

If you can't see this message, [view it in your browser.](#)

SCIENCE DIPLOMACY NEWS ALERT | 1-15 AUGUST 2022| ISSUE 91

[www.fisd.in](http://www.fisd.in)

## NEWS ALERT

*Forum for Indian Science Diplomacy*

RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in scientific 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](mailto:science.diplomacy@ris.org.in)

## CONTENTS

### GLOBAL

[Simple Cheap Material for Carbon Capture](#)

[Method to Convert Methane Gas into Liquid Methanol](#)

[Hydrogel to Improve Shelf Life of Vaccines](#)

[Fish-Safe Turbines for Hydropower Plants](#)

[Design Prevents Buildup of Scar Tissue Around Medical Implants](#)

[Cornea Made From Pig Collagen Restores Vision](#)

### COVID-19 (WORLD)

[Symptoms of Long COVID Studied](#)

[Rapid At-Home Prototype Saliva Test as Good as RT-PCR](#)

### COVID-19 (INDIA)

[COVID Omicron BA.2.75 Variant Spreads](#)

[India to Accelerate Coverage of Precautionary Dose of COVID-19](#)

### INDIA– SCIENCE & TECHNOLOGY

[Polymer-Based Electrode to Increase Electrochemical Performance of Supercapacitors](#)

[Biodegradable, Biopolymer Nanocomposite Can Monitor Packed Food Freshness](#)

[ICMR-NIV Found New Monkeypox Virus Strain](#)

[Low-Cost, Fast-Charging Sodium-ion Batteries](#)

[New Scheme to Augment Research Capabilities](#)

### IN BRIEF

[India Approves Climate Plan with Increased Ambition](#)

[Turning Fish Waste into Quality Carbon-based Nanomaterial](#)

[Building Bricks from Waste Materials](#)

[New 3D Printing Process is Faster and More Precise](#)  
[Improved Cement with Shrimp Shell Nanoparticles](#)

## **RESOURCES AND EVENTS**

[US Adopts Chips Bill](#)  
[Arctic is Warming More Rapidly](#)

## **SCIENCE POLICY AND DIPLOMACY**

[WHO Pandemic Treaty Negotiations Launched](#)  
[Divisions Deepen over Deadline for Deep Sea Mining Rules](#)

## **GLOBAL**

### **[Simple Cheap Material for Carbon Capture](#)**

UC Berkeley chemists have created a cheap, easy and energy-efficient way to capture carbon dioxide from smokestacks using an inexpensive polymer called melamine—the main component of Formica. The process for synthesizing the melamine material could potentially be adapted to capture emissions from vehicle exhaust or other movable sources of carbon dioxide. The new material is simple to make, requiring primarily off-the-shelf chemicals - melamine powder, formaldehyde and cyanuric acid. The melamine porous network captures CO<sub>2</sub> at about 40 degrees Celsius, and releases it at 80 degrees Celsius resulting in high energy savings.

### **[Method to Convert Methane Gas into Liquid Methanol](#)**

A group of researchers has succeeded in converting methane into methanol using light and dispersed transition metals such as copper in a process known as photo-oxidation. The reaction was the best obtained to date for conversion of methane gas into liquid fuel under ambient conditions of temperature and pressure (25 °C and 1 bar respectively). The results of the study are an important step in making natural gas available as an energy source for the production of alternative fuels to gasoline and diesel. Although natural gas is considered a fossil fuel, its conversion into methanol emits less carbon dioxide (CO<sub>2</sub>) than other liquid fuels in the same category.

### **[Hydrogel to Improve Shelf Life of Vaccines](#)**

An international research team led by ETH Zurich has now developed a special hydrogel that vastly improves the shelf life of vaccines, even without refrigeration. The development could save many lives and lower the cost of cold chains. They worked together to develop a safe, versatile platform to increase the thermal stability of vaccines. It aims to vastly improve the distribution of viable vaccines and reduce the economic costs of the cold chain. In addition to a higher rate of vaccine viability, the real game changer of this new biomedical hydrogel technology is the potential economic effect it could have on reducing costs and health risks associated with the cold chain. It requires further research, safety studies, and clinical trials before the hydrogels can be implemented for vaccine distribution. Their immediate use is for transporting heat sensitive enzymes used in cancer research, for example, or protein molecules for research in lab settings.

### **Fish-Safe Turbines for Hydropower Plants**

A company named Natel Energy, has attempted to mimic natural river ecosystems with hydropower systems that are more sustainable than conventional hydro plants. They have designed fish-safe thick, rounded turbine blades to mimic natural river conditions. Hydropower plants can bridge the gap between power-plant efficiency and environmental sustainability. By retrofitting existing hydropower plants and developing new projects, they can boost the hydropower industry, which is facing increasing scrutiny and environmental regulation that could otherwise close down many existing plants.

### **Design Prevents Buildup of Scar Tissue Around Medical Implants**

A team of MIT engineers and collaborators have devised a way to overcome foreign body response. In a study of mice, they showed that when they incorporated mechanical actuation into a soft robotic device, the device remained functional for much longer than a typical drug-delivery implant. They found that the device is repeatedly inflated and deflated for five minutes every 12 hours, and this mechanical deflection prevents immune cells from accumulating around the device. They used this type of motion to extend the lifetime and the efficacy of these implanted reservoirs that can deliver drugs like insulin, and believe that it can be for other applications as well like using the device to deliver pancreatic islet cells that could act as a “bioartificial pancreas” to help treat diabetes.

### **Cornea Made from Pig Collagen Restores Vision**

Researchers in Sweden, Iran and India have used pig collagen to make Corneas and have been able to restore sight for people who were previously legally blind or visually impaired. Two years after the operations, none of the recipients have reported serious complications or adverse side effects. The team manufactured a flexible yet resilient dome that resembles a contact lens by extracting and purifying collagen from porcine skin. Following successful trials, the team began testing the artificial corneas in 20 human volunteers in India and Iran. All 20 people in the trial had corneal blindness. Fourteen were legally blind before the operation and six had severely impaired sight. Afterwards, everyone had improved vision. Three of the formerly blind participants had 20/20 vision following the procedure. Because collagen is a structured protein that lacks individual cells, a recipient’s immune system should not reject the porcine cornea.

## **COVID-19**

### **COVID-19 (WORLD)**

#### **Symptoms of Long COVID Studied**

Mortality rates following SARS-CoV-2 infection have decreased but post-acute sequelae of COVID-19, or long COVID, has emerged: a chronic illness in people who have ongoing multidimensional symptomatology and disability weeks to years after the initial infection. , community-based studies have suggested a lower prevalence of persistent symptoms; whereas among people who were hospitalized following COVID-19 infection, a high proportion does not fully recover (50–70 percent). The number of COVID-19 cases continues to rise and now

exceeds 500 million worldwide. Consequently, the number of people with long COVID is similarly increasing.

### **Rapid, At-Home Prototype Saliva Test as Good as RT-PCR**

Researchers from Penn State University have developed a rapid and easy saliva-based SARS-CoV-2 self-testing device with RT-LAMP in a mobile device (SLIDE). Its five distinct modules conduct all of the steps needed for RT-LAMP. To use SLIDE, a person simply spits into a vial on a cartridge that they insert into the device, and results are sent to a smartphone within 45 minutes. In lab tests, SLIDE successfully gave results consistent with those from RT-PCR. For details see <https://pubs.acs.org/doi/10.1021/acssensors.2c01023>

### **COVID-19 (INDIA)**

#### **COVID Omicron BA.2.75 Variant Spreads**

Doctors and experts with INSACOG said that cases of COVID's Omicron BA.2.75 Variant are rising across India. Delhi recorded a sharp rise in case numbers in the past three weeks, with upwards of 1,000 fresh COVID cases reported every day. The capital also recorded 52 deaths in one week, with a positivity rate of about 20 percent - the highest since January 2022. INSACOG has said that BA.2.75 is the dominant strain in many parts of India at present, and that it shows signs of quick transmission and breakthrough infections even in people who have been fully vaccinated. The government has advised that people get the booster dose of the vaccine.

#### **India to Accelerate Coverage of Precautionary Dose of COVID-19**

Health Minister, Mansukh Mandaviya urged states and union territories to accelerate coverage of precautionary dose of COVID-19 among population aged above 18 years and above, while advising that availability of heterologous precaution dose of Corbevax vaccine. Vaccination camps to be organised at public places to increase the uptake of precautionary dose among eligible beneficiaries.

## **INDIA-SCIENCE & TECHNOLOGY**

### **Polymer-Based Electrode Can Increase Electrochemical Performance of Supercapacitors**

Researchers from Sanatana Dharma College, Alappuzha, has found a strategy to improve the performance of polyaniline (PANI)-based supercapacitors and has achieved very high Specific Capacitance per unit of area or areal capacitance and prolonged cycle life. They found that electrodes made from pristine, porous, conducting and high molecular-weight PANI synthesized by self-stabilized polymerization (SSDP) when used with an electrolyte powered with an additive that boosts redox reactions (redox-additive) can drive these energy storage devices to deliver incredible performances. The lightweight symmetric supercapacitors fabricated using these electrodes outperform many new electrode materials. The conducting polymer-based electrode is lightweight and highly stable. The supercapacitors' enhanced performance and long cycle life are attributed to the binder-free nature, porosity, high and homogeneous molecular weight and appreciable conductivity of the electrode material and the electrode/redox-activated electrolyte combination.

### **Biodegradable, Biopolymer Nanocomposite Can Monitor Packed Food Freshness**

Scientists from the Institute of Advanced Study in Science and Technology (IASST) have developed a smart biodegradable biopolymer nanocomposite which can detect relative humidity. In this, two biopolymers, Guar Gum (a variety of beans obtained from plants) and Alginate (obtained from brown algae), were blended with carbon dots (nanomaterial) to make a nanocomposite film that was successfully used to detect relative humidity. The fabricated nanocomposite film was an excellent smart sensor based on the fluorescence 'on-off' mechanisms against humidity. The nanocomposite film shows change in fluorescence in presence of high humidity. Hence, the fabricated nanocomposite film can monitor the packed food freshness using just a UV light source. This finds application as smart packaging materials, especially for the food industry.

### **ICMR-NIV Found New Monkeypox Virus Strain**

Researchers at the Indian Council of Medical Research – National Institute of Virology (ICMR-NIV) have found a new strain of Monkeypox virus, which is different from the one which caused the spread in Europe. The genome sequencing showed that they were infected with monkeypox virus strain A.2, which belongs to the hMPXV-1A lineage of clade 3. The current monkeypox outbreak in the United States is also down to the circulation of the MPXV lineage A.2 from 2021, which has evolved from lineage A that caused the Nigeria outbreak in 2017–2018. Researchers at the NIV have not yet studied how significant or dangerous the A.2 strain is.

### **Low-Cost, Fast-Charging Sodium-ion Batteries**

Researchers from IIT Kharagpur have used nano-materials to develop Sodium-ion-based batteries and supercapacitors for next-generation energy storage technologies and their use in e-vehicles. The low-cost Na-ion-based technologies would be cheap and are expected to reduce the cost of e-cycles significantly. The team used sodium iron phosphates and sodium manganese phosphates which they synthesised to obtain Na-ion-based batteries and supercapacitors. The combination of novel nanostructures of sodium-based oxides and carbon leads to high energy and power density devices and reduce dependence on imported lithium. The sodium based materials are cheaper than Lithium-based materials, high performing, and can be scaled up to industrial-level production. A Sodium -ion cell can also be discharged to zero volts.

### **New Scheme to Augment Research Capabilities**

A new scheme was launched to augment the research capabilities in a structured way to create a robust R&D ecosystem in state and private universities and colleges, including self-financed institutions working within these universities. The State University Research Excellence (SERB-SURE) is an innovative scheme of the Science and Engineering Research Board (SERB), a statutory body of the Department of Science and Technology (DST), that can foster collaboration for high-end research at state and private universities and colleges. SERB-SURE scheme provides research support to active researchers belonging to state and private universities and colleges, including self-financed institutions working within these universities, across India, to undertake research and development in frontier areas of science, engineering, and quantitative social science.

## IN BRIEF

### [India Approves Climate Plan with Increased Ambition](#)

India's cabinet has approved an updated national climate plan, including targets pledged by PM Narendra Modi in November 2021, including a 2070 net zero goal and 45 percent reduction in emissions intensity by 2030. The document increases ambition from India's previous target, set in 2016, to reduce emissions for each unit of GDP 33-35 percent from 2005 levels by 2030. It clarifies the target for clean energy, aiming for half of installed electricity generation capacity to come from non-fossil sources at the end of the decade. Non-fossil capacity, which includes nuclear and large hydro dams as well as wind and solar, is around 40 percent today. The timing just months ahead of Cop27 in Egypt are significant. The 2030 goal is a substantial pledge which will require deep structural changes in the Indian economy. In a press statement, the government said the long-term climate goals are conditional on finance, estimated at \$1 trillion. The updated plan is expected to be uploaded to the UN registry in the coming days.

### [Turning Fish Waste into Quality Carbon-based Nanomaterial](#)

A team of scientists from Nagoya Institute of Technology in Japan has found a simple and convenient way to turn fish waste into extremely high-quality Carbon nano-onions (CNOs). They developed a synthesis route in which fish scales extracted from fish waste after cleaning are converted into CNOs in mere seconds through microwave pyrolysis. The process needs no complex catalysts, nor harsh conditions, nor prolonged wait times; the fish scales can be converted into CNOs in less than 10 seconds, and yields CNOs with very high crystallinity. The surface of the CNOs is selectively and thoroughly functionalized with (-COOH) and (-OH) groups which allows for an excellent dispersability in various solvents, and exceptional optical properties. The team demonstrated their stable optical properties which could enable fabrication of large-area emissive flexible films and LED devices.

### [Building Bricks from Waste Materials](#)

Researchers from the Flinders Chalker Lab have used low-cost feedstocks to make lightweight but durable polymer building blocks which can be bonded together with an adhesive-free chemical reaction. They have tested a new type of brick made from waste cooking oil, mixed with sulphur and dicyclopentadiene (DCPD). Both sulphur and DCPD are byproducts of petroleum refining. The bricks bond together without mortar upon application of a trace amount of amine catalyst. All the starting materials are plentiful and can be classified as industrial waste. The method is under further development to scale-up possible commercialisation.

### [New 3D Printing Process is Faster and More Precise](#)

Rutgers engineers have created a way to 3D print large and complex parts at a fraction of the cost of current methods. The new approach, called Multiplexed Fused Filament Fabrication (MF3), uses a single gantry, the sliding structure on a 3D printer, to print individual or multiple parts simultaneously. By programming their prototype to move in efficient patterns, and by using a series of small nozzles - rather than a single large nozzle, as is common in conventional printing - to deposit molten material, the researchers were able to increase printing resolution and size as well as significantly decrease printing time. MF3 could change how thermo-plastic printing is done. The team has applied for a U.S. patent for their technology. At the heart of MF3's innovation is its software that maps an object into the virtual "slices," or layers that will be printed. Rutgers researchers wrote slicer software that optimized the gantry arm's movement and determined when the nozzles should be turned on and off to achieve the highest efficiency. MF3's new "toolpath strategy" makes it possible to "concurrently print multiple, geometrically distinct, non-contiguous parts of varying sizes" using a single printer. The hardware used in MF3 can be purchased off the shelf and does not need to be customized, making potential adoption easier. An MF3 printer has multiple nozzles giving it built-in resilience, making it less prone to costly downtime,

### **Improved Cement with Shrimp Shell Nanoparticles**

A team of US researchers have created nanocrystals and nanofibers of chitin, the second most abundant biopolymer in nature, from waste shrimp shells. When these tiny bits of chitin, which are about 1,000 times smaller than a human hair, were added to cement paste, the resulting material was up to 40 percent stronger and a 12 percent improvement in the ability to compress it. Set time for the cement was also delayed by more than an hour, a desired property for long-distance transport and hot weather concrete work. The team found that Crab, shrimp and lobster shells are made up of about 20-30 percent chitin with much of the rest being calcium carbonate, another useful additive for cement. The charge on the surface of the molecules could be controlled, and, consequently, how they behave in the cement slurry. The method is being scaled up.

## **RESOURCES & EVENTS**

### **US Adopts Chips Bill**

US President Joe Biden signed into law a bill providing \$52.7bn in subsidies for US semiconductor manufacturers and research, in a landmark effort to boost United States competition with China's scientific and technology initiatives. Biden called the law "a once-in-a-generation investment in America itself". The Biden administration had previously underscored that the legislation, now called the CHIPS and Science Act, is vital to national security, competing with China, and reducing US dependence on Taiwan and South Korea for critical technologies. The US Department of Commerce has yet to establish guidelines for evaluating grant applications, and it is unclear when projects will be financed. The signing was attended by chief executives of Micron, Intel, Lockheed Martin, HP and Advanced Micro Devices, as well as cabinet officials and car industry and union leaders, including United Auto Workers President Ray Curry, etc.

### **Arctic is Warming More Rapidly**

Finnish scientists, using several sets of observational data, have found that over a little more than four decades, the actual rate of Arctic warming has been nearly four times faster than earlier estimated. Some parts of the region saw even more extreme Arctic amplification. This is alarming, because the Arctic contains sensitive and delicately balanced climate components that, if destabilised, could have global consequences. For example, melting permafrost in the Arctic could produce large amounts of carbon dioxide and methane — the latter being an extremely potent greenhouse gas. The Earth's permafrost currently stores about 1.6 trillion tons of carbon — more than twice the amount in the atmosphere today. Shrinking of the Arctic's floating cover of sea ice reduces the reflection of sunlight and could be a major cause of Arctic amplification. Unlike reflective ice, dark ocean waters hungrily absorb solar energy and warm up significantly during summer. This delays freeze-up in the fall, allowing stored summertime heat to be released into the atmosphere. The more the climate warms, the more sea ice melts. This leads to more warming, which causes even more ice shrinkage and yet more warming — all in a positive feedback loop that goes a long way towards explaining Arctic amplification. This brings out the need for more accurate climate modeling. For details see <https://www.nature.com/articles/s43247-022-00498-3>.

## SCIENCE POLICY AND DIPLOMACY

### [WHO Pandemic Treaty Negotiations Launched](#)

The Intergovernmental Negotiating Body (INB) to draft and negotiate a WHO convention, agreement or other international instrument on pandemic prevention, preparedness and response held its second meeting in Geneva from 18-21 July 2022. It agreed, by consensus, to work to conclude a new, legally-binding international pandemic agreement. They are working to conclude this agreement in May 2024. The next meeting of the INB will be held in December 2022, and the INB will deliver a progress report to the 76th World Health Assembly in 2023. Any new agreement, if and when agreed by Member States, is drafted and negotiated by governments themselves, who will take any action in line with their sovereignty. A second round of global public hearings is expected to take place in September 2022. So far, only two binding treaties have been concluded in the WHO's nearly 80-year history - the Framework Convention on Tobacco Control, and the International Health Regulations

### [Divisions Deepen over Deadline for Deep Sea Mining Rules](#)

A growing number of countries are demanding more time to decide on rules that would allow companies to mine the deep seabed for minerals needed to manufacture batteries for the energy transition. Last year, the small island state of Nauru, triggered a never-before-used procedure giving the International Seabed Authority (ISA), the UN body which regulates mining activities in international waters, until July 2023 to fast-track deep sea mining exploitation rules. The ultimatum would allow the nascent industry to apply for mining permits as soon as next year. During three weeks of meetings recently at the ISA's headquarters in Kingston, Jamaica, some member states failed to include a discussion on the implication of the two-year ultimatum to the official agenda, stripping the body's 167 member states of the ability to meet and express their views before the deadline next year. Deep sea mining companies have been carrying out exploration of an area of the Pacific Ocean floor, which has a concentration of black polymetallic nodules, rich in nickel, cobalt, copper and manganese. Following the triggering of the two-year-rule, the ISA secretary has designed a



roadmap that could allow the nascent deep sea mining industry to begin commercial operations as soon as next year. Under procedural rules, the ISA will have to “consider and provisionally approve” requests for exploitation licences regardless of whether the mining code is finalised. Since then, scientists have warned that far too little is known about the deep ocean, its biodiversity and the role it plays in storing carbon to allow companies to mine the seabed. Mining would result in biodiversity loss that would be irreversible on multi-generational timescales, they say.

### **RIS course on Science Diplomacy Planned in January 2023**

RIS is planning to organise a course on Science Diplomacy For international participants from partner countries of the ITEC programme of the Ministry of External Affairs, Government of India. This course will be similar to the courses organised in 2017, 2018, 2019, and 2020, and is planned for January 2023, for two weeks duration. Details will be indicated as soon as the course is finalised. The participation is open to science policy makers, diplomats and scientists from ITEC partner countries.

### **[RIS and GSEJ Extend Submission Deadline for Science Diplomacy Review Special Issue](#)**

The Science Diplomacy Review (SDR) is a peer-reviewed and open access journal published by the Forum for Indian Science Diplomacy (FISD) based at Research and Information System for Developing Countries (RIS), an autonomous independent policy research think tank with India’s Ministry of External Affairs. SDR’s special issue titled ‘*New Dimensions of Science Diplomacy for the Twenty-First Century*’ will be published in collaboration between RIS and the Centre for Global Science and Epistemic Justice (GSEJ) at the University of Kent, UK. We invite contributions that unpack the idea of ‘science diplomacy’ through examinations on past and emerging experiences. Authors may submit full length research articles (4,000-5,000 words) as well as shorter articles and commentaries (1,500-3,000 words). Papers that focus on non-state actors and/or from the Global South perspectives, and papers with novel research methods are particularly welcome. The last date for submission of the full paper is 2 August 2022. The details are available at <http://fisd.in>.

We welcome your comments and valuable suggestions. Please write to us for receiving publications, updates and notices regarding seminars, conferences etc.

### **NOTE TO OUR READERS AND STAKEHOLDERS:**

The Science Diplomacy Programme at RIS has been sending you the fortnightly issues of Science Diplomacy Alerts regularly. We request your cooperation to review the Alerts and improve its content. For this purpose, please complete the form at <https://forms.gle/o4d869FxaM9t3KNw7>, and submit it. Your support and cooperation is appreciated.

**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](mailto:science.diplomacy@ris.org.in)

Website: [www.fisd.in](http://www.fisd.in)

***Disclaimer:***

Opinions and recommendations in the report are exclusively of the author(s) and not of any other individual or institution including FISD. This report has been prepared in good faith on the basis of information available at the date of publication. All interactions and transactions with industry sponsors and their representatives have been transparent and conducted in an open, honest and independent manner as enshrined in FISD Memorandum of Association. FISD does not accept any corporate funding that comes with a mandated research area which is not in line with FISD research agenda. The corporate funding of an FISD activity does not, in any way, imply FISD endorsement of the views of the sponsoring organization or its products or policies. FISD does not conduct research that is focused on any specific product or service provided by the corporate sponsor.

To unsubscribe please [click here](#)