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**FORUM FOR INDIAN  
SCIENCE DIPLOMACY**

SCIENCE DIPLOMACY NEWS ALERTS | 1-15 DECEMBER 2021 | ISSUE 75

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## NEWS ALERT

*Forum for Indian Science Diplomacy*

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## **GLOBAL**

### **Immune system-stimulating nanoparticle for stronger vaccines**

A team led by MIT researchers has designed a new nanoparticle adjuvant that may be more potent than others now in use. Studies in mice showed that it significantly improved antibody production following vaccination against HIV, diphtheria, and influenza. The researchers now hope to incorporate the adjuvant into an HIV vaccine that is currently being tested in clinical trials, in hopes of improving its performance. The new type of adjuvant is called SMNP (saponin/MPLA nanoparticles). This kind of adjuvant could also be useful for any other kind of subunit vaccine, which consists of fragments of viral proteins or other molecules. In addition to their work on HIV vaccines, the researchers are also working on a potential Covid-19 vaccine.

### **Sodium-based material yields stable alternative to lithium-ion batteries**

Researchers from the University of Texas at Austin have created a new sodium-based battery material that is highly stable, capable of recharging as quickly as a traditional lithium-ion battery and able to pave the way toward delivering more energy than current battery technologies. The researchers have developed a new sodium based material which solves the dendrite problem causing batteries to fail, and used a new solid electrolyte that boosts energy storage. The new anode material, called sodium antimony telluride intermetallic - Na metal composite (NST-Na), is made by rolling a thin sheet of sodium metal onto an antimony telluride powder, folding it over on itself, and repeating many times. This process results in a very uniform distribution of sodium atoms that

makes it less likely to form dendrites or surface corrosion than existing sodium metal anodes. That makes the battery more stable and allows faster charging, comparable to a lithium-ion battery's charge rate. It also has a higher energy capacity than existing sodium-ion batteries. The team has applied for a patent on the new sodium metal anode material's fabrication, structure and functionality.

### [New antibody-drug delivery system](#)

Researchers from Australia and Austria have developed: the world's first metal-organic framework (MOFs) antibody-drug delivery system that has the potential to fast-track potent new therapies for cancer, cardiovascular and autoimmune diseases. They found that MOF antibody crystals bind to their target cancer cells and if exposed to the low pH in the cells, they break down, delivering the drugs directly and solely to the desired area. They used a metal-organic framework of metal (zinc) and carbonate ions, and a small organic molecule (an imidazole, a colourless solid compound that is soluble in water) which not only keeps the payload attached to the antibody but can also acts as a reservoir of personalized therapeutics. This is a benefit with the potential to become a new medical tool to target specific diseases with customized drugs and optimized doses. The new method is cheaper, faster and more versatile than anything available currently and can boost the potency of the drugs reaching their target.

### [Contamination test for dairy and food products](#)

Researchers from Canada have developed a test to reveal bacterial contamination in dairy products well before they have a chance to reach humans, simply by reading a signal from a test printed inside every container. The technology can be adapted to detect the most common food pathogens and is also expected to be effective for use with other foods and beverages. The test in its current form works by isolating even trace amounts of infectious bacteria in milk products and works by printing the inner surface of a container with a tasteless, food-safe patch that repels everything but the target organisms, using a biosensor that triggers a change in the patch when such organisms are detected. The method was tested with whole milk with introduced E. coli to prove the technology can detect even trace amounts of the bacterium. The detection technology can readily be applied to other food-borne pathogens, such as listeria and clostridium. A test patch covering multiple pathogens could be printed on or otherwise incorporated into many forms of packages, including cartons, plastic tubs, milk bags and bottles so that it can be read, either visually or with a scanner, without opening the package.

### [Catalyst technology converts methane](#)

Researchers at Iowa State University has found and tested a catalyst technology to convert methane greenhouse gas into useful, valuable chemicals. The results provided a potential solution to this long-time challenge and represented the best stability, conversion rate, and selectivity to convert methane to ethane or ethylene, two main precursors for the modern petrochemical industry. The researchers are seeking a patent for the technology. The catalyst consists of one or two layers of platinum, each layer just an atom thick, deposited on two-dimensional metal carbide structures called "MXenes." The thin layers essentially allow every platinum atom to be used as a catalyst and prevent the formation of residues that cover and deactivate the platinum. That means less platinum is required to make the catalyst. The researchers' new catalyst technology could reduce the emission of methane and its combustion product, CO<sub>2</sub>, in the future.

### [Tool to speed development of new solar cells](#)

MIT and Google Brain researchers have developed a new system called a differentiable solar cell simulator that makes it possible not just to evaluate one proposed design at a time, but to provide information about which changes will provide the desired improvements. This could greatly increase the rate for the discovery of new, improved configurations. The tool will enable more rapid discovery of other higher performance devices. The system can decrease the number of times needed to run a simulator to give quicker access to a wider space of optimized structures. The tool can identify a unique set of material parameters that has been hidden so far because it's very complex to run those simulations.

### [A step toward “living biotherapeutics”](#)

MIT Chemical engineers created a coating for microbes that could make it easier to deploy the organisms to treat gastrointestinal disease. They have shown that they can protect those bacteria with a coating that helps them to survive the manufacturing process. One of the strains that the researchers used to test the coating is *Bacteroides thetaiotaomicron*. This species, which has enzymes specialized to digest carbohydrates, appears to be more abundant in the gut microbiome of healthy people. Bacteria with this type of protective coating could also be useful for agricultural applications such as helping to make crops more stress-tolerant. Another possible application for the coating is to use it to protect microbes that are used as vaccines. The BCG vaccine, which consists of the bovine version of the microbe that causes tuberculosis, is difficult to produce and must be stored at low temperatures. Coating it with a protective layer could eliminate the need for cold storage and make distribution easier.

### [Advanced catalysts for clean hydrogen production](#)

Oregon State University researchers have found that hydrogen can be cleanly produced with much greater efficiency and at a lower cost than is possible with current commercially available catalysts. The new findings describe ways to design catalysts that can greatly improve the efficiency of the clean hydrogen production process. Researchers studied the restructuring of catalysts in reactions and then manipulated their surface structure and composition at the atomic scale to achieve a highly efficient catalytic process for producing hydrogen. An active phase of a catalyst based on amorphous iridium hydroxide exhibited efficiency 150 times that of its original perovskite structure and close to three orders of magnitude better than the common commercial catalyst, iridium oxide. They found at least two groups of materials that undergo irreversible changes that turned out to be significantly better catalysts for hydrogen production, which can help us produce hydrogen at \$2 per kilogram and eventually \$1 per kilogram.

## COVID-19

### COVID-19 (WORLD)

#### [WHO finds ‘No Clear Benefit’ to treating Covid with convalescent plasma](#)

The World Health Organization guideline development group stated on 6 December that “there was no clear benefit for critical outcomes such as mortality and mechanical ventilation for patients with non-severe, severe or critical illness, and significant resource requirements in terms of cost and time for administration.” The group said the treatment also faces practical challenges, such as finding and testing donors as well as collecting, storing and transporting the plasma. The recommendation is based on 16

trials with more than 16,000 patients with non-severe, severe and critical Covid infections.

### **[Fast identification of Omicron spread through wastewater monitoring in Denmark](#)**

A company Eurofins Scientific has been monitoring wastewater in Denmark for the presence of SARS-CoV-2, through the regular (3 times per week) sampling of around 200 wastewater treatment plants across the country. On 1st December 2021, as part of the national surveillance programme, the regularly planned wastewater samples were tested for the presence of Delta and Omicron variants, through rapid detection of single point K417N and L452R mutations respectively. On 2nd December, 3 of these wastewater samples tested positive for the mutation K417N, indicating the likely presence of Omicron. On 3rd December, the presence of Omicron was confirmed, providing the Danish authorities with very early warning of the presence of the new variant and allowing them to take the necessary measures rapidly.

### **[U.S. funding of \\$400 million for Vaccination Programs](#)**

The United States announced that it will provide \$400 million for a new program that should help other countries speed vaccines to their citizens. Called the Initiative for Global Vaccine (Global Vax), the U.S. Agency for International Development said the program would “enhance international coordination” to help countries “overcome vaccine access barriers.” The agency added that it would focus on countries in Africa. Most of the money will go toward getting shots into arms in remote areas and helping countries with vaccine policies and delivery logistics. The remainder go where there are surges in cases and to help countries make their own vaccines. The latest effort is above and beyond the \$1.3 billion already committed to expanding vaccine access around the world.

### **[New antibody treatment for Omicron mutations](#)**

Tests done in-vitro against a pseudo-virus that recreates a synthesized version of Omicron showed that sotrovimab (a GlaxoSmithKline antibody) stands up to all mutations in the spike protein of the variant and not just the key mutations. The tests included all 37 mutations identified to-date in the spike protein. This suggests that GlaxoSmithKline’s new antibody treatment is effective against the full combination of mutations in the new variant, though invivo human trials must be done to prove this. The drug could reduce the risk of hospitalization and death in people with mild to moderate COVID by 79 per cent, and has been approved by UK regulators.

### **[A new rapid and inexpensive PCR method to detect SARS-CoV-2 Omicron variant](#)**

Israeli researchers have used four different RT-qPCR assays to carry out a quick identification of the new Omicron variant (B.1.1.529) of Covid-19, which has a large number of mutations. The assays do this by amplifying and then binding to characteristic mutations in this variant, namely, in the non-structural protein nsp6, the viral spike, and the nucleocapsid genes. Not only are these assays simple to perform, but they are also suitable for multiplexing with a little adjustment and can be used to detect the presence of the Omicron variant in routine test samples. The assays were tested against the earliest Omicron samples in Israel and compared against the Delta variant which was, at that time, the only strain of SARS-CoV-2 in circulation in Israel. A few Alpha- and wild-type strains were also used to test for specificity of assay performance. The four assays are ideal for rapidly identifying the presence of the Omicron variant in a simple and cost-effective manner compared to genome sequencing. They can make up

part of a scalable rapid protocol with the selected mutations providing highly accurate identification of this variant.

### **Two common compounds reduce COVID-19 virus replication**

Researchers from the University of Florida have found in preliminary tests that a pair of over-the-counter compounds can inhibit the virus that causes COVID-19. The combination includes diphenhydramine, an antihistamine used for allergy symptoms. When paired with lactoferrin, a protein found in cow and human milk, the compounds were found to hinder the SARS-CoV-2 virus during tests in monkey cells and human lung cells. The type of lactoferrin used in the research differs slightly from the type that is commonly available to consumers. In lab tests on human and monkey cells, the combination was particularly potent: Individually, the two compounds each inhibited SARS-CoV-2 virus replication by about 30 per cent. Together, they reduced virus replication by 99 per cent. The findings are a first step in developing a formulation that could be used to accelerate COVID-19 recovery.

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

### **FIND and CSIR-IGIB partner to strengthen genomic surveillance of Coronavirus**

FIND, the global alliance for diagnostics, has partnered with CSIR-IGIB (Institute of Genomics and Integrated Biology), New Delhi to decentralize genomic surveillance of SARS-CoV-2, down to the district level by setting up MicroLabs that enable sequencing, analysis and interpretation of sequencing data with minimal turnaround time and infrastructure limited settings. It will provide strategic guidance to incorporate next-generation sequencing into broader national disease surveillance frameworks and inform data analyses, management and sharing based on global data policies and guidelines. It will provide a platform for knowledge-sharing and lessons learnt to inform national capacity-building efforts and policy guidance.

### **ICMR-NIV develops rapid RT-LAMP Covid test kit**

National Institute of Virology (ICMR-NIV), Mumbai researchers have developed a cost-effective and rapid Covid-19 testing kit that gives results of the swab samples tested in 30-40 minutes. The team worked on developing the cost-effective and time-saving 'RT LAMP' technology for sensitive, cost-effective and rapid diagnosis of Covid-19. With this novel colorimetric isothermal amplification testing kit, it can also detect the latest variant of Covid-19, Omicron. Clinical samples have been tested using the RT LAMP kit and the results match the real time PCR with a diagnostic sensitivity of 100 per cent and specificity of 100 per cent.

## **INDIA – SCIENCE & TECHNOLOGY**

### **Durable superhydrophobic coatings for stainless steel**

Indian researchers have developed superhydrophobic coatings that can improve stainless steel's corrosion resistance, making it usable in marine applications, pipelines, power generation, and nuclear sectors. Researchers at the International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) investigated the durability of their superhydrophobic coatings on SS 304 — the stainless steel used in marine devices, machinery, electronic parts, piping, power equipment and the nuclear sector, due to its excellent workability and cost-effectiveness. It was observed that the developed coatings were able to withstand 100 cycles of abrasion testing. These coatings also exhibited superior corrosion resistance, which can help overcome the

problems encountered by SS 304 in harsh and contaminated environments such as marine and gas pipelines, including surface ageing and corrosion.

### **Technology development hub opened**

Union minister of state for science and technology Dr Jitendra Singh inaugurated a common research and technology development hub (CRTDH) at the CSIR- Institute of Minerals and Materials Technology (IMMT) Bhubaneswar. CRTDH will provide technological solutions to entrepreneurs, to mentor entrepreneurs/startups and facilitate incubation of startups, and to nurture and promote innovations in MSMEs and provide them knowledge-based support in the areas of new materials and chemical processes.

### **Hydrogen Sulphide suppresses HIV infection**

Scientists from the Department of Microbiology and Cell Biology (MCB) have found that hydrogen sulphide (H<sub>2</sub>S) is effective in suppressing the HIV virus. Reactivation and replication along with other beneficial effects, such as maintenance of mitochondrial health and dissipation of oxidative stress were noticed in [cellular] models. This opens the door to supplementing cART with chemical donors of H<sub>2</sub>S to lock HIV in a state of deep latency, potentially improving the lives of millions infected with the virus. Since H<sub>2</sub>S donors are already undergoing clinical trials for other diseases, they can quickly be repurposed for HIV treatment.

### **Efforts towards active removal of space debris by ISRO**

The Indian Space Research Organisation (ISRO) has initiated research and development activities for the removal of debris left in orbit by space missions. ISRO follows the guidelines laid down by the United Nations as well as by the Inter-Agency Space Debris Coordination Committee for space debris mitigation. The guidelines include post-mission disposal of satellites and rocket bodies efficiently to ensure the space debris produced by India does not stay in orbit.

### **Flight test of Vertical Launch Short Range Surface to Air Missile**

Vertical Launch Short Range Surface to Air Missile was successfully flight tested today by Defence Research & Development Organisation (DRDO) off the coast of Odisha. The launch was conducted from a vertical launcher against an electronic target at a very low altitude. The flight path of the vehicle along with health parameters were monitored using a number of tracking instruments. All sub-systems performed as per expectation. This launcher is part of the weapon system for Indian Naval Ships and will further enhance defence capability of Indian Naval Ships against aerial threats.

### **ISRO to inform about rising sea-level in Indian Ocean region**

The Indian Space and Research Organisation (ISRO) will provide near real-time prediction of storm surge and surge induced inundation for the Indian coast during cyclones using satellite observations and numerical models. ISRO is gearing up to provide such information to some of the Small Island Developing States (SIDS) in the Indian Ocean Region, under an initiative, Infrastructure for Resilient Island States (IRIS).

### **IISER Bhopal unveils Turmeric genome**

A team of IISER Bhopal researchers have sequenced the genome of the turmeric plant for the first time in the world. The researchers have used two techniques: the short-read

sequencing of 10x Genomics (Chromium) and long-read Oxford Nanopore sequencing to unravel the genetic makeup of turmeric. The IISER sequencing and analysis have also confirmed the triploid genetic makeup of turmeric. The researchers performed comparative evolutionary analysis across 17 plant species which showed the evolution of various genes. To survive under environmental stress conditions, the turmeric plant has developed unique genetic pathways for synthesis of secondary metabolites such as curcuminoids for its own survival

### **Indigenous Stand-Off Anti-Tank Missile**

Defence Research and Development Organisation (DRDO) and Indian Air Force (IAF) flight-tested the indigenously designed and developed Helicopter launched Stand-off Anti-tank (SANT) Missile on December 11, 2021. The flight-test was successful in meeting all its mission objectives. The release mechanism, advanced guidance and tracking algorithms, all avionics with integrated software, performed satisfactorily and tracking systems monitored all mission events. The missile is equipped with a state-of-the-art MMW seeker which provides high precision strike capability from a safe distance. The weapon can neutralize targets in a range up to 10 kms.

### **One Health Consortium launched**

The Department of Biotechnology has launched a One Health Consortium to study the prevalence of ten selected zoonotic diseases (throughout the country) and five trans-boundary animal diseases (mainly from northeast boundary states) and analyze risks so as to provide forewarning to stakeholders. The consortium will initiate cross-cutting collaborations between animal, human and wildlife health professionals and establish a network of laboratories at centralized and field level, estimation of prevalence and burden of selected diseases, detection of pathogens by serological (antigen) or molecular tests especially in clinical cases and modelling of data for disease forecasting as well as risk assessment.

### **\$30 billion Programme for development of semiconductors in India**

The Indian government has approved a comprehensive program for the development of semiconductor and display ecosystem in the country by providing a globally competitive incentive package to companies. The programme aims to provide attractive incentive support to companies / consortia that are engaged in targets Silicon Semiconductor Fabs, Display Fabs, Compound Semiconductors / Silicon Photonics / Sensors (including MEMS) Fabs, Semiconductor Packaging (ATMP / OSAT), Semiconductor Design. The incentives include fiscal support for projects. An India Semiconductor Mission will be set up led by global experts and will act as the nodal agency for development of the Semiconductors and Display ecosystem. The government plans to spend \$ 30 billion to position India as global hub for electronics manufacturing with semiconductors as the foundation.

## **IN BRIEF**

### **A novel protein therapy for efficient skin wound healing**

Researchers from Singapore have found a protein named Agrin which promotes wound healing and repair, when it is triggered after skin tissue is injured. These findings could pave the way for the development of Agrin protein therapy to accelerate skin tissue healing for chronic wounds from diabetes or burns. During injury, a major chunk of extracellular matrix (ECM)—which helps to rebuild tissue—is lost, therefore delaying wound healing. As such, the timely replenishment of key ECM proteins may accelerate

wound healing. The researchers have shown that timely induction or exogenous supplementation of Agrin, an ECM protein, may promote accelerated healing of injured skin tissues. Using both human and pre-clinical models, they found that physical injury to the skin tissue enhanced the expression of Agrin, which preserves the mechanical architecture of injured skin layers by repairing the skin tissue. The team also discovered that a recombinant fragment of Agrin that can be easily produced, sAgrin, may serve as a bio-additive material to improve healing when applied as a topical hydrogel to the injured skin. These findings would advance the development of Agrin-based wound healing biomaterials that could help patients with chronic wounds.

### **Lithium conducting polymeric materials for battery anodes**

Researchers at the University of Arkansas have developed a novel lithium-containing crosslinked polymeric material, LiGL (GL = glycerol). This LiGL polymeric film exhibits exceptional properties and can effectively protect Li metal anodes from dendritic growth and realize Li electrodes' long-term stable cyclability. These polymeric films, precisely synthesized via molecular layer deposition (MLD), have better protection effects and thereby better performance of Li metal anodes. The test results are very promising and the MLD LiGL technology may have paved a technical pathway for addressing the issues of Li anodes and improved Lithium batteries.

### **Perovskite solar cells with higher efficiency**

Researchers from Italy and Germany have developed a novel method to significantly improve the efficiency of perovskite solar cells. The method is based on a modification of the interfaces of the perovskite active layer by introducing small amounts of organic halide salts. Using this approach, the team has achieved a power conversion efficiency of 23.7 per cent -- the highest reported to date for an inverted architecture perovskite solar cell. The improvement in performance is accompanied by an increase in device stability, making this a promising development. The devices can be fabricated at low temperatures of less than 100° C and with large areas.

### **Wood-based conductors could make Li-ion batteries safer**

Researchers at Brown University and the University of Maryland have found a new wood-based material that conducts ions 10–100 times better than other polymers. It could find use in next-generation solid-state lithium-ion batteries. The material, which was fabricated by combines copper and cellulose nanofibrils and could be used in an all-solid-state battery. The new material allows the normally ion-insulating cellulose to rapidly transport lithium ions along the direction of the polymer chains thanks to the copper opening molecular channels in the polymer. As well as its high lithium-ion conductivity the new material is thin and flexible, and operates over a wide range of voltages of 0.2 to 4.5 V. The researchers say that their approach could be extended to other polymers and metal cations.

### **mRNA Flu vaccine gets positive phase 1 trial results**

US biotech company Moderna has announced promising data from an early-stage human trial of its mRNA flu shot, based on the same technology used in its successful COVID-19 vaccine. The experimental flu shot was found to be safe, and successfully evoked high levels of antibodies in 180 people at all dosage levels, in both younger and older adults. The majority of current flu vaccines have efficacy of about 40 to 60 percent. It is hoped that mRNA technology can accelerate immunization development and production, and heighten efficacy. Several mRNA molecules that encode for

different strains can also be delivered in the same shot, a more efficient vaccination method that could lessen the load on public health systems. Moderna's experimental flu shot is "quadrivalent", covering four strains of flu: A/H1N1, A/H3N2, B/Yamagata and B/Victoria – selected based on recommendations by the World Health Organization.

### [New source of greenhouse gas emissions in the Siberian permafrost](#)

Researchers from Finland have discovered a massive new source of nitrous oxide (N<sub>2</sub>O), an abundant type of permafrost called Yedoma, rich in organic material, stretching over more than a million square kilometers of land in the Northern Hemisphere. They found that as permafrost melts along the rivers in northern Siberia, it releases between 10 and 100 times the amount of nitrous oxide that would typically be expected from permafrost thaw. Nitrous oxide is less abundant than carbon dioxide and methane in the atmosphere, but its global warming potential is 300 times stronger than carbon dioxide over a 100-year period. The same conditions as in Siberia can be found in many other places, raising concerns. The rapid nitrogen release from thawing permafrost can substantially improve the availability of nitrogen in Arctic ecosystems, with direct impact on climate change and on carbon fixation by plants and eutrophication of water systems.

## RESOURCES AND EVENTS

### [World Health Assembly agrees on pandemic prevention, preparedness and response](#)

In a consensus decision the World Health Assembly agreed to start a global process to draft and negotiate a convention, agreement or other international instrument to strengthen pandemic prevention, preparedness and response. The Health Assembly met in a Special Session on 29 November - 1 December, and [adopted a sole decision](#) which establishes an intergovernmental negotiating body (INB) to draft and negotiate a WHO convention, agreement, or other international instrument on pandemic prevention, preparedness and response, with a view to adoption under Article 19 of the WHO Constitution, or other provisions of the Constitution as may be deemed appropriate by the INB. The INB will hold its first meeting by 1 March 2022 (to agree on ways of working and timelines) and its second by 1 August 2022 (to discuss progress on a working draft). It will also hold public hearings to inform its deliberations; deliver a progress report to the 76th World Health Assembly in 2023 and submit its outcome for consideration by the 77th World Health Assembly in 2024.

### [India Russia Leaders' Summit](#)

The 21st summit of leaders of India and Russia was held on 6 December. Both sides agreed to strengthen cooperation in key science and technology areas such as steel making, energy, civil nuclear energy, space, defence technology, etc. They welcomed the Roadmap for Science, Technology & Innovation Cooperation and launching of India-Russia Technology Assessment and Accelerated Commercialization Program which gives opportunities to Start-ups and SMES of the two countries to address societal challenges through innovative technologies. They agreed to facilitate collaboration in development of software products, platforms and services, electronics manufacturing, and digital technologies, including those related to information protection, security of critical infrastructure and law enforcement between the two countries.

### **[India-EU strengthen cooperation in climate and clean energy](#)**

India and the EU agreed to a detailed working plan until 2023 at the EU India Energy Panel meeting, and also agreed to implement the 2016 EU-India Clean Energy and Climate Partnership. The focus of the new working plan is on strengthened cooperation in the area of grid integration, energy efficiency, renewable energy, and finance. Increased cooperation in energy efficiency will cover areas like floating solar, cold chain, and sustainable financing, thermal solar and offshore wind. It was agreed to hold an India-EU offshore wind summit, set up an India-EU High Level Platform on Smart Grid Replication, the India-EU Hydrogen Forum, and an India-EU Financing Investment in Clean Energy Platform, and increase collaboration within International Solar Alliance (ISA).

## **SCIENCE POLICY AND DIPLOMACY**

### **[SCO member countries discuss action plan on S&T Cooperation](#)**

Experts from the areas of Science and Technology from the member countries of Shanghai Cooperation Organisation (SCO) discussed priority areas for the formulation of a draft action plan on Scientific and Technological Cooperation in Priority Areas for the year 2022-2025 at the expert meeting of the SCO Member States. All the member countries agreed to the Draft Action Plan on Scientific and Technological Cooperation for the year 2022-2025, which identified 4 priority areas as Emerging Medical/Biotechnology, Electronics, Energy, Modern Technologies for Precision Agriculture. The Expert Group discussed the implementation status of decisions of the 5th Meeting of the Heads of the Ministries and Agencies of Science and Technology of the Member States of SCO. They also coordinated the draft Action Plan in Priority Areas and agreed that the Technology Networks of priority areas in the SCO region are important to bridge the gap between all forms of research and the humanitarian service sector. During the meeting, the parties agreed to hold the 6th Meeting of Heads of the Ministries and Agencies of Science and Technology of the SCO Member States in April 2022.

### **[Measures for the protection of the environment in the Mediterranean](#)**

The Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Protocols concluded their 22nd meeting (COP 22, Antalya, Turkey, 7-10 December 2021) with a package of action-oriented decisions to protect the Mediterranean marine and coastal environment and bolster sustainable development. COP 22 adopted a decision on an Emission Control Area for Sulphur Oxides to cut these harmful emissions. On biodiversity, COP 22 adopted a Strategic Action Programme and a Post-2020 Regional Strategy. A number of measures on green recovery were agreed. The Antalya Declaration was adopted calling for a "Blue Mediterranean".

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## **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)

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