier AI, which is the most sophisticated form of the technology that is being used in generative models such as ChatGPT, has the "potential for serious, even catastrophic, harm, either deliberate or unintentional, stemming from the most significant capabilities of these AI models". The UK government also announced that there would be future AI safety summits. South Korea will launch another "mini virtual" Summit on AI in the next six months and France will host the next in-person AI summit next year.

EU Parliamentarians Agree on Law to Restore Natural Environments

Negotiators from the European Parliament and EU member states reached an agreement late on 9 November on the fiercely debated nature conservation project. The EU Nature Restoration Law sets a target for the European Union to restore at least 20 per cent of the bloc's land and sea areas by 2030 and all ecosystems in need of restoration by 2050. According to EU figures, around 80 per cent of habitats in the European Union are in a poor state. In addition, 10 per cent of bee and butterfly species are threatened with extinction and 70 per cent of soils are in an unhealthy

condition. The law was preceded by a fierce dispute, partly because there were fears of heavy restrictions on farmers. The conservative European People's Party, or EPP, in particular were strongly opposed to the plan and tried to put it on ice completely. With the compromise that has now been negotiated, farmers will not be obliged to make a certain percentage of their land available for environmentally friendly measures in future, which farmers had feared would happen. The law still has to be formally approved by the EU member states and the European Parliament.

EU Council regulation on supply of critical raw materials

The EU Council and the European Parliament today reached a deal on the proposed regulation establishing a framework to ensure a secure and sustainable supply of critical raw materials, better known as the Critical Raw Materials Act. The agreement is provisional, pending formal adoption in both institutions. The Commission's proposed regulation establishes a list of 34 critical raw materials (including 16 strategic ones) and sets targets to increase the EU contribution of these substances (10% for the extraction; 40% for the processing and 15% for the recycling). To achieve this, the proposal called for a quick and simplified permit procedure for strategic extracting projects, to be dealt by a single national contact point. It also called for risk analysis of possible dependencies, member states' exploration plans, higher investment in research, innovation and skills; and protection of the environment by promoting the circularity and sustainability of raw materials. On the global stage, the regulation identified measures to diversify imports of critical raw materials ensuring that not more than 65% of the Union's consumption of each strategic raw material comes from a single third country. The provisional agreement adds one critical raw material (aluminium) to the list of strategic raw materials. Synthetic graphite will also be a strategic raw material for a period of three years.

SCIENCE POLICY AND DIPLOMACY

Minamata Convention on Mercury: COP5 Meeting

Parties to the Minamata Convention convened for the fifth meeting of the Conference of the Parties (COP-5), in Geneva, 30 October - 3 November. It marked the tenth anniversary of the Convention and agreed to update Annexes A and B of the Convention to list phaseout dates for certain types of batteries, switches and relays, fluorescent lamps, and cosmetics, and mandate the phaseout of mercury as a catalyst in polyurethane production by 2025. However, efforts by the African Group and other parties to agree on a phaseout of dental amalgam, which is still widely used for dental fillings, did not achieve consensus. A decision on mercury waste thresholds of 15 mg/kg on imports and exports contaminated with mercury gives an international standard for deciding whether a shipment should be blocked. It also means that producer nations now have a benchmark for blocking exports of mercury-contaminated waste. COP-5 adopted the budget and programme of work for the 2024-25 biennium, approving a core budget of USD 8.4 million and estimating needs of USD 4.83 million for its Special Trust Fund. On artisanal and small-scale mining (ASGM), parties decided to strengthen engagement with Indigenous Peoples in addressing the harmful impacts of mercury exposure in ASGM. COP discussions highlighted the interlinkages between the Minamata Convention and recently-adopted global frameworks, especially the Kunming-Montreal Global Biodiversity Framework (GBF) and the Global Framework on Chemicals.

Sixth International Solar Alliance Assembly Meeting

The 6th session of the International Solar Alliance Assembly was held in New Delhi, 30 October-2 November with participation from 121 countries, encompassing our member, signatory, and prospective nations. 30 Ministers led their country delegations. ISA inaugurated four projects that were established with its support. Solar power was provided to the parliament building in Malawi, as well as two rural healthcare centers in Fiji, a school in Kiribati and a cold storage facility in Seychelles. Developing countries including Bangladesh, Fiji, Guinea and Nigeria made voluntary contributions to the ISA. Likewise, developed countries such as the USA, Australia, Denmark, and Germany have provided or have pledged their support. Discussions were held on solar technologies, co-hosted by Asian Development Bank (ADB) and International Solar Energy Society ISES, with a focus on technologies for PV manufacturing, batteries, and green hydrogen. Four reports were released covering advances in solar markets, technology, and investments, and in pathways to green hydrogen (<https://lnkd.in/djmQdYHd>). A solar-powered future is inevitable. But action is needed to put in place regulatory frameworks that expedite solar adoption as the preferred energy source.

Plastics Treaty must be Comprehensive

A group of researchers led by the Scientists' Coalition for an Effective Plastics Treaty say that the new Global Plastics Treaty being negotiated at the next INC-3 meeting in Nairobi from 13 November, must prioritise "upstream" issues: cutting total production and consumption of plastics, phasing out hazardous chemicals and tackling fossil fuel subsidies. [Read the full report here](#). They say the zero draft of the treaty "disproportionately emphasises waste management investment and neglects opportunities" for more efficient and cost-effective upstream strategies like reduction, redesign and reuse. They say the treaty must be holistic -- with more focus on early interventions and the people, places and ecosystems most impacted by plastic pollution. Currently, "downstream" recovery and recycling receives 88 per cent of investment money -- while just 4 per cent is directed to "upstream" reuse solutions. The researchers say this imbalance comes from "fossil-fuel-entwined political economy of plastics," which continues to accelerate production, consumption and waste, adding further to the triple Planetary Crisis -- climate change, biodiversity loss and pollution. The researchers say the treaty should require polymer manufacturers to pay a "substantial fee pegged to the quantity of primary plastics produced," define criteria for strong and independent Extended Producer Responsibility schemes, and ensure both public and private financing align with the zero waste hierarchy by prioritising upstream strategies. The treaty must address damage to ecosystems. Once in the environment, plastic litter can entangle and choke wildlife, and plastic objects can act as a reservoir for invasive species and concentrate other pollutants. Plastics can also break down into potentially toxic micro- and nanoplastics. The researchers call for significantly reducing the production and use of especially hazardous chemicals, and increasing transparency and traceability along the whole plastics supply chain.

We welcome your comments and valuable suggestions. Please write to us for receiving publications, updates and notices regarding seminars, conferences etc. Contact us at science.diplomacy@ris.org.in

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