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SCIENCE DIPLOMACY**

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NEWS ALERT

Forum for Indian Science Diplomacy

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

GLOBAL

[G20 Osaka Declaration and Innovation Policies](#)

The G20 Leaders Declaration adopted at Osaka, 29 June stated that Innovation is an important driver for economic growth, which can also contribute to advancing towards the SDGs and enhancing inclusiveness, and in achieving an inclusive, sustainable, safe, trustworthy and innovative society through digitalization and promoting the application of emerging technologies. Recognizing the critical role played by effective use of data, as an enabler of economic growth, development and social wellbeing, the leaders agreed to promote international policy discussions to harness the full potential of data. The responsible development and use of Artificial Intelligence (AI) can be a driving force to help advance the SDGs and to realize a sustainable and inclusive society. A human-centered approach to AI was stressed, and the non-binding G20 The growing importance of promoting security in the digital economy and addressing security gaps and vulnerabilities as well as the protection of intellectual property was underlined.

[Bonn Climate Change Conference concludes](#)

The Bonn Climate talks (UNFCCC) wrapped up on 27 June with most diplomats strongly defending the latest IPCC report arguing that "Science is not negotiable". The final negotiated text merely "expressed its appreciation and gratitude to the IPCC and the scientific community for responding to the invitation of the Conference of the Parties (COP) and providing the SR1.5, which reflects the best available science". Brazil continued to stall efforts to regulate carbon credits due to differences on how to handle "legacy" carbon credits under the old Kyoto Protocol. There were also many proposals to ensure that the new UN system not only shifted emissions around the globe, but reduced their overall level. The negotiating bloc of small island states, Aosis, pushed for a global tax on carbon offsets, but was resisted by wealthy countries. Meanwhile, the European Union and members of the umbrella group advocated offsets to be calculated based on more ambitious baselines. Ultimately, the discussion was postponed by negotiators to a later date.

[Swine fever epidemic and East & South-East Asia](#)

The FAO (Food and Agriculture Organisation) reported that the rapid spread of African Swine Fever (ASF) is threatening food security and livelihoods of millions of households in the East and Southeast Asia region. The regions which rely on pig farming, like China, Vietnam, Cambodia, Mongolia, South Korea and Laos are particularly affected by the spread of the disease. Cross border trade of contaminated pigs is also contributing to the prevalence of ASF. It is a contagious viral disease that affects wild boars and pigs and spread through direct contact, contaminated food and materials that come in contact with the infected animals. It causes high fever, internal bleeding and is almost fatal within a few weeks due to the unavailability of any treatment or vaccine available.

[Potential of Onshore Wind Energy](#)

A recent study published in the journal Energy suggests the increased use of onshore wind energy could provide Europe more than 10 times its existing electricity needs. An increased rollout of the onshore wind turbines with all the available land and futuristic turbine designs coming up can prove crucial and make a huge contribution in fulfilling the energy needs of the continent. The EU is aiming to reduce greenhouse gas emissions by 80-95% by 2050 as compared to the 1990 levels and therefore has been trying to bring about an enormous shift towards the renewable power sources all across the continent

[Supersonic jet injector for nanoscale manufacturing](#)

Based on focused electron beam deposition, researchers at Georgia Institute of Technology have developed a technique that allows structures to be fabricated from gas-phase precursors at rates approaching what could be expected in the liquid phase -- all without raising the temperature of substrates. That could lead to manufacturing of the nanometer-scale structures at rates that could make them practical for use in magnetic memory, high-frequency antennas, quantum communication devices, spintronics and atomic-scale resonators. The ability to rapidly produce small, three-dimensional structures could open up a range of new applications. The researchers have also created hybrid jets, which allow not only dramatic acceleration of nanostructure growth but also precisely control the material composition during growth.

[Solar technology for producing clean drinking water](#)

Recently, researchers at the University of Texas in Austin have been working to upgrade solar stills as a cheap, low-tech alternative. The process involves hydrogels, polymer mixtures that form a 3D porous, water—absorbent network. Using a gel-like sponge of three polymers—one a water-binding polymer called polyvinyl alcohol (PVA), another a light absorber called polypyrrole (PPy), and chitosan—their solar still produced 3.6 L/h/m² of water, the highest rate ever reported. At this higher water production rate, a solar still 1 square meter in size could produce about 30 litres of clean drinking water per day, enough for a small family. Besides, all three polymers in the hydrogel are both commercially available and cheap.

[AI algorithm for severe weather prediction](#)

A collaborative study between the AccuWeather Inc, the Penn State and the University of Almeria, Spain have developed an AI algorithm that can detect rotational movement in clouds from satellite images that might otherwise go unnoticed. It uses computer vision and machine learning techniques to automatically recognise and detect comma-shaped clouds in

satellite images. The method was found to have around 99 percent accuracy and it outperforms other severe-weather detection methods.

[Success in HIV elimination in mice genome](#)

A team of researchers from the Temple University and the University of Nebraska Medical Center (UNMC) have successfully eliminated the replication competent HIV-1 DNA, from the genomes of living animals, marking a crucial step towards a possible cure for human HIV infection. The study was done on mice engineered to produce T cells and infected with HIV and subsequently the CRISPR-Cas9 technology was applied in addition to treating them with LASER ART

[Bacteria engineered for Cancer Immunotherapy](#)

Researchers at Columbia Engineering and Columbia University Irving Medical Center (CUIMC) announced that they have used a strain of non-pathogenic bacteria that can colonize solid tumours in mice and safely deliver potent immunotherapies, acting as a Trojan Horse that treats tumours from within. The therapy led not only to complete tumour regression in a mouse model of lymphoma, but also significant control of distant, uninjected tumour lesions. This opens the way to engineer bacteria to invade tumours locally, and then stimulate the immune system to seek out tumours and metastases that are too small to be detected with imaging or other approaches.

[High definition polarisation camera](#)

Polarization, the direction in which light vibrates, is invisible to the human eye (but visible to some species of shrimp and insects). But it provides a great deal of information about the objects with which it interacts. Cameras that see polarized light are currently used to detect material stress, enhance contrast for object detection, and analyze surface quality for dents or scratches. Researchers at the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) have developed a highly compact, portable camera that can image polarization in a single shot. The miniature camera -- about the size of a thumb -- could find a place in the vision systems of autonomous vehicles, onboard planes or satellites to study atmospheric chemistry, or be used to detect camouflaged objects. This technology could be integrated into existing imaging systems, such as the one in cell phones or cars, enabling the widespread adoption of polarization imaging and new applications previously unforeseen. This research opens an exciting new direction for camera technology with unprecedented compactness, allowing many applications in atmospheric science, remote sensing, facial recognition, machine vision and more.

[High definition satellite radar system by NASA](#)

Researchers from the NASA Jet Propulsion Laboratory (JPL) and the University of Bath have developed a satellite-based early warning system that could spot tiny movements in bridges that indicate they could collapse. The new technique can be used for near-real time monitoring of an entire structure. Precise Synthetic Aperture Radar (SAR) data, when gathered from multiple satellites pointed at different angles, can be used to build a 3D picture of a building, bridge or city street. The technique can also be used to monitor movement of structures when underground excavations, such as tunnel boring, are taking place.

[Discovery of non-resistant new antibiotics](#)

A team at the Inserm and Rennes Institute of Chemical Sciences (ISCR) recently identified a new bacterial toxin which they transformed into potent antibiotics active against various

bacteria responsible for human infections, whether Gram-positive or negative. A toxin produced by *Staphylococcus aureus* is also capable of killing other bacteria present in the human body. Based on this, a new family of so-called peptidomimetics was synthesized of which two proved effective against resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa* in mouse models of severe sepsis or skin infection. In addition, no toxicity to the other cells and organs, whether in animals or human cells was observed. These new compounds are well tolerated at their active doses -- and even beyond -- and are devoid of the renal toxicity issues often encountered with this type of compound. The bacteria that the researchers had left in contact for several days in the animals with these antibiotics showed no signs of resistance. These new molecules represent promising candidates for the development of new antibiotics that can provide alternative treatments to antimicrobial resistance. The next step involves launching phase I clinical trials in humans. The patent has been licensed and a start-up created.

[New list of essential medicines & diagnostics by WHO](#)

WHO has published two lists of essential medicines and diagnostics which focus on cancer and other global health challenges. More than 150 countries use WHO's Essential Medicines List to guide decisions about which medicines represent the best value for money, based on evidence and health impact. The updated List of Essential Diagnostics contains 46 general tests that can be used for routine patient care as well as for the detection and diagnosis of a wide array of disease conditions, and 69 tests intended for the detection, diagnosis and monitoring of specific diseases. Both WHO lists are models for countries to develop their own national lists.

[Eggshell Reinforced hydrogel for bone repair](#)

A team of researchers at the University of Massachusetts Lowell has found that chicken eggshell microparticles inserted into a hydrogel matrix can be used to strengthen bone grown in a lab for use in bone grafts and other procedures. Currently, bone grafts and substitute biomaterials hold a \$2.7 billion market value globally. Through the innovative process, crushed eggshells are inserted into a hydrogel mixture that forms a miniature frame to grow bone in the laboratory to be used for bone grafts. The process could also be used to help grow cartilage, teeth and tendons. The research team has already filed a patent for it and anticipate the process can be adapted for use in many significant ways.

[Colossal Elastocaloric Effect for better refrigeration](#)

An alloy that undergoes a reversible temperature change of 31.5 K when squeezed has been created by physicists in China, Spain and the US. The uncompressed material has an austenite crystal structure, that is converted to a martensite crystal structure by about 500 MPa of squeezing. This results in a change of temperature of 31.5 K. The team describes their research as a "significant step forward towards large-scale elastocaloric refrigeration applications. Furthermore, they say that their selection criteria could be used to find other materials that exhibit the colossal elastocaloric effect.

[New anticancer agents to control tumour growth](#)

Researchers at Purdue University have discovered a novel set of MYC promoter G-quadruplex stabilizers that have demonstrated anticancer activity in human cancer cell cultures. It works by downregulating the expression of the MYC oncogene, which is overexpressed in cancer and is associated with almost all aspects of cancer development. The agents they discovered could be used in helping to treat nearly every type of cancer.

Some of the technology from their work has been licensed to Gibson Oncology LLC through the Purdue Research Foundation Office of Technology Commercialization. The MYC innovation will greatly enhance interest in these anticancer agents within the scientific community and will also contribute to the understanding of how they work.

Cowpea genome sequenced

The cowpea, also known as the black-eyed pea, is one of the most important food and nutritional security crops, providing the main source of protein to millions of people in developing countries. It is grown for its grains, tender leaves and pods as food for human consumption, with the crop residues being used for fodder or added back to the soil to improve fertility. It has high resilience to harsh conditions, including hot and dry environments, and poor soils. University of California, Riverside researchers have now sequenced the genome of the cowpea variety IT97K-499-35 using single-molecule real-time sequencing combined with optical and genetic mapping. This opens the way to understand its remarkable ability to recover from drought stress and improve other crops that are vulnerable to climate change.

INDIA

Digitisation of Health: Initiative by AYUSH and MeitY

Ministry of AYUSH has signed an MOU with the Ministry of Electronics and Information Technology (MeitY), Government of India for digitisation of AYUSH leading to transformation in health care at all levels. Under the collaboration, MeitY will provide high quality technical support to the AYUSH Ministry in order to achieve the objective of digitisation of the health sector..

Collaboration between the Tata Trusts and Gates Foundation in Agriculture

India Agritech Incubation Network (IAIN), which is envisioned as a network of incubators across India to promote innovations for smallholder farmers, will be set up as a collaborative project between the Tata Trusts and the Bill and Melinda Gates Foundation. The first hub for IAIN is planned to be set up at IIT Kanpur and innovative solutions with a focus on affordability, accessibility, efficiency and user experience will receive incubation support for 12-24 months. The initiative aims to support around 60 enterprises with technology and business incubation, impacting 50,000 farmers in the next five years.

IISc & BT to collaborate in Cybersecurity

Telecom giant BT and the Indian Institute of Science (IISc), have started a new phase of UK-India joint research with the opening of a new collaborative research centre in Bengaluru. The new BT India Research Centre (BTIRC) will join BT's network of collaborative research facilities around the globe, including centres in Northern Ireland, China, the US, and the UAE. The BTIRC will operate multiple research tracks, focused primarily on artificial intelligence, mobility and software engineering technologies for use in BT's strategic programmes, products and services. Future areas will include cybersecurity innovations.

AI4Bharat launched by IIT-Madras

An online platform AI4Bharat has been launched by IIT-Madras in a bid to accelerate innovation in the field of artificial intelligence. It would help build solutions to local problems in agriculture, health care and other sectors and will also mentor students to use AI for

creating impactful solutions. The initiative aims at creating a community of 100 selected AI experts and 50 domain experts.

IOT and Data science to aid farming communities

An MoU has been signed between the Kerala State IT Mission and Cisco to bring benefits of digital technology to farming communities in Kerala. The collaboration is part of Country Digitisation Acceleration programme and will provide access to data storage of the farming data of paddy and prawns also would run analytics to extract insights on crop yields, weather patterns, plant disease pattern, moisture content and forecasting. Establishment of Village Knowledge Centres is also envisioned as part of the programme, for knowledge delivery and providing better access to e-learning and advisory services to the farming and fishing communities.

Heart Attack diagnostic device by IIT-Hyderabad

Scientists from IIT-Hyderabad have designed a microfluidic device that can help in early diagnosis of heart attack. The team has successfully integrated the microfluidic device with chitosan-coated nickel vanadate nanospheres to enable rapid detection and better sensitivity. Results of the research study are published in the Journal of Materials Chemistry B.

Indian agreement to boost IP Culture in defence

Department of Defence Production's (DDP's) Intellectual Property Facilitation Cell (IPFC) and the Ministry of Science and Technology's National Research Development Corporation (NRDC) have signed a MoU to strengthen intellectual property (IP) rights within India's defence industry. The partnership between the IPFC and NRDC is expected to bridge capacity gaps and provide a major boost to the ongoing efforts of the MoD towards promoting a culture of innovation and IP rights in India's defence industry. The agreement is intended to enable the two agencies to support domestic defence companies to file patents for defence technologies and to commercialise related products and IPs.

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