



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

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### **Launch of Coalition for Disaster-Resilient Infrastructure (CDRI)**

The Coalition for Disaster-Resilient Infrastructure (CDRI) was launched by the Prime Minister of India, Shri Narendra Modi, at the UN Secretary-General's Climate Action Summit in New York, US. The alliance will be monitored by a secretariat in Delhi, supported by the UN Office for Disaster Risk Reduction (UNDRR), to enable knowledge exchange, technical support and capacity building. CDRI aims to rapidly expand the development of resilient infrastructure, retrofit existing infrastructure for resilience, as well as to enable a measurable reduction in infrastructure losses. There are 12 founding members of CDRI: Australia, Bhutan, Fiji, Indonesia, Italy, Japan, Maldives, Mexico, Mongolia, Rwanda, Sri Lanka and the UK. The platform is bringing together developed and developing countries to build synergies for achieving the goal of disaster-resilient infrastructure.

### **New initiative to drive industry transition to low-carbon economy**

A new initiative was launched on 23rd September at the UN Climate Action Summit to guide the greenhouse gas emitting industries toward a low-carbon economy. India and Sweden together with Argentina, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, South Korea and the UK, as well as a group of companies including Dalmia Cement, DSM, Heathrow Airport, LKAB, Mahindra Group, Royal Schiphol Group, Scania, SpiceJet, SSAB, ThyssenKrupp and Vattenfall, announced a new leadership Group for Industry Transition that will drive transformation in hard-to-decarbonize and energy-intensive sectors. This global initiative will be supported by the World Economic Forum, the Energy Transitions Commission, Mission Innovation, Stockholm Environment Institute, and the European Climate Foundation among many others. It is a public-private effort, to ensure that heavy industries and mobility companies can find a conducive pathway to deliver as per the mandates of the Paris Agreement. It is a significant move as industry sector emissions, including those from hard-to-abate and energy-intensive sectors like steel, cement, aluminium, aviation and shipping are expected to be responsible for 15.7Gt by 2050.

### **Water-saving crop irrigation sensor developed**

Researchers at the environmental, mechanical, and chemical departments of the University of Connecticut engineered a soil moisture sensor that is cost effective than any available sensor and responds to the global need to regulate water consumption in agriculture. Designed and tested on the university's farm, the sensors are small in size to insert into the soil with ease and involve low cost to manufacture. Current sensors are priced between \$100 and \$1,000 each, while the one developed at UConn costs \$2, as stated by the researchers. In the UConn prototype, wires are connected from the sensors to an instrument that logs data. Researchers conducted field tests of the sensors -- performing side-by-side tests with commercial sensors under various environmental conditions throughout a 10-month period. The effects of the environmental variations on soil moisture throughout the period were clearly reflected. They are expected to save nearly 35% of water consumption. Critically, the small sensors can also be easily exported around the

world given the fact that soil moisture plays a fundamental role in agricultural decision-making, globally. Accurate soil moisture sensing is essential to ensure a water level that produces the most robust crops while not wasting the natural resource. The UConn researchers are also working on a nitrogen sensor that is the same model of the water sensors. It would help provide farmers with information on when fields need fertilizing. Currently, nitrogen sensors are not available using this type of technology.

## INDIA

### [India's efforts towards addressing climate change challenges](#)

Prime Minister Shri Narendra Modi addressed the Climate Action Summit's opening ceremony organized by the UN Secretary General on the sidelines of the UN General Assembly. He asserted that more effort is required to overcome a challenges of climate change and called for a global people's movement to bring about behavioural change, including respect for nature, judicious use of resources, reduce our needs and live within our means, which have been important aspects of both our traditions and present day efforts At present, India is striving to present a practical approach and a roadmap in this context, with the pledge to increase the share of non fossil fuel and by 2022, India's renewable energy capacity would be increased to much beyond 175 GW, and later till 450 GW. As stated by the prime minister, India plans to make the transport sector green through e-mobility and considerably increase the proportion of the biofuel blend in petrol and diesel. Efforts are being made to provide clean cooking gas to 150 million families in India. Some other efforts include The Jal Jeevan mission, launched for water conservation, rainwater harvesting and development of water resources, with a planned budget of approximately 50 billion dollars, to be spent in the next few years; the International Solar Alliance with participation from almost 80 countries and launch of the Coalition for Disaster Resilient Infrastructure. Also, on the occasion of India's Independence Day on 15th August, a people's movement to end the use of single use plastic was called for.

### [NHSRC designated as a WHO Collaborating Centre](#)

The National Health Systems Resource Centre (NHSRC), has been designated as the WHO Collaborating Centre for Priority Medical Devices and Health Technology Policy. The NHSRC will draw up technical specifications for technologies procured under National Health Mission, draft policies for medical device maintenance and management, undertake evaluations of health product innovations, conduct Health Technology Assessments (HTA), and support the Ministry of Health and Family Welfare on issues related to diagnostics initiative, National Dialysis Program and other technology intensive services. At present, NHSRC works on development of technical specification of Blood pressure measuring devices, In vitro diagnostics and devices for cancer and cardiovascular diseases. Future collaboration includes work on International Classification and Nomenclature for Medical Devices, which would improve access to affordable health technologies.

### [Private sector steps up to channelise CSR fund into research](#)

Companies such as Larson & Toubro, Schneider Electric India, Dabur and ITC are looking at funding key research activities in top institutions, in the wake of the government's decision

to expand the scope of mandatory corporate social responsibility (CSR) spending. Last month the government had allowed CSR spending on publicly funded incubators and contribute to research in science, technology, medicine and engineering at major institutions to help boost R&D investments in the country. Some of the companies were already engaged in such alliances; for example, the engineering company L & T has existing collaborations with Defence Research and Development Organisation (DRDO), Department of Atomic Energy (DAE), Indian Space Research Organisation (ISRO), Council of Scientific and Industrial Research (CSIR) and some Indian Institutes of Technology (IITs). Academic and research institutions, are drawing up plans to tap CSR investment from India Inc, to fund research in technology and innovation. Universities are aiming towards industry-academia alliances not just for funds, but also for targeted scientific collaborations in areas relevant to industry. Inclusion of R&D under CSR is seen as a great step as more people will be benefited out of the research outcomes and will also enhance industry-academia relationships.

#### **[Launch of satellite-based advisory service for deep sea fishermen](#)**

The Indian National Centre for Ocean Information Services (INCOIS) and Airport Authority of India launched a new system that expands the scope for disseminating alerts and other messages to fishermen who go for multi-day fishing inside the seas. At present, fishermen get advisories, forecasts and early warnings only up to a distance of 10 to 12 km from the coast. The new service will extend the range up to 90 km. It consists of a specially designed device and a mobile application and works by using the communication opportunity provided by GAGAN (GPS-Aided Geo Augmented Navigation) satellite system of the Indian Space Research Organization (ISRO) and Airports Authority of India. GAGAN consists of three geosynchronous satellites - GSAT-8, GSAT-10 and GSAT-15 and its footprints cover the entire Indian Ocean round the clock. Under the service, alerts and other messages would be sent through a mobile phone which would decode and display the information in nine languages. The technology for the device has been transferred to a Bengaluru-based company named, Acord. The device has been named GEMINI (GAGAN Enabled Mariner's Instrument for Navigation and Information).

### **IN BRIEF**

#### **[Technique developed to improve improve ductility of ceramic materials](#)**

Purdue University researchers have developed a new process to help overcome the brittle nature of ceramics and make it more ductile and durable. The Purdue team calls the process "flash sintering," which adds an electric field to the conventional sintering process used to form bulk components from ceramics. Even at room temperatures, ceramics sintered with the electric field surprisingly deform, before being fractured when compressed at high strain. The research showed that applying an electric field to the formation of ceramics makes the material easily reshaped as metal at room temperature. This could open the door for using many different ceramics in defense operations, automobile manufacturing, nuclear reactor components and sustainable energy devices.

#### **[Start-up develops AI Sensors sheet to detect heart disorders and stress ailment](#)**

A team of IIT Mumbai graduates has developed an artificial intelligence (AI) powered

sensor sheet that can be put under the mattress to detect indicators such as heart health, respiration, sleep, as well as stress with medical grade accuracy; it has been priced at INR 7,200. The device works on a technology known as BallistoCardioGraphy (BCG), which involves measurement of the movement of heart. BCG can be extended to find movement, breathing and snoring. The Dozee sensor sheet when placed beneath the mattress under the chest of the user, captures micro-vibrations produced by the body every time the heart pumps blood, in addition to detecting inhalation, exhalation, muscle twitches, tremors or body movements. These signals are then precisely converted into bio-markers by sophisticated AI algorithms. It also alerts users, caretakers and the doctors to set up custom alerts for conditions such as arrhythmia, apnea.

### **India's Road Ministry to Utilise Plastic Waste**

Ministry of Road Transport & Highways has embarked upon a mission for utilising waste plastic. It has mobilised nearly 26 thousand people across the country for spreading awareness on plastic waste management. The Ministry is encouraging the use of waste plastic in highway construction, especially on National Highways within 50 km periphery of urban areas that have a population of 500,000 or more. A stretch of road has recently been constructed using waste plastic on NH-48 near Delhi. A portion of Delhi- Meerut expressway and Gurugram-Sohna road have also been planned for construction, using plastic waste. Plastic waste has already been used in wearing courses of National Highways construction on the pilot basis in the states of Tamil Nadu and Kerala. The technology used is in compliance with the guidelines of Indian Roads Congress for the use of waste plastic in Hot Bituminous Mixes to wear courses. It is estimated that construction of 1 kilometre of 4-lane highway can help in disposal of approximately 7 tonnes of waste plastic.

### **Discovery in gallium nitride to enable energy efficient electronics**

Gallium nitride, a semiconductor that revolutionized energy-efficient LED lighting, could also transform electronics and wireless communication, as per the discovery made by researchers at Cornell University. In recent years, search for alternatives to silicon has led to lab-grown compound semiconductor materials: group III-nitrides. Gallium nitride (GaN) and aluminum nitride (AlN); their alloys have a wider bandgap, allowing them to withstand greater voltages and higher frequencies for faster, more efficient energy transmission. Rather than using impurities, they stacked a thin GaN crystal layer, called a quantum well, atop an AlN crystal, and the difference in their crystal structures was found to generate a high density of mobile holes. Compared with magnesium-doping, the researchers discovered that the resulting 2D hole gas makes the GaN structures almost 10 times more conductive. Using the new material structure, some of the most efficient p-type GaN transistors were demonstrated in a collaborative project with Intel. A patent application has been filed. This could open up new possibilities in high-power switching, 5G cellular technology and energy efficient electronics, including phone and laptop chargers.

### **Highly sensitive diode developed to convert microwaves into electricity**

The Japan Science and Technology Agency (JST), Fujitsu Limited, and the Tokyo Metropolitan University, jointly announced the development of a highly sensitive rectifying element in the form of a nanowire backward diode, which can convert low-power microwaves into electricity. The new technology is expected to play a role in harvesting energy from radio waves in the environment, in which electricity is generated from ambient radio waves, such as those emitted from mobile phone base stations. The researchers reduced the capacity of and miniaturized a backward diode that is capable of steep rectification operations with zero bias. They were able to form a sub-micron sized diode, and thereby succeeded, for the first time in the world, in developing a nanowire backward diode with over 10 times the sensitivity of conventional Schottky barrier diodes. The technology can be used as a source of power for sensors for various applications..

### **Private sector collaborates to produce electricity from Biogas**

US-based firms Bloom Energy and EnergyPower announced a joint effort to deploy an integrated solution for supplying clean, reliable power generated from municipal and agri waste to local Indian businesses. EnergyPower will be deploying a new agricultural and municipal waste digester combined with Bloom Energy's solid oxide fuel cell technology to deliver reliable, renewable power to customers in the Shirala district, Maharashtra. Anaerobic digesters will be used to breakdown and clean bio-waste to produce bio methane, which will fuel Bloom Energy Servers. Bloom Energy plans to install and operate 4 MW of Bloom Energy Servers at the plant in Shirala, Maharashtra in the first half of 2020. Bloom Energy's solid oxide fuel cell is the world's highest efficiency electric generating device. Bloom Energy Servers can use natural gas, biogas, or hydrogen as fuel, and produce power without combustion through an electrochemical process that generates virtually no smog-forming emissions.

### **Engineers develop thin, lightweight lens**

University of Utah electrical and computer engineering researchers have developed a new kind of optical lens that is much thinner and lighter than conventional camera lenses that works with night imaging, which can be used in drones as well as night vision cameras for soldiers. While conventional lenses for smartphone cameras are a couple of millimetres thick, the new lens is only a few microns thick, or a thousand times thinner than regular lenses. A conventional curved lens takes light that bounces off an object and bends it before it ultimately reaches the camera sensor that forms the digital picture. However, this lens has many microstructures, each bending the light in the correct direction at the sensor. The team has developed a fabrication process with a new type of polymer along with algorithms that can calculate the geometry of these microstructures. The result is a lens that is flat instead of curved and more than 20 times thinner than a human hair with the added capability of being used in thermal imaging to see objects in the dark. This technology would allow lighter military drones to fly longer for night missions or to map forest fires or look for victims of natural disasters. And soldiers in the field could carry much lighter night vision cameras for longer durations. This new lens could also be cheaper to manufacture because the design

allows them to create them out of plastic instead of glass.

## RESOURCES AND EVENTS

### **WEF publishes Global Competitiveness Index Report 2019**

As per the annual Global Competitiveness Index, compiled by Geneva-based World Economic Forum (WEF), Singapore has replaced the US as the world's most competitive economy. India has moved down 10 places to rank 68th (from 58th) largely due to improvements witnessed by several other economies. The country is ranked high at 15th place in terms of corporate governance, while it is ranked second globally for shareholder governance. In terms of the market size, India is ranked third, while it has got the same rank for renewable energy regulation. Besides, India also punches above its development status when it comes to innovation, which is well ahead of most emerging economies and on par with several advanced economies, as per the report. The major shortcomings are in some of the basic enablers of competitiveness, the WEF said, are limited ICT (information, communications and technology) adoption, poor health conditions and low healthy life expectancy. India needs to grow its skills base, while its product market efficiency is undermined by a lack of trade openness and the labour market is characterised by a lack of worker rights' protections, insufficiently developed active labour market policies and critically low participation of women. With a ratio of female workers to male workers of 0.26, India has been ranked very low at 128th place. India is also ranked low at 118th in terms of meritocracy and incentivisation and at 107th place for skills. In the overall ranking, India is followed by some of its neighbours including Sri Lanka at 84th place, Bangladesh at 105th, Nepal at 108th and Pakistan at 110th place. The Global Competitiveness Index (GCI), which was launched in 1979, maps the competitiveness landscape of 141 economies through 103 indicators organised into 12 pillars. The report showed that several economies with strong innovation capability like Korea, Japan and France, or increasing capability, like China, India and Brazil, must improve their talent base and the functioning of their labour markets. The report can be accessed at [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2019.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf).

### **ITEC Programme on 'Science Diplomacy' in January 2020**

RIS will be conducting the fifth 2-week long capacity-building programme on 'Science Diplomacy' under the Indian Technical & Economic Cooperation (ITEC) Programme supported by the Ministry of External Affairs, Government of India, from 6-17 January 2020. Details are available at [https://www.itecgoi.in/courses\\_listinst.php?salt6=fb342234b799&salt9=edfba6076c&salt3=bd9a232b262019-2020](https://www.itecgoi.in/courses_listinst.php?salt6=fb342234b799&salt9=edfba6076c&salt3=bd9a232b262019-2020). Online registration for course would commence on ITEC website [www.itec.goj.in](http://www.itec.goj.in) sometime around mid-October 2019. Indian Missions in ITEC partner countries would facilitate the travel of selected candidates. Details of the previous year's programme, including eligibility, agenda, etc. are available at <http://ris.org.in/ris-itec-course-science-diplomacy-2019>.

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