

World's Sharpest Laser Created by Scientists Can Travel 2 Million Miles Before It Falts

Updated | The sharpest laser in the world has been created by scientists, with the light it emits able to travel 2 million miles before it goes out of sync.

This breakthrough has widespread applications, and it could be used for high-precision experiments to make atomic clocks more accurate, to collect better radio astronomy data and to test Einstein's theory of relativity.

The first laser was built in 1960. Since then they have captured the public imagination and have been prominent in popular culture—from James Bond to *Star Wars*. Lasers emit light through optical amplification—it is an acronym for “light amplification by stimulated emission of radiation.”

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Being able to focus a laser on a tight spot has numerous applications in science, and lasers now feature in many aspects of industry, medicine and information technology. For example, the discovery of gravitational waves (ripples in space-time predicted by Einstein 100 years ago) was made possible by beaming two lasers into space to detect tiny fluctuations in space-time.

It was once thought the first lasers to be developed would not require refining, but as the need for increasing accuracy grew, scientists and engineers had to develop more precise lasers.

Now, researchers from Germany and the U.S. have created the sharpest laser in the world.

Light from a laser ideally has one fixed frequency (or wavelength) and a linewidth—the width of the band of frequencies of radiation. But the linewidth of most lasers is too big to carry out high-precision experiments. As a result, scientists must find ways to develop lasers with greater frequency stability and a narrower linewidth.

In a study published in [Physical Review Letters](#), the team announced the development of a laser with a linewidth of just 10 megahertz.

Thomas Legero, from the Physikalisch-Technische Bundesanstalt in Germany, was one of the physicists involved in the research. “The smaller the linewidth of the laser, the more accurate the measurement of the atom's frequency in an optical clock,” [he said in a statement](#). “This new laser will enable us to decisively improve the quality of our clocks.”



The laser built by the team from the U.S. and Germany is the sharpest ever created. PTB As well as its small linewidth, the team also showed that the frequency of the light emitted from the

laser was more precise than anything achieved before. They found it only goes out of sync after 11 seconds of beaming it. This means the light has traveled 2 million miles—10 times the distance from Earth to the sun—before it went out of sync.

The American and German researchers are now using the lasers to improve optical atomic clocks, which could potentially be used to tell the time with unparalleled precision. At present, GPS devices, communication systems, power grids and financial networks rely on atomic clocks to synchronize. Optical atomic clocks are thought to be a far more accurate way of timekeeping, but creating them is extremely difficult.

“In the future,” Legero said, “it is planned to disseminate this light also within a European network. This plan would allow even more precise comparisons between the optical clocks in Braunschweig and the clocks of our European colleagues in Paris and London.”

They also plan to reduce the linewidth even further—and are aiming to get it below 1 MHz in the future.

This story has been updated with a correction to the opening sentence, which said the distance was 2 billion miles rather than 2 million miles.

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NASA developing first asteroid deflection mission

This file computer-generated handout image taken on May 15, 2015 and released by the European Space Agency (ESA) on May 15, 2015 shows the impact of the DART (Double Asteroid Redirection Test) projectile on the binary asteroid system (65803) Didymos observed by the AIM (Asteroid Impact Mission) satellite. | Photo Credit: [AFP/NASA IMAGES](#)

NASA is developing the first-ever mission that will deflect a near-Earth asteroid, and help test the systems that will allow mankind to protect the planet from potential cosmic body impacts in the future.

The Double Asteroid Redirection Test (DART) — which is being designed and would be built and managed by the John Hopkins Applied Physics Laboratory — is moving from concept development to preliminary design phase, the US space agency said.

“DART would be NASA’s first mission to demonstrate what’s known as the kinetic impactor technique — striking the asteroid to shift its orbit — to defend against a potential future asteroid impact,” said Lindley Johnson, planetary defense officer at NASA Headquarters in Washington.

“This approval step advances the project towards a historic test with a nonthreatening small asteroid,” said Johnson.

“DART is a critical step in demonstrating we can protect our planet from a future asteroid impact,” said Andy Cheng, who serves as the DART investigation co-lead.

“Since we don’t know that much about their internal structure or composition, we need to perform this experiment on a real asteroid,” Andy said.

“With DART, we can show how to protect Earth from an asteroid strike with a kinetic impactor by knocking the hazardous object into a different flight path that would not threaten the planet,” he said.

The target for DART is an asteroid that will have a distant approach to Earth in October 2022, and then again in 2024.

The asteroid is called Didymos — Greek for “twin” — because it is an asteroid binary system that consists of two bodies: Didymos A, about 780 metres in size, and a smaller asteroid orbiting it called Didymos B, about 160 metres in size.

DART would impact only the smaller of the two bodies, Didymos B.

The Didymos system has been closely studied since 2003.

The primary body is a rocky S-type object, with composition similar to that of many asteroids. The composition of its small companion, Didymos B, is unknown, but the size is typical of asteroids that could potentially create regional effects should they impact Earth.

After launch, DART would fly to Didymos and use an APL- developed onboard autonomous targeting system to aim itself at Didymos B.

Then the refrigerator-sized spacecraft would strike the smaller body at a speed about nine times faster than a bullet, about six kilometres per second.

Earth-based observatories would be able to see the impact and the resulting change in the orbit of Didymos B around Didymos A, allowing scientists to better determine the capabilities of kinetic impact as an asteroid mitigation strategy.

The kinetic impact technique works by changing the speed of a threatening asteroid by a small fraction of its total velocity, but by doing it well before the predicted impact so that this small nudge will add up over time to a big shift of the asteroid's path away from Earth.

A study of nearly 300 people living in different parts of India found that nine single-base variants (single-nucleotide polymorphisms or SNPs) account

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Rukmini: 'Rukmini' keeps eye on dancing 'dragon' at sea

NEW DELHI: With China increasing its naval presence in the [Indian Ocean Region](#) amid the ongoing Sikkim stand-off, the Indian Navy is keeping an eye on the 'dragon' with the help of its 'eye in the sky', Gsat-7, the Navy's own dedicated military satellite that was launched on September 29, 2013.

The 2,625-kg satellite, named 'Rukmini', has helped the Navy monitor the [Indian Ocean Region](#) (IOR) as it has a nearly 2,000 nautical mile 'footprint'. The multi-band communication-cum surveillance satellite, which is operating from the geo-stationary orbit (at 36,000km altitude), provides real-time inputs to naval warships, submarines and maritime aircraft and networking capabilities to its naval assets on the high seas.

With the help of the shore-based operational centres, 'Rukmini' (also called INSAT-4F) has not only helped the Navy keep an eye on both Arabian Sea and Bay of Bengal but also helped the force increase its communication and surveillance capabilities from Persian Gulf to Malacca Strait, which together is equivalent to almost 70% of the IOR.

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[Rukmini](#), which provides wide range of service spectrum from low bit rate voice to high bit rate data communication, has given the Navy an integrated platform and helped it overcome the limitation of 'line of sight' (the straight path of signal when unobstructed by the horizon). With the help of this 'eye in the sky', the Army, too, gets vital inputs about over-the-land movements.

Due to the absence of the advanced [GSLV](#) rocket with carrying capacity of 4-tonne class satellite in 2013, Indian Space Research Organisation (Isro) had to use the commercial services of Arianespace in French Guiana, Kourou, to launch Rs 185-crore Gsat-7. "The satellite, which operates in UHF, S, C and Ku bands, has an advanced Helix antenna," an [Isro](#) source said. The satellite, which has a payload power of 2000W, has a mission life of nine years.

Before Gsat-7 was launched, the navy, for warship communication, had to depend on Inmarsat, a major provider of global mobile satellite communications services. The desi satellite has reduced the Navy's dependence on foreign services for warship communication.

A second satellite of this kind, Gsat-7A, meant exclusively for the IAF, is currently being developed. "This satellite is due to be launched by year-end," the source said. Gsat-7A will enable the air force interlink different ground radar stations, ground airbase and airborne early warning and control (AWACS) aircraft such as Beriev A-50 Phalcon and DRDO AEW&CS. The satellite will also enhance network-centric warfare capabilities of the IAF and, therefore, enhance its global operations.

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Scheme for IPR Awareness – Creative India; Innovative India**Scheme for IPR Awareness – Creative India; Innovative India**

Taking forward the National Intellectual Property Rights (IPR) Policy 2016, a 'Scheme for IPR Awareness – Creative India; Innovative India' has been launched by Cell for IPR Promotion and Management (CIPAM) under the aegis of the Department of Industrial Policy and Promotion.

The Scheme aims at raising IPR awareness amongst students, youth, authors, artists, budding inventors and professionals to inspire them to create, innovate and protect their creations and inventions across India including Tier 1, Tier 2, Tier 3 cities as well as rural areas in the next 3 years.

The Scheme for IPR Awareness aims to conduct over 4000 IPR awareness workshops/seminars in academic institutions (schools and colleges) and the industry, including MSMEs and Startups, as also IP training and sensitization programmes for enforcement agencies and the judiciary.

Workshops will cover all vital IP topics including international filing procedures, promotion of Geographical Indications and highlighting the ill effects of piracy and counterfeiting.

The Scheme for IPR Awareness would be implemented through partner organizations to promote innovation and entrepreneurship, for which complete details can be viewed at <http://dipp.nic.in/whats-new/scheme-ipr-awareness>.

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122 countries adopt global treaty banning nuclear weapons

A global treaty banning nuclear weapons was adopted at the United Nations on Friday despite opposition from the United States, Britain, France and other nuclear powers that boycotted negotiations.

The treaty was adopted by a vote of 122 in favour with one country — NATO member The Netherlands voting against —while Singapore abstained.

Loud applause and cheers broke out in the UN conference hall following the vote that capped three weeks of negotiations on the text providing for a total ban on developing, stockpiling or threatening to use nuclear weapons.

Nuclear-armed states have dismissed the ban as unrealistic, arguing it will have no impact on reducing the global stockpile of 15,000 atomic weapons.

“Is there anyone that believes that North Korea would agree to a ban on nuclear weapons?” asked US Ambassador Nikki Haley when negotiations began in March. “There is nothing I want more for my family than a world with no nuclear weapons, but we have to be realistic.”

But supporters hailed a historic achievement.

“We have managed to sow the first seeds of a world free of nuclear weapons,” said Costa Rica’s ambassador, Elayne Whyte Gomez, the president of the UN conference that negotiated the treaty.

Led by Austria, Brazil, Mexico, South Africa and New Zealand, 141 countries joined in drafting the treaty that they hope will increase pressure on nuclear states to take disarmament more seriously.

None of the nine countries that possess nuclear weapons — the United States, Russia, Britain, China, France, India, Pakistan, North Korea and Israel — took part in the negotiations or the vote.

Even Japan — the only country to have suffered atomic attacks, in 1945 — boycotted the talks as did most NATO countries.

Nuclear powers argue their arsenals serve as a deterrent against a nuclear attack and say they remain committed to the nuclear Non-Proliferation Treaty (NPT).

The decades-old NPT seeks to prevent the spread of atomic weapons but also puts the onus on nuclear states to reduce their stockpiles.

Impatience however is growing among many non-nuclear states over the slow pace of disarmament as are worries that weapons of mass destruction will fall into the wrong hands.

Disarmament campaigners say the treaty will go a long way in increasing the stigma associated with nuclear weapons and will have an impact on public opinion.

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Sensor network to map and predict pollution in Godavari

The Ganga may be the focus of the government's river-cleaning efforts, but a group of U.S. researchers is working on a system to map undulating pollution trends in the Godavari, India's second longest river.

Using a mix of methods, including satellite-monitoring, traversing stretches of the river to collect water samples and using special sensors to measure bacterial and chemical pollution, the researchers are trying to develop a cost-effective forecast system.

The team's long-term objective is to be able to inform State officials and citizens of a probable spike in, say, levels of dangerous microbes or effluents, similar to weather and air pollution forecasts. That apart, said Anup Malani, Professor of the University of Chicago Law School, it is to be able to access "raw data" that could be used to inform the efficacy of a proposed faecal sludge treatment plant and whether behavioural interventions — including incentives or punishments — to restrict activities that pollute the river could actually work. "We've had debates with town planners who told us that all the pollution gets washed away... Is that true? We need to find out," Mr. Malani, who is also co-founder of the International Innovation Corps, told *The Hindu*. "That would help us know whether interventions are needed only up-river or along various stretches."

The project started eight months ago and has so far identified two "hotspots" of pollution, which Mr. Malani declined to reveal, saying he would first inform the Andhra Pradesh government about them. The sampling exercise, being done along a portion of the 1,400-km river spanning Rajamundhry (East Godavari district) and Kovvur, Narsapur and Palakol (all in West Godavari), measures parameters such as total dissolved salts, nitrate, pH, temperature, turbidity and electrical conductivity. These are relayed to a website called Thoreau, a wireless sensing network maintained at the University of Chicago to map environmental parameters, for analysis. Some river attributes such as microbial levels require to be measured in laboratories, though the team hopes eventually to be able to use low-cost sensors that measure them, too, in real time.

"Through cloud-based data collection and real-time mapping systems, the research and implementation teams intend to demonstrate the importance and value of detecting and anticipating pollutants that enter the river in the form of human waste, organic materials, and chemical contaminants," the University of Chicago research team said in a statement.

The exercise is part of a Bill and Melinda Gates Foundation project to support the programme of the Administrative Staff College of India (ASCI) to provide city-wide sanitation improvements in urban Andhra Pradesh. Sensors to monitor river pollution are an emerging technological approach in India.

In April, Ashutosh Sharma, Secretary, Department of Science and Technology (DST), said 40 proposals to make the sensors (to monitor river and environmental pollution) had come in, and two would be short-listed soon. Intel, which will make the chips powering the devices, and the DST will split a 35-crore investment.

Says BJP will campaign against corruption, law and order problems and lack of development work in Himachal Pradesh

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DIPP to set up India's first TISC in Punjab

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The Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce & Industry, Government of India, signed an Institutional agreement with the Punjab State Council of Science and Technology in New Delhi today to establish India's first Technology and Innovation Support Center (TISC) at Patent Information Centre, Punjab, under the World Intellectual Property Organization's (WIPO) TISC program.

The objective of the TISC is to stimulate a dynamic, vibrant and balanced Intellectual Property Rights (IPRs) system in India to foster creativity and innovation, thereby promoting entrepreneurship and enhancing social, economic and cultural development by establishing a network of TISCs in India.

WIPO's Technology and Innovation Support Center (TISC) program provides innovators in developing countries with access to locally based, high quality technology information and related services, helping them to exploit their innovative potential and to create, protect, and manage their Intellectual Property Rights (IPRs).

Services offered by TISCs include:

- Access to online patent and non-patent (scientific and technical) resources and IP-related publications;
- Assistance in searching and retrieving technology information;
- Training in database search;
- On-demand searches (novelty, state-of-the-art and infringement);
- Monitoring technology and competitors;
- Basic information on industrial property laws, management and strategy, and technology commercialization and marketing.

The Cell for IPR Promotion and Management (CIPAM) is designated as the National Focal Point for the TISC national network. As the national focal point, CIPAM shall identify potential host institutions, assess their capacities and support them in joining the TISC program. CIPAM will also act as the main intermediary between WIPO and TISC host institutions and coordinate all the activities of the national TISC network.

Over 500 TISCs operate worldwide and establishing TISC in India will give the host institutions an access to the global network. In upcoming years, CIPAM is planning to establish TISCs in Universities, State Science Councils, R&D institutions etc. TISC will give an impetus to knowledge sharing, sharing of best practices among the TISCs, capacity building, generation and commercialization of IPs.



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When DNA is the new hard drive

Stuff of sci-fi: A representation of a human hand, encoded into and then recalled from the DNA of a living cell. NYT

It was one of the very first motion pictures ever made: a galloping mare filmed in 1878 by British photographer Eadweard Muybridge, who was trying to learn whether horses in motion ever become truly airborne.

More than a century later, that clip has rejoined the cutting edge. It is now the first movie ever to be encoded in the DNA of a living cell, where it can be retrieved at will and multiplied indefinitely as the host divides and grows.

The advance, reported on Wednesday in the journal *Nature* by researchers at Harvard Medical School, is the latest and perhaps most astonishing example of the genome's potential as a vast storage device.

Scientists already have managed to translate all of Shakespeare's sonnets into DNA. George Church, a geneticist at Harvard and one of the authors of the new study, recently encoded his own book, *Regenesis*, into bacterial DNA and made 90 billion copies of it.

"A record for publication," he said in an interview.

Even stranger

With the new research, he and other scientists have begun to wonder if it may be possible one day to do something even stranger: to program bacteria to snuggle up to cells in the human body and to record what they are doing, in essence making a "movie" of each cell's life.

When something goes wrong, when a person gets ill, doctors might extract the bacteria and play back the record. It would be, said Mr. Church, analogous to the black boxes carried by airplanes whose data is used in the event of a crash.

At the moment, all that is "the other side of science fiction," said Ewan Birney, director of the European Bioinformatics Institute and a member of the group that put Shakespeare's sonnets in DNA. "Storing information in DNA is this side of science fiction."

Mr. Church and Seth Shipman, a geneticist, and their colleagues began by assigning each pixel in the black-and-white film a DNA code based on its shade of gray. The vast chains of DNA in each cell are made of just four molecules — adenine, guanine, thymine and cytosine — arranged in enormously varied configurations.

Gene editing technique

The geneticists ended up with a sequence of DNA molecules that represented the entirety of the film. Then they used a powerful new gene editing technique, Crispr, to slip this sequence into the genome of a common gut bacteria, *E. coli*.

Despite the modification, the bacteria thrived and multiplied. The film stored in the genome was preserved intact with each new generation of progeny, the team found.

Andrew Odlyzko, a mathematics professor and expert on digital technology at the University of

Minnesota who was not involved in the new research, called it “fascinating.”

Molecular biology

Imagine, he said, “the impossibility of controlling secrets, when those secrets are encoded in the genomes of the bacteria in our guts or on our skins.”

The renowned physicist Richard Feynman proposed half a century ago that DNA could be used for storage in this way. That was long before the molecular biology revolution, and decades before anyone could sequence DNA — much less edit it.

“Biology is not simply writing information; it is doing something about it,” Mr. Feynman said in a 1959 lecture.

“Consider the possibility that we too can make a thing very small which does what we want!”NYT

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US House passes bill on defence co-operation with India

American Congressman Ami Bera during an interview, in New Delhi. (File Photo) | Photo Credit: [Shanker Chakravarty](#)

The U.S National Defence Authorisation Act (NDAA) 2018 passed by the House of Representatives has mandated the Secretaries of Defence and State to come up with a strategy for advancing defence cooperation between India and the U.S in six months. The legislation that appropriates funds for defence will have to be passed by the Senate before it moves for the President's signature.

Indian American Representative Ami Bera, Vice-Ranking Member of the House Foreign Affairs Committee, moved the amendment on US-India defence cooperation. Last year's NDAA had designated India as a "major defence partner," and also had a similar provision for preparing a strategy, but the findings of the review has not been published yet. The term, 'major defence partner' remains undefined, but senior officials have explained that after the designation, India's request for arms and technology is treated with a presumption of approval now, as opposed to a presumption of denial that existed earlier.

"The United States is the world's oldest democracy and India is the world's largest democracy. It is vitally important to develop a strategy that advances defense cooperation between our two nations. I am grateful this amendment passed and look forward to the Defense Department's strategy that addresses critical issues like common security challenges, the role of partners and allies, and areas for collaboration in science and technology. Cooperation between the US and India enhances our own defense and our ability to meet the evolving security challenges of the 21st century," Mr. Bera said in a statement.

The bill passed by the House supports the massive hike in defence spending proposed by President Donald Trump, focussing on missile defence, adding more troops and ships, a 2.4 percent salary increase for soldiers. The bill, however, has several provisions that the Trump administration is not keen on. After the Senate passes its version of the bill, both will have to be reconciled.

The bill also asks the administration to pursue the communications interoperability and security memorandum of agreement and the basic exchange and cooperation agreement for geospatial cooperation, the foundational agreements on defence that the U.S is keen to sign with India.

A Bangladeshi auto-rickshaw driver is suing for damages after his phone number was used in a movie, leading to a barrage of calls from female fans

Nuclear disarmament campaign group ICAN won the Nobel Peace Prize on Friday for its efforts to consign the atomic bomb to history, firing off a

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Govt. panel to study cow derivatives

Harsh Vardhan.

The government has set up a 19-member panel, including three members linked to the RSS and VHP, to carry out what it says will be scientifically validated research on cow derivatives including its urine, and their benefits, according to an inter-departmental circular and members of the panel.

Headed by Science and Technology Minister Harsh Vardhan, the committee will select projects that can help scientifically validate the benefits of panchgavya — the concoction of cow dung, cow urine, milk, curd and ghee — in various spheres such as nutrition, health and agriculture, says the circular accessed by PTI.

Named the National Steering Committee, the panel includes secretaries of the departments of Science and Technology, Biotechnology, Ministry of New and Renewable Energy, and scientists from the Indian Institute of Technology (IIT), Delhi.

It also has three members of Vigyan Bharti and Go Vigyan Anusandhan Kendra, outfits affiliated to the RSS and VHP. The government circular says former CSIR Director R.A. Mashelkar, known for vigorously campaigning against U.S. patents on turmeric and basmati rice, is also a member of the panel. The others include IIT-Delhi director Prof. V. Ramgopal Rao and Prof. V.K. Vijay of the IIT's Centre for Rural Development and Technology.

The government has given the project the acronym SVAROP, which stands for Scientific Validation and Research on Panchagavya, and says it is a “national programme” that's being conducted by the Department of Science and Technology, Department of Biotechnology, and the Council for Scientific and Industrial Research (CSIR) of the Ministry of Science and Technology in collaboration with IIT-Delhi.

The document also says “this multi-disciplinary programme” will involve participation of other related ministries, government departments, academic institutions, research laboratories, voluntary organisations and others “to carry out research and development and also build capacities, and cover five thematic areas including scientific validation of uniqueness of indigenous cows.”

It will cover “scientific validation of ‘panchagavya’ for medicines and health, scientific validation of ‘panchagavya’ and its products for agriculture applications, scientific validation of ‘panchagavya’ for food and nutrition,” the circular says.

Vijay Bhatkar, president of the Delhi-based Vigyan Bharti, an RSS-affiliated science body, is the co-chairman of the committee.

Says BJP will campaign against corruption, law and order problems and lack of development work in Himachal Pradesh

The process of holding the requisite Board Meetings and Shareholder Meetings has been completed in phases in September 2017.

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GM mustard policy: SC gives govt. time

The government on Monday informed the Supreme Court that a policy decision on the commercial release of the Genetically Modified (GM) mustard crop is yet to be finalised.

The Centre said it was poring through the various suggestions on and objections to the commercial rollout of the GM crops.

A Bench, led by Chief Justice of India J.S. Khehar and Justice D.Y. Chandrachud, granted the government one week to report back on when the policy would be finalised. It said the policy should be good-intentioned and well-informed.

The court had on October 17, 2016, extended the stay on the commercial release of the GM mustard until further orders. It had asked the Centre to collect public opinion before the release.

The government had assured the court that there would be no commercial release of GM seeds till the views of the public were collected and placed before the appraisal committee.

Sowing without safety

The hearing was conducted on the basis of a petition filed by activist Aruna Rodrigues, who had alleged that the government was sowing GM seeds without the relevant tests.

Mustard is one of India's most important winter crops, sown between mid-October and late November.

Advocate Prashant Bhushan, appearing for Ms. Rodrigues, alleged the government was sowing the seeds in various fields and that the bio-safety dossier, which has to be made public by putting it on the website, had not yet been done.

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BITs and pieces of trade with Israel

Many pundits in India continue to gaze at the India-Israel relationship through the lens of Palestine. However, some argue that it is critical to de-hyphenate India's relations with Israel and Palestine, a process that began in 1992 when New Delhi established diplomatic relations with Tel Aviv and which has gathered steam since then. [Prime Minister Narendra Modi's visit to Israel](#) earlier this month made this de-hyphenation blatant and conspicuous.

Growing trade and investment relations are a strong reason to study India-Israel relations on their own merit. Bilateral merchandise trade increased from \$200 million in 1992 to around \$4 billion in 2016, an increase of 2,000% in 25 years. Cumulative foreign direct investment (FDI) inflows from Israel, from April 2000 to March 2017, stood at \$122 million. While these are low, constituting only 0.04% of total FDI inflows to India, there is enormous potential for Israeli investment in fields such as renewable energy and water management (drip irrigation and desalination). Defence production, which is at the heart of the 'Make in India' campaign, is another area with significant potential for Israeli investment, a move that will help India save billions of dollars it currently spends on importing weapons from Israel. Israel is the third largest supplier of arms to India after Russia and the U.S. Investment in defence production will also give a fillip to domestic manufacturing, reduce dependence on bureaucratic state-owned ordnance factories and bring in new technology — an example being the recently set up plant in Madhya Pradesh, between India's Punj Lloyd and Israel Weapon Industries, to manufacture small arms.

Boosting trade and investment ties found explicit mention in the India-Israel joint statement during Mr. Modi's visit. To encourage bilateral investments, Mr. Modi and his Israeli counterpart, Benjamin Netanyahu, also agreed to conduct negotiations on a bilateral investment treaty (BIT).

Is an India-Israel BIT possible? In 1996, India and Israel signed a BIT. However, this was reportedly terminated by India when it unilaterally discontinued 58 BITs recently. For a new BIT to be negotiated, both sides will have to start afresh. However, there are challenges given the many fundamental differences Israel and India have on BITs, as outlined in their Model BITs of 2003 and 2016, respectively. The first is on the investor-state dispute settlement (ISDS) provision that allows foreign investors to bring claims against a host state for alleged treaty breaches at international arbitral forums. Foreign investors prefer international arbitration — which is faster and independent — over litigating in domestic courts. The Israeli model gives an investor the choice to submit any investment dispute with a state to international arbitration if not resolved within six months through negotiations. The Indian model imposes many procedural and jurisdictional restrictions on an investor's right to bring an ISDS claim. These include a foreign investor having to litigate in domestic courts for five years before pursuing a claim under international law. These requirements make it very difficult for a foreign investor to make efficient use of the ISDS provision.

Bit of a bumpy ride

Second, Israel's model provides a broad asset-based definition of foreign investment that covers both FDI and portfolio investment. The Indian model of 2016 defines investment narrowly as an enterprise (with its assets) that has to possess certain characteristics of investment including the investment having 'significance for the development' — words not defined in the BIT — of the host country. Third, the Israeli model contains a broad most favoured nation (MFN) provision — a cornerstone of non-discrimination in international economic relations — which is missing in the Indian model. The absence of MFN, from Israel's perspective, would mean that its businesses would have no remedy under international law if India were to discriminate against it, say, by offering greater incentives to another defence manufacturer over an Israeli one.

Fourth, the Indian model excludes taxation altogether from the purview of the BIT. Thus, the foreign investor cannot bring an ISDS claim even if taxes imposed are confiscatory, discriminatory or unfair. However, in the Israeli model, taxation-related measures are recognised as an exception only to MFN and national treatment provisions. Foreign investors can still challenge taxation-related measures for violating other BIT provisions such as the fair and equitable treatment or expropriation. India's recent record in administering its taxation laws has made foreign investors jittery. The World Investment Report 2017 issued by the United Nations Conference on Trade and Development also points out that tax-related concerns are a deterrent for some foreign investors to invest in India. Thus, Israeli investors will not be comfortable if taxation is completely outside BIT's purview.

In sum, the Indian position on BITs is very pro-state, offering limited rights and protection to foreign investors. The Israeli position is the opposite. An India-Israel BIT looks difficult till both sides move away from their stated positions. Both sides should work towards having a BIT that reconciles investment protection with a state's right to regulate.

Prabhash Ranjan is an Assistant Professor of Law at South Asian University, New Delhi. The views expressed are personal

The new U.S. Fed Chairman is unlikely to opt for policies that might upset the President's plan

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India, Japan civil nuclear deal comes into force

S. Jaishankar | Photo Credit: [PTI](#)

The landmark India-Japan civil nuclear agreement came into force on Thursday. Foreign Secretary S. Jaishankar exchanged the diplomatic notes with the Japanese envoy to India to formalise the completion of the process.

“The India-Japan Agreement for Cooperation in the Peaceful Uses of Nuclear Energy entered into force on July 20, 2017 with the exchange of diplomatic notes between Dr. S. Jaishankar, Foreign Secretary and H.E. Mr. Kenji Hiramatsu, Ambassador of Japan to India,” said a statement from the Ministry of External Affairs.

The pact was signed in Tokyo during the visit of Prime Minister Narendra Modi to Japan on November 11, 2016.

“This Agreement is a reflection of the strategic partnership between India and Japan and will pave the way for enhanced cooperation in energy security and clean energy. It seeks to promote full cooperation between the two countries in the development and uses of nuclear energy for peaceful purposes on a stable, reliable and predictable basis,” said the statement.

The deal is essential for bringing a network of nuclear energy cooperation for India, especially with the U.S. as prominent American nuclear companies are owned by the Japanese nuclear majors like Toshiba.

Says BJP will campaign against corruption, law and order problems and lack of development work in Himachal Pradesh

The process of holding the requisite Board Meetings and Shareholder Meetings has been completed in phases in September 2017.

Ruben George is staying at Ram Nath Kovind's house at Kalyanpur, near Kanpur

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India to Host Global Conference on Cyber Space 2017 – World’s Largest Conference on Cyber Space

India to Host Global Conference on Cyber Space 2017 – World’s Largest Conference on Cyber Space

- *The GCCS is taking place outside OECD nations for the first time*
- *The theme for the GCCS 2017 is ‘**Cyber4All: An Inclusive, Sustainable, Developmental, Safe and Secure Cyberspace**’*
- *The conference to take place on 23rd & 24th of November 2017 in New Delhi*
- *Shri Narendra Modi, Hon’ble Prime Minister of India to Inaugurate the conference*

“India will be hosting the 5th **Global Conference on Cyber Space (GCCS) in 2017**, one of the world’s largest conference on Cyber Space and related issues” announced **Shri Ravi Shankar Prasad, Hon’ble Union Minister for Electronics & Information Technology and Law & Justice**, in the presence of Shri P.P. Chaudhary, Hon’ble Union Minister of State for Electronics and Information Technology and Law & Justice after chairing a High-Level Organizing Committee meeting here today.

GCCS 2017 to have:

- **Over 2000 delegates**
- **Representatives from more than 100 countries**
- **More than 50 Ministerial delegates**
- **4 sessions with keynote addresses by eminent speakers on themes of GCCS 2017**
- **12 Parallel discussions with other focused topics**
- **Participation of policy makers, industry, academia, civil society and think tanks**

Themed on **Cyber4All: An Inclusive, Sustainable, Developmental, Safe and Secure Cyberspace**, the GCCS 2017 will be inaugurated by the Hon’ble Prime Minister of India **Shri Narendra Modi**. To be held in India for the first time, the two-day conference will see participation of around 2000 delegates from senior Government officials, industry leaders, academia and civil society from over 100 countries. GCCS will congregate and deliberate on issues relating to promotion of cooperation in cyberspace, norms for responsible behaviour in cyberspace and to enhance cyber capacity building. Many of these delegations will be headed at Ministerial level delegates thereby making it an important forum of global consultation of various issues of cyber space.

Addressing the media, **Shri Ravi Shankar Prasad** said, “We feel proud to host the 5th of edition of the prestigious *Global Conference on Cyber Space in 2017*. The theme of this conference in a way reflect the changing architecture of India in the Digital space. Among the multiple transformative programmes under *Digital India*, the biggest thing that India brings about to the table is *Digital Inclusion* that makes it sustainable and developmental; which has been given utmost importance under the theme *Cyber4All*.”

“The Internet must be safe and secure, which necessitates a safe and secure digital space. This will remain a focal point throughout the conference. We are in consultation with the industry leaders, educational institutions and trade bodies to discuss the concerns related to cyber security and collectively works towards robust cyber security system. Through GCCS, we would like to show the international community how Indian digital ecosystem is becoming a beacon for development to the rest of the world.” Added **Shri Ravi Shankar Prasad**.

The GCCS 2017 will take place on the 23rd and 24th of November, 2017 in Aero City, New Delhi. Multiple run-up events are planned across India and abroad to create awareness about GCCS 2017, along with 2 days of pre-event activities right before the conference.

GCCS is a prestigious international conference that aims at encouraging dialogue among stakeholders of cyberspace, which has been taking place since 2011. Incepted in 2011 in London, GCCS witnessed a participation of 700 global delegates. It helped in setting up rules and guidelines for the editions to follow. The second conference was held in 2012 in Budapest with focus on *relationship between internet rights and internet security* and was attended by 700 delegates from nearly 60 countries. The third edition of GCCS was held in 2013 in Seoul with participation from 1600 delegates. The conference built on the themes such as Economic Growth and Development, Social and Cultural Benefits, a Safe and Secure Cyberspace, Cybercrime and International Security.

The fourth version GCCS 2015 was held on April 16-17, 2015 in The Hague, Netherlands. Nearly 1800 members from nearly 100 countries participated in this conference and over 60 countries participated with delegations led at Ministerial level. The conference focused on *Freedom, Security and Growth* in cyber space. GCCS 2015 was a program designed as high level stock taking exercise and to generate input for other ongoing processes rather than an independent norm setting initiative. The launch of Global Forum on Cyber Expertise (GFCE) was main deliverable of the conference for capacity building in cyber space.

‘Goal of GCCS 2017 is to promote an **inclusive Cyber Space** with focus on policies and frameworks for **inclusivity, sustainability, development, security, safety & freedom, technology and partnerships for upholding digital democracy, maximizing collaboration for strengthening security and safety and advocating dialogue for digital diplomacy**’. It will be an opportunity to showcase the “Digital India” program as a positive, sustainable and scalable model for use of ICTs for addressing developmental challenges and growth opportunities. It can help provide vision of inclusive digital society for inclusive growth, education, healthcare especially for

developing world.

The plenary sessions and other activities during GCCS 2017 will be designed around the themes of **Cyber4Inclusive Growth, Cyber4DigitalInclusion, Cyber4Security and Cyber4Diplomacy**. During various sessions and activities focused around these themes, GCCS 2017 will bring forth the business, empowerment and developmental potential of Cyber space for realizing the goals of sustainable development.

Cyber security will be one of the major focus areas in GCCS 2017 especially as the central government is in the process of setting up separate sector specific emergency response centres to ensure cyber security and strengthen technology infrastructure. The conference will be an ideal forum for the exchange of ideas with global think tanks and promote closer co-operation among the international community.

GCCS 2017 will be an excellent platform for Industry and its Associations, Civil Society, Academia, Governments and Think-tanks from across the world to deliberate on issues, opportunities and challenges faced in the cyber world and pave the way for a better digital future. Indian start-ups will also get exposure to the global industry leaders and investors in GCCS 2017 to pitch their ideas through multiple seminars, side events and exhibitions.

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Google's machine-raised mosquitoes to shrink vector's numbers

Google's parent company Alphabet and scientists in the US have teamed up to release 20 million machine-raised mosquitoes to shrink the numbers of the disease-carrying ones.

According to the plans, millions of sterile male mosquitoes will be released in Fresno county in California, which will then mate with wild female mosquitoes. The eggs the females lay won't hatch, a [report](#) in the Washington Post said.

The project, called Debug Fresno, is being undertaken by Verily, a subsidiary of Alphabet, Google's holding company.

Scientists said that the goal is to cut the numbers of *Aedes aegypti* mosquitoes -- the species responsible for spreading zika, dengue and chikungunya.

For 20 weeks, the company plans to release a million of the sterile, non-biting male mosquitoes in two neighbourhoods in Fresno county.

The male mosquitoes are bred and infected with *Wolbachia*, a bacterium that is naturally found in at least 40 per cent of all insect species, the report said.

"Over time, we hope to see a steep decline in the presence of *Aedes aegypti* in these communities," Verily was quoted as saying.

In a phenomenon called cytoplasmic incompatibility, "matings between *Wolbachia*-infected males and uninfected females result in embryo lethality or low hatch rates", William Sullivan and Scott L. O'Neill wrote in the journal *Nature*.

They said that the bacterium used to sterilise mosquitoes "is not known" to infect humans.

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Mobile App for Road Maintenance “Aarambh launched

Mobile App for Road Maintenance “Aarambh launched

The visiting ILO Deputy Director General(Policy) International Labour Organization Ms. Deborah Greenfield, who is on an official visit to India called on Hon’ble Shri Narendra Singh Tomar, Union Minister for Panchayati Raj, Rural Development, Drinking Water & Sanitation on 24th July 2017. She highly appreciated the ongoing Flagship Programmes of MORD such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Pradhan Mantri Grameen Sadak Yojana (PMGSY), Deen Dayal Upadhyay Grameen Kaushalya Yojana (DDUGKY), Pradhan Mantri Awas Yojana (PMAY-Grameen) and thanked Government of India for launching these initiatives which not only address the basic subsistence needs of the rural poor but also effectively contribute to employment creation, poverty alleviation and inclusive growth.

Ms.Greenfield highlighted ongoing ILO-MORD Partnership with the above Flagship Programmes such as : ILO-PMGSY Rural Roads Project, Barefoot Technicians Training under MGNREGA and support to training of Rural Masons under PMAY(Grameen). It is very heartening for the ILO to collaborate with the MORD as it can bring in experience of and learnings from the “Best International Practices” in implementation of these programmes and also promote and integrate and mainstream the *Decent Work Elements* in operational guidelines of these programmes. She recognized the high employment potential for rural population particularly the women in these initiatives.

The Hon’ble Union Minister Shri Tomar and Ms. Greenfield launched the following publications and Mobile App for Road Maintenance “Aarambh”:

- **Concept Note and Guidance Note “Mobilizing Funds for Maintenance of Rural Road”.**
 - o *Resource mobilization for rural roads maintenance has always been a challenge for the States. This Concept Note outlines innovative ways which can be adopted by the state Governments for mobilizing additional funds for road maintenance and presents some international best practices worldwide.*
- **“Mobile Phone based App for Performance Based Maintenance Contracting and Community Contracting for maintenance of rural roads” Brochure**
 - o *This Mobile Phone App aims at use of GIS based mapping for making road inventories, condition surveys, and producing cost estimates and other relevant data for preparation and monitoring of annual road maintenance plans. Its usage would greatly enhance the service delivery of the state level institutions in planning and implementing performance based rural roads maintenance contracts.*

She expressed that these publications and the Mobile App would greatly help in improving the service delivery for road maintenance in all the States.

The Hon’ble Minister appreciated the ongoing collaboration between ILO and Ministry of Rural Development, particularly PMGSY, MGNREGS and PMAY(G). He emphasized that the newly launched mobile application would simplify the maintenance management of rural roads. The Minister reiterated the resolve of Government of India to connect all eligible habitations in rural areas by constructing good quality roads by 2019. The States are being encouraged to put in place robust mechanism to ensure routine and periodic maintenance of these roads even after the first five-year period, after their construction is over.

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Human antibodies produced in lab for first time - Times of India

BOSTON: In a first, scientists have produced human antibodies in the laboratory using a technique that could usher the rapid development of new vaccines to treat a wide range of infectious diseases.

Antibodies are produced by the body's B cells to fight off infections by bacteria, viruses, and other invasive pathogens.

When an individual B cell recognises a specific pathogen-derived "antigen" molecule, it can proliferate and develop into plasma cells that secrete large amounts of antibody capable of binding to the antigen and fending off the infection.

Researchers, including those from [Harvard University](#) and [Massachusetts Institute of Technology \(MIT\)](#) in the US, wanted to replicate this process in the laboratory to produce specific antibodies from B cells isolated from patient blood samples.

However, in addition to encountering a specific antigen, B cells need a second signal to start proliferating and developing into plasma cells.

This second signal can be provided by short DNA fragments called CpG oligonucleotides, which activate a protein inside B cells named TLR9.

However, treating patient-derived B cells with CpG oligonucleotides stimulates every B cell in the sample, not just the tiny fraction capable of producing a particular antibody.

Researchers, led by Facundo Batista from the [Francis Crick Institute](#) in the UK, produced specific human antibodies in the laboratory by treating patient-derived B cells with tiny nanoparticles coated with both CpG oligonucleotides and an antigen.

With this technique, CpG oligonucleotides are only internalised into B cells that recognise the specific antigen, and these cells are therefore the only ones in which TLR9 is activated to induce their proliferation and development into antibody-secreting plasma cells.

The team successfully demonstrated their approach using various bacterial and viral antigens, including the tetanus toxoid and proteins from several strains of influenza A.

In each case, the researchers were able to produce specific, high-affinity antibodies in just a few days. Some of the anti-influenza antibodies generated by the technique recognised multiple strains of the virus and were able to neutralise its ability to infect cells.

The procedure does not depend on the donors having been previously exposed to any of these antigens through vaccination or infection.

Researchers were able to generate anti-HIV antibodies from B cells isolated from HIV-free patients.

They hope that their approach will help researchers rapidly generate therapeutic antibodies for the treatment of infectious diseases and other conditions such as cancer.

"Specifically, it should allow the production of these antibodies within a shorter time frame in vitro and without the need for vaccination or blood/serum donation from recently infected or vaccinated individuals," Batista said.

"Our method offers the potential to accelerate the development of new vaccines by allowing the efficient evaluation of candidate target antigens," he said.

The research was published in The Journal of Experimental Medicine.

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First Two NOPVs Shachi and Shruti Launched by RDEL at Pipavav, Gujarat**First Two NOPVs Shachi and Shruti Launched by RDEL at Pipavav, Gujarat**

Reliance Defence and Engineering Limited (RDEL) today launched the first two Naval Offshore Patrol Vessels (NOPVs) at their shipyard in Pipavav, Gujarat. The ships are part of a five ship project being constructed for the Indian Navy. The two NOPVs, **Shachi** and **Shruti** were launched by Smt. Preeti Luthra, wife of Vice Admiral Girish Luthra, PVSM, AVSM, VSM, ADC; the Flag Officer Commanding-in-Chief Western Naval Command at the RDEL Shipyard Pipavav, Gujarat.

The primary role of NOPVs is to undertake surveillance of the country's vast Exclusive Economic Zone (EEZ) besides operational tasks such as anti-piracy patrols, fleet support operations, maritime security of offshore assets, coastal security operations, and protection of shipping lanes. The NOPVs would increase the ocean surveillance and patrolling capabilities of the Indian Navy.

The NOPVs being constructed at RDEL are patrol ships and are armed with 76mm Super Rapid Gun Mount (SRGM) system along with two 30mm AK-630M guns which provide medium range and short range offensive and defensive capabilities. The armament is remotely controlled through an electronic Fire Control System. The ships are fitted with diesel engine driven propulsion systems and can deliver speeds upto 25 knots. All ship operations are controlled by an intelligent Integrated Platform Management System which has interfaces for all operational activities onboard the ship.

Speaking on the occasion, Vice Admiral Girish Luthra, mentioned that the launch is a significant and milestone event, as these two NOPVs are the first warships to be launched by a private sector shipyard in India. He further noted that opening up of warship building to the private sector by the Indian Navy is an opportunity that the private sector must make full use of, and is an enabling factor for increased private sector participation in this key area of national capability. The CinC also mentioned that while we have constructed and commissioned a number of quality warships, our shipyards need to constantly strive to transform with an aim to achieve global standards in quality, productivity and build periods with focus on innovation, modern techniques, and processes, and all round efficiency. He added that projects need to be implemented as per planned schedule. He stated that in addition to meeting national requirements, the shipyards should also focus on export orientation.

The CinC also complimented Reliance Defence and Engg Ltd and their workforce, and the Navy's warship overseeing and Quality Assurance teams, for their perseverance and efforts to reach this important milestone, and mentioned that he looked forward to commissioning of *Shachi* and *Shruti* into the Indian Navy in the near future.

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Scientists to chase solar eclipse using NASA jets

WASHINGTON: In a first, scientists are planning to chase the shadow of the Moon using [NASA's](#) research jets during the upcoming total [solar eclipse](#) in the US, in order to capture the clearest ever images of the Sun's outer atmosphere.

Amir Caspi of the Southwest Research Institute in the US and his team will use two of NASA's WB-57F research jets to follow the darkness across the US on August 21.

Taking observations from twin telescopes mounted on the noses of the planes, Caspi will capture the clearest images of the Sun's corona to date and the first-ever thermal images of [Mercury](#), revealing how temperature varies across the planet's surface.

"These could well turn out to be the best ever observations of high frequency phenomena in the corona," said Dan Seaton, researcher at University of Colorado in the US.

The total solar eclipse provides a rare opportunity for scientists to study the Sun, particularly its atmosphere.

As the Moon completely covers the Sun and perfectly blocks its light during an eclipse, the typically faint corona is easily seen against the dark sky.

During the upcoming total solar eclipse, scientists will observe the solar corona using stabilised telescopes aboard the WB-57F research aircraft.

This vantage point provides distinct advantages over ground-based observations, researchers said.

The corona is heated to millions of degrees, yet the lower atmospheric layers like the photosphere - the visible surface of the Sun - are only heated to a few thousand degrees. Scientists are not sure how this inversion happens.

One theory proposes micro explosions, termed nanoflares - too small and frequent to detect individually, but with a large collective effect - might release heat into the corona.

No one has yet directly seen nanoflares, but the high-resolution and high-speed images to be taken from the WB-57F jets might reveal their effects on the corona.

The high-definition pictures, captured 30 times per second, will be analysed for wave motion in the corona to see if waves move towards or away from the surface of the Sun, and with what strengths and sizes.

The two planes, launching from Ellington Field near NASA's [Johnson Space Center](#) in Houston will observe the total eclipse for about three and a half minutes each.

By flying high in the stratosphere, observations taken with onboard telescopes will avoid looking through the majority of Earth's atmosphere, greatly improving image quality.

At the planes' cruising altitude of 50,000 feet, the sky is 20-30 times darker than as seen from the ground, and there is much less atmospheric turbulence, allowing fine structures and motions in the Sun's corona to be visible.

Observations of Mercury will also be taken a half-hour before and after totality, when the sky is still

relatively dark.

These images, taken in the infrared, will be the first attempt to map the variation of temperature across the surface of the planet.

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25 Charging Stations for Electric Vehicles Installed in Bengaluru on Pilot Basis Under Fame-India Scheme: Shri Piyush Goyal

25 Charging Stations for Electric Vehicles Installed in Bengaluru on Pilot Basis Under Fame-India Scheme: Shri Piyush Goyal

The Minister of State (IC) for Power, Coal, New & Renewable Energy and Mines, Shri Piyush Goyal, while giving a written reply to a question in Lok Sabha today, informed the House that under Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India [FAME-India] Scheme of the Government, 25 Charging Stations have been installed at 6 different locations in Bengaluru by M/s. Mahindra REVA Electric Vehicles Pvt. Ltd, as a pilot project. Based on the proposals received under FAME Scheme, charging infrastructure in selected cities/ locations would be sanctioned by the Department of Heavy Industries.

Shri Goyal also informed that the Project Implementation & Sanctioning Committee (PISC) under the chairmanship of Secretary, Department of Heavy Industries has sanctioned following proposal of charging infrastructures under FAME-India Scheme:

| Sl. No. | Proposal | Implementing Organisation | Date of Sanction (Date of PISC Meeting) |
|---------|---|---|---|
| 1. | Proposal for setting up of 50 charging stations in Delhi NCR. | Bharat Heavy Electricals Limited (BHEL) | 20 th August 2015 |
| 2. | Proposal for setting up of 50 Charging Stations in Delhi NCR. | Rajasthan Electronics & Instruments Limited (REIL) | 20 th August 2015 |
| 3. | Proposal for setting up of 200 charging stations (both AC and DC fast) in the cities of Delhi, Jaipur and Chandigarh. | Rajasthan Electronics & Instruments Limited (REIL) | 15 th June 2017 |
| 4. | Proposal for providing 75 AC Smart Charger in Delhi NCR of Delhi. | Consortium of Mahindra – Reva – Ola – Asia Electric | 15 th June 2017 |
| 5. | Proposal for 60 No. Charging Infrastructure in NCR of Delhi. | Lithium Urban Technologies Pvt Ltd. | 15 th June 2017 |

Supply of electricity in E-mobility business including setting up of vehicle charging infrastructure is also included in the long term corporate plan of NTPC, Shri Goyal added.

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Akash missile: India's anti-China missile can't be trusted in fights, says CAG in 8 damning points

As many as a third of the home-made Akash [surface-to-air missiles](#) are unreliable, unusable and untested, posing an operational risk during hostilities, the country's national auditor said in a damning report.

This revelation comes at a time when a stand-off between Indian and Chinese troops continues along the border in Sikkim sector.

[Akash](#), to be positioned in the vulnerable Siliguri corridor (also referred to as the Chicken's neck), was India's counter to any strike by Chinese Air Force fighters. But the [CAG](#) report puts a big question mark on its utility and also on the Make in India initiative that seeks to trim the country's dependence on imported arms.

Here's what CAG had to say:

- 1) The [missiles](#) fell short of the target, had lower than the required velocity, and there was malfunctioning of critical units
- 2) The missile systems were to be installed at six designated sites (in northeast), between 2013 and 2015. But till date, none of the missile systems have been installed
- 3) Out of 80 missiles received up to November 2014, 20 missiles were test fired during April-November 2014. Six of these missiles, which is 30%, failed the test
- 4) Two of the missiles failed to even take off. These deficiencies pose an operational risk during hostilities
- 5) The lifespan of some missiles had expired by March 2017
- 6) The missiles were bought at a high cost but would stay usable for a less period than their stipulated life.
- 7) Delay in civil works at the sites pushed the installation of the missile systems behind schedule.
- 8) The CAG was also not ready to accept Indian Air Force's argument that the delay in commissioning of missile system was not attributable to non-availability of infrastructure

The report is a body blow to the missile system and comes after the Army earlier this year showed interest in going for the Israeli quick-reaction surface-to-air missiles ([QR-SAMs](#)) to take on enemy fighters, helicopters and drones instead of Akash.

Defence ministry sources said the Army has made it clear that it does not want any more Akash regiments after it gets the first two ordered earlier for Rs 14,180 crore, with six firing batteries and hundreds of missiles each.

According to a Times of India report, the Army holds Akash area defence missile systems do not meet its operational requirements for defending its strike corps against enemy air attacks in forward areas.

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Scooping out oil spills made easy by IISER Thiruvananthapuram

Quick removal “It takes only from 30 minutes to two hours from the time of application to scooping out the rigid fibre balls containing congealed oil,” says Kana Sureshan (right)

More efficient and quick absorption of crude oil from the sea following marine spill has now become possible thanks to scientists from the Indian Institute of Science, Education and Research (IISER) in Thiruvananthapuram who have developed a hydrophobic sorbent that can suck up oil and congeal it. A hydrophobic material automatically becomes oil-loving and takes up oil when it comes in contact with it. The results were published in the journal *Angewandte Chemie*.

Hydrophobic sorbent

A two-member research team led by Prof. Kana M. Sureshan from the School of Chemistry at IISER developed the hydrophobic sorbent by using a cheap raw material (mannitol) and cellulose pulp as a matrix. Mannitol was converted into a hydrophobic gelator through a one-step process and a solution was made using this compound. Cellulose balls the size of marbles were then dipped in the solution and dried.

“The gelator gets adsorbed on the cellulose fibre through hydrogen bonding. This process of adsorption of gelator on the cellulose fibre matrix changes the cellulose matrix from being very hydrophilic (water-loving) to hydrophobic (water repelling),” says Prof. Sureshan. A hydrophobic material naturally becomes oleophilic (oil-loving).

Unlike other alternatives, the sorbent can be easily applied over oil-water mixture, and no solvent is needed for spraying the gelator thus making it environmental benign. The gelator adsorbed on the surface of cellulose fibre is able to absorb oil when it comes in contact with it.

“Once the sorbent sucks the oil, the gelator slowly gets released from the cellulose fibre and congealing of oil takes place,” Prof. Sureshan says. Only when the oil congeals can it be removed without the oil dripping due to gravity.

Congealing of oil becomes possible as the gelator used by the team self-assembles to form micro fibres and the oil loses its fluidity and gets trapped within the entangled fibrous network to form a rigid gel. Gelation essentially turns the liquid oil phase into a semi-solid one and this allows the fibre balls with the congealed oil to be simply scooped out or removed using a scoop or a sieve.

“It takes only about 30 minutes to two hours from the time of application to scooping out the rigid fibre balls containing congealed oil, leaving behind clean water. Since crude oil spreads quickly in the sea after a spill, it is necessary to quickly remove the oil from water,” Prof. Sureshan says.

The team tested the ability of their sorbent to congeal oil using six different crude oils, including the one from Bombay High.

Irrespective of the different viscosities of the six crude oils tested, the sorbent was able to absorb the oil and the rigid globules could be scooped out in 30 minutes to two hours.

Studies found that the sorbent was able to absorb and congeal 16 times its own weight of oil. The absorbed oil can be recovered by applying pressure or fractionated by a simple distillation process.

A study of nearly 300 people living in different parts of India found that nine single-base variants

(single-nucleotide polymorphisms or SNPs) account

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Scientists just created a flexible bio-glue for healing wounds

Scientists have developed a super strong, flexible adhesive material inspired by the glue secreted by slugs that sticks to biological tissues – even when wet – without causing toxicity. The "tough adhesive" is biocompatible and binds to tissues with a strength comparable to the body's own resilient cartilage, researchers said.

"The key feature of our material is the combination of a very strong adhesive force and the ability to transfer and dissipate stress, which have historically not been integrated into a single adhesive," said Dave Mooney, professor at Harvard University's Paulson School of Engineering and Applied Sciences (SEAS) in the US.

Slugs secrete a special kind of mucus when threatened that glue it in place, making it difficult for a predator to pry it off its surface.

This glue was previously determined to be composed of a tough matrix peppered with positively charged proteins, which inspired Jianyu Li, an assistant professor at McGill University in Canada and colleagues to create a double-layered hydrogel consisting of an alginate-polyacrylamide matrix supporting an adhesive layer that has positively-charged polymers protruding from its surface.

The polymers bond to biological tissues via three mechanisms – electrostatic attraction to negatively charged cell surfaces, covalent bonds between neighbouring atoms, and physical interpenetration – making the adhesive extremely strong.

"Most prior material designs have focused only on the interface between the tissue and the adhesive. Our adhesive is able to dissipate energy through its matrix layer, which enables it to deform much more before it breaks," said Li.

The team's design for the matrix layer includes calcium ions that are bound to the alginate hydrogel via ionic bonds. When stress is applied to the adhesive, those "sacrificial" ionic bonds break first, allowing the matrix to absorb a large amount of energy before its structure becomes compromised.

In experimental tests, more than three times the energy was needed to disrupt the tough adhesive's bonding compared with other medical-grade adhesives. When it did break, what failed was the hydrogel itself, not the bond between the adhesive and the tissue, demonstrating an unprecedented level of simultaneous high adhesion strength and matrix toughness.

The researchers tested their adhesive on a variety of both dry and wet pig tissues including skin, cartilage, heart, artery, and liver, and found that it bound to all of them with significantly greater strength than other medical adhesives.

The tough adhesive also maintained its stability and bonding when implanted into rats for two weeks, or when used to seal a hole in a pig heart that was mechanically inflated and deflated and then subjected to tens of thousands of cycles of stretching.

It also caused no tissue damage or adhesions to surrounding tissues when applied to a liver hemorrhage in mice – side effects that were observed with both super glue and a commercial thrombin-based adhesive.

Such a high-performance material has numerous potential applications in the medical field, either

as a patch that can be cut to desired sizes and applied to tissue surfaces or as an injectable solution for deeper injuries. The research was published in the journal Science.

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