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Business Standard

Sat, 15 Aug 2020

BEL makes 30,000 ventilators 'in record time' to help govt in Covid fight

Bharat Electronics Limited, a Navratna PSU under the Ministry of Defence, on Friday announced the successful completion of manufacturing 30,000 numbers of ICU Ventilators

Bengaluru: Bharat Electronics Limited, a Navratna PSU under the Ministry of Defence, on Friday announced the successful completion of manufacturing 30,000 numbers of ICU Ventilators in a 'record time' to help the Government of India in its efforts in combating the COVID-19 pandemic.

Ministry of Health & Family Welfare placed an order for these 30,000 ICU Ventilators in April 2020 to meet the healthcare infrastructure requirements of the nation, seeing the rise in COVID cases, Bengaluru-headquartered BEL said in a statement.

BEL has manufactured the ICU Ventilator, Model CV 200, based on licensing agreement with Skanray Technologies Private Ltd, Mysuru, and design support from DRDO.

"The indigenisation efforts of DRDO, BEL and Skanray in addressing the non-availability of critical components like highly complex medical grade miniature proportional valves, on/off solenoid valves, oxygen sensors and flow sensors was certainly a game changer as India can now boast of a capable and mature medical electronics ecosystem," the statement said.

After receiving the order, based on its 'Agile Production System Capability', within two weeks BEL established the manufacturing line to produce 500 to 1,000 Ventilators per day, it said.

Manufacturing of these ventilators was undertaken during severe lockdown period and BEL received immense support from various government agencies to resolve the supply chain disruptions.

As manufacturing of these ventilators was centred at the Bangalore Unit of BEL, the Karnataka government took extra initiatives by earmarking a nodal IAS officer for BEL to liaison with, to resolve various lockdown-related issues.

"BEL also would like to make special mention of the support rendered by scores of Indian industries ranging from MSMEs to large business houses in supporting BEL towards manufacturing of 30,000 ventilators in a short span of time", the statement added.

The valuable feedback received from the committee of expert doctors and hospitals pan India helped BEL to quickly upgrade the Ventilator with additional modes of operation through software to address Indian COVID-19 patient needs, it was stated.

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/current-affairs/bel-makes-30-000-ventilators-in-record-time-to-help-govt-in-covid-fight-120081401780_1.html



DRDO's cutting edge anti-drone system to be deployed in Delhi for PM's security

*DRDO said that the anti-drone technology can bring down micro-drones
at a distance of up to 3 km and lase a target as far as 1-1.25 km away*

By Manjeet Singh Negi

New Delhi: The Defence Research and Development Organisation (DRDO) has developed an anti-drone system that is being deployed in Delhi for Prime Minister Narendra Modi's safety this year. This system will safeguard against any drone attacks.

According to the DRDO, this technology can bring down micro-drones through either jamming of command and control links or by damaging electronics of drones through laser-based directed energy weapons. "The comprehensive solution is to tackle the problem that drones may pose to national security agencies," DRDO said in a statement.

In addition, this anti-drone technology can detect and jam micro-drones at a distance of up to 3 km and lase a target 1-1.25 km far depending on the wattage of the laser weapon. The DRDO said that this solution can be an effective counter to increased drone-based activity in India's western and northern sectors.

Recently, the Armed Forces proposed arming its 100 Heron drones with missiles to carry out offense. The Indian Navy has also been cleared to upgrade its existing Unmanned Aerial Vehicles (UAVs) and buy 10 new surveillance drones to closely monitor Indian waters.

On more than one occasion in recent years, security forces deployed along the Line of Control (LOC) have captured drones with Pakistani credentials on them. The most recent one was shot down by Border Security Force (BSF) jawans over Kathua in Jammu and Kashmir on July 24 of this year.



DRDO's anti-drone system (Photo Credits: Manjeet Singh Negi/India Today)

<https://www.indiatoday.in/india/story/drdo-s-cutting-edge-anti-drone-system-to-be-deployed-in-delhi-for-pm-s-security-1711307-2020-08-14>

डीआरडीओ ने विकसित की एंटी ड्रोन सॉल्यूशन तकनीक, स्वतंत्रता दिवस समारोह में की जाएगी इस्तेमाल

यह सिस्टम लेजर हथियारों के वाट क्षमता के आधार पर तीन किलोमीटर तक के माइक्रो ड्रोन का पता लगा सकती है और एक से ढाई किलोमीटर तक के लेजर लक्ष्य को पा सकती है।

नई दिल्ली: रक्षा अनुसंधान और विकास संगठन (DRDO) ने एक व्यापक एंटी-ड्रोन सॉल्यूशन और तकनीक विकसित की है, जो कमांड एंड कंट्रोल लिंक के जैमिंग के माध्यम से या लेजर-आधारित डायरेक्टेड एनर्जी वेपन (Directed Energy Weapon) के माध्यम से ड्रोन के इलेक्ट्रॉनिक्स को नुकसान पहुंचाकर माइक्रो ड्रोन को नीचे ला सकती है।

यह सिस्टम लेजर हथियारों के वाट क्षमता के आधार पर तीन किलोमीटर तक के माइक्रो ड्रोन का पता लगा सकती है और एक से ढाई किलोमीटर तक के लेजर लक्ष्य को पा सकती है। पश्चिमी और उत्तरी क्षेत्रों में ड्रोन-आधारित गतिविधि को बढ़ाने के लिए प्रभावी काउंटर प्रभावी हो सकता है। इसे दिल्ली में स्वतंत्रता दिवस समारोह के लिए भी तैनात किया गया है।



यह सिस्टम लेजर हथियारों के वाट क्षमता के आधार पर तीन किलोमीटर तक के माइक्रो ड्रोन का पता लगा सकती है और एक से ढाई किलोमीटर तक के लेजर लक्ष्य को पा सकती है।

डीआरडीओ ने विकसित किया था पी-7 हेवी ड्रॉप सिस्टम

वहीं, दूसरी ओर पिछले महीने रक्षा अनुसंधान एवं विकास संगठन ने पी-7 हेवी ड्रॉप सिस्टम विकसित किया है। इसके जरिए 7-टन वजन तक के सैन्य उपकरणों को आईएल 76 विमान से नीचे गिराया जा सकेगा। पी-7 हेवी ड्रॉप सिस्टम की मदद से दुर्गम स्थलों पर सैन्य वाहनों (सात टन वजन तक के) को उतारा जा सकेगा। इससे दुश्मन को मुंहतोड़ जवाब दिया जा सकेगा।

डीआरडीओ ने विकसित किया था उच्च क्वालिटी का ड्रोन

इसके साथ ही जुलाई माह में ही भारत चीन तनाव के बीच डीआरडीओ ने एक उच्च क्वालिटी का ड्रोन विकसित किया था। इस ड्रोन का नाम भारत रखा गया। पूर्वी लद्दाख के वास्तविक नियंत्रण रेखा (LAC) के ऊंचाई वाले क्षेत्रों और पहाड़ी इलाकों में सटीक निगरानी रखने के लिए भारत नाम का अपना स्वदेशी ड्रोन बनाया गया। भारत ड्रोन को इंडियन आर्मी को सौंप दिया गया था।

इस खास तकनीक वाले ड्रोन को लेकर रक्षा मंत्रालय ने कहा था कि भारतीय सेना को पूर्वी लद्दाख क्षेत्र में चल रहे विवाद में सटीक निगरानी के लिए ड्रोन की आवश्यकता थी। इस आवश्यकता के लिए डीआरडीओ ने सेना को भारत ड्रोन प्रदान किया है।

<https://www.jagran.com/news/national-drdo-develops-anti-drone-solution-technology-deployed-for-independence-day-celebrations-20628702.html>

Independence Day: DRDO's anti-drone system guarded Red Fort, had laser to bring down targets

Unprecedented security ring was thrown around the Red Fort from where PM Modi delivered his Independence Day speech, listing his government's past achievements and presenting the roadmap for the future

Edited By Amit Chaturvedi

New Delhi: As Prime Minister Narendra Modi addressed the nation on 74th Independence Day, he was surrounded by a posse of security and state-of-the-art security apparatus.

Among them was an anti-drone system developed by the Defence Research and Development Organisation or DRDO which was stationed near the Red Fort.

According to DRDO, as reported by news agency ANI, the anti-drone system can detect and jam micro drones up to three kilometres and use laser to bring down a target up to 2.5 kilometres.

Unprecedented security ring was thrown around the Red Fort from where PM Modi delivered his Independence Day speech, listing his government's past achievements and presenting the roadmap for the future.

Security personnel were deployed both in plainclothes and uniform in the area. Facial recognition system was also been set up at vantage points to keep an eye on the attendees. The police said that all the necessary guidelines in view of the Covid-19 pandemic were also enforced.

Apart from this, the Delhi Police had also coordinated with other states and union territories - from Delhi's neighbours like Haryana, Uttar Pradesh and Rajasthan to others namely Punjab, Jammu and Kashmir, Madhya Pradesh, Jharkhand and Bihar - and discussed security measures in the view of August 15.

The personnel of National Security Guard (NSG), Special Protection Group (SPG) and Indo-Tibetan Border Police (ITBP) were also present in the area.

Over 300 cameras were installed for security and their footage was monitored round-the-clock, the police said.

There were around 4,000 security personnel at the Red Fort who stood in adherence with social distancing norms, they said.

<https://www.hindustantimes.com/india-news/independence-day-drdo-s-anti-drone-system-guarded-red-fort-had-laser-to-bring-down-targets/story-iKwyEr7JC4pR2nxSeqH69H.html>



DRDO's anti-drone system stationed near the Red Fort on Saturday.(ANI Photo)

Independence Day: DRDO's anti-drone tech guarded Modi at Red Fort

By Shubham Sharma

As Prime Minister Narendra Modi addressed the nation on the occasion of India's 74th Independence Day, a sophisticated military tech developed by the Defense Research and Development Organization (DRDO) formed a part of his security.

It guarded the vicinity of the Red Fort with weapons to detect rogue micro drones and take them out instantly.

Here is all you need to know about it.

In this article

- 1) System to jam and destroy drones with lasers
 - 2) Attack range up to 3 kilometers
 - 3) Could be effective in controlling drone activity
 - 4) Attack at the speed of light
- **Technology: System to jam and destroy drones with lasers**

Stationed at a vantage point facing Red Fort, DRDO's anti-drone solution scouted for potentially rogue unmanned aerial vehicles.

According to reports, it carried two main systems to take out potential targets: a jammer capable of breaking a drone's command and control link to make it unresponsive and a Direct Energy Weapon that could fire an invisible beam of laser to fry its electronics mid-air.

- **Range: Attack range up to 3 kilometers**

The jammer of the system can disable a micro drone flying up to 3 kilometers away, while the laser weapon could damage electronics of a UAV flying 1 to 2.5 kilometers away, DRDO officials told ANI.

They added that the range of laser depends on the wattage of DEW being used, without specifying the power of the system deployed at Red Fort.

- **Benefit: Could be effective in controlling drone activity**

The DRDO officials emphasized that their laser-equipped anti-drone system could be used to counter rogue UAV activity in northern and western parts of India.

Notably, laser weapons are seen as the latest advancement in military tech, something that could neutralize an increasing number of potential threats, including UAVs, armed boats, and adversary intelligence, surveillance, and reconnaissance systems.

- **Speed: Attack at the speed of light**

The biggest advantage of laser weapons is the element of speed.

Whether deployed on a drone or warship, the beams emitted by DEWs come out as concentrated photons, which travel at the speed of light or, you can say, 50,000 times the speed of an Intercontinental Ballistic Missile (ICBM). It cannot be matched by any other weapon, at least not today.

<https://www.newsbytesapp.com/timeline/india/64672/304605/independence-day-drdo-s-anti-drone-tech-guarded-red-fort>



आसमान का रक्षक: DRDO द्वारा विकसित ड्रोन विरोधी प्रणाली के बारे में पाँच तथ्य

By Smit Kapoor

Defence Research and Development Organisation (DRDO) द्वारा विकसित एक ड्रोन-रोधी प्रणाली को 74 वें स्वतंत्रता दिवस के अवसर पर शनिवार को लाल किले के पास तैनात किया गया था। अभूतपूर्व फ़ॉरेस्ट रिंग को रेड फ़ॉर्स्ट के चारों ओर फेंका गया था जहाँ से पीएम मोदी ने अपना स्वतंत्रता दिवस भाषण दिया, अपनी सरकार की पिछली उपलब्धियों को सूचीबद्ध किया और भविष्य के लिए रोडमैप पेश किया।

DRDO द्वारा विकसित ड्रोन-विरोधी प्रणाली के बारे में पाँच तथ्य:

- DRDO -विकसित प्रणाली 3 किलोमीटर तक के माइक्रो ड्रोन का पता लगा सकती है और लेजर हथियार के वाट क्षमता के आधार पर 1-2.5 किलोमीटर तक के लक्ष्य को नीचे लाने के लिए लेजर का उपयोग कर सकती है।
- DRDO प्रणाली एक पल में ड्रोन खतरों का पता लगा सकती है और उन्हें समाप्त कर सकती है। मानव रहित हवाई वाहन, अधिकतर छोटे आकार के, ड्रोन कहलाते हैं। उन्हें दूरस्थ रूप से नियंत्रित किया जाता है और उनका उपयोग उन खतरों के अलावा विस्फोटक ले जाने के लिए उपद्रवियों या आतंकवादियों द्वारा किया जा सकता है।
- यह देश के पश्चिमी और उत्तरी क्षेत्रों में ड्रोन-आधारित गतिविधि को बढ़ाने के लिए एक प्रभावी काउंटर हो सकता है।
- DRDO प्रणाली ने अपनी मार प्रणाली का उपयोग करके परीक्षणों के दौरान एक आने वाले ड्रोन को सफलतापूर्वक बेअसर कर दिया। काउंटर ड्रोन प्रणाली में हवा में ड्रोन का पता लगाने और नष्ट करने दोनों की क्षमता है।
- इस वर्ष गणतंत्र दिवस परेड को सुरक्षा कवच प्रदान करने के लिए सबसे पहले DRDO काउंटर ड्रोन प्रणाली को तैनात किया गया था, जिसमें ब्राजील के राष्ट्रपति जेयर बोल्सोनारो और प्रधान मंत्री नरेंद्र मोदी सहित अन्य गणमान्य लोगों ने भाग लिया था।
- मोदी-ट्रम्प रोड शो के लिए ahemdabad में भी सिस्टम तैनात किया गया था जहाँ उन्हें ड्रोन से किसी भी हवाई खतरे को नाकाम करने का काम सौंपा गया था।



<https://khabarnonstop.com/guardian-of-the-skies-five-facts-about-drdo-developed-anti-drone-system/>

Guardian of the skies: Five facts about DRDO-developed anti-drone system

- *The guardian of the skies: Five facts about DRDO-developed anti-drone system*

An anti-drone system developed by the Defence Research and Development Organisation (DRDO) was deployed near the Red Fort on Saturday on the occasion of the 74th Independence Day. Unprecedented security ring was thrown around the Red Fort from where PM Modi delivered his Independence Day speech, listing his government's past achievements and presenting the roadmap for the future.



DRDO's anti-drone system stationed near the Red Fort on Saturday.(ANI Photo)

Five facts about DRDO developed anti-drone system:

- The DRDO-developed system can detect and jam micro drones up to 3 kilometres and use laser to bring down a target up to 1-2.5 kilometres depending on the wattage of laser weapon.
- The DRDO system can detect and identify drone threats at a moment's instance and terminate them. Unmanned aerial vehicles, mostly of small size, are called drones. They are controlled remotely and can be utilised by miscreants or militants for carrying explosives apart from other threats they pose.
- It can be an effective counter to increased drone-based activity in the western and northern sectors of the country.
- The DRDO system successfully neutralised an incoming drone during trials using its kill system. The counter drone system has capabilities to both detect and destroy drones in air.
- The DRDO counter drone system was first deployed to provide security cover to the Republic Day Parade this year which was attended by Brazilian President Jair Bolsonaro and Prime Minister Narendra Modi, along with other dignitaries.
- The system was also deployed in Ahmedabad for the Modi-Trump roadshow where they were tasked to thwart any aerial threat from drones.

<https://www.livemint.com/news/india/guardian-of-the-skies-five-facts-about-drdo-developed-anti-drone-system-11597478762158.html>

MBT Arjun or T-14 Armata – Can Indian Army opt for indigenous Arjun Tanks over Russia T-90s or T-14s?

After going through delays and several rounds of improvements, can India's indigenous main battle tank, Arjun, prove its might amid the ongoing border row with China in eastern Ladakh?

By Smriti Chaudhary

The Arjun Main Battle Tank (MBT) project was initiated in the mid-1970s, but the first two regiments of the tank were inducted into the Army starting 2004. With this India joined the league of 10 countries worldwide that have designed and developed their own MBT.

The other countries that have designed and developed their own MBT are the UK, France, Germany, USA, Israel, South Korea, Russia, Japan and China.

The state-run Defence Research and Development Organisation (DRDO) undertook the task of developing the tank. Even with DRDO creating capabilities within the country for the fabrication of Hull and Turret for accelerated deliveries, the Cabinet Committee on Security in 2019 approved the procurement of 464 Russian made T-90MS main battle tanks in a deal worth Rs 13,400 crores.



However, it is believed that the Arjun MK I had performed better than Russian T-90s during a desert trial conducted by the Army in 2010. Among several parameters including accuracy and consistency of firepower, mobility and agility, Arjun outperformed the T-90.

In December 2014, Comptroller and Auditor General (CAG) of India said that the benchmark fixed by the Army for the evaluation of the T-90 tank was more relaxed vis-à-vis MBT Arjun on the multiple parameters including scientific stress technique, check of lubricants/oils, System reliability, Laser range finder, the firing of armour piercing ammunition and medium fording amongst others.

Arjun MK-I has gone through several rounds of improvements to fit the Army's requirements. In 2018, a top Chinese military official praised the tank. Senior Colonel Liu Degang, deputy commander of the Academy which keeps a close watch on the military hardware of India, said it is "very good" and suits Indian conditions.

On the other hand, Arjun has its fair share of challenges. "The Arjun's development period was so long that major design decisions became completely obsolete. The 105-millimeter gun, perfectly adequate in the 1970s when stacked up against the NATO-standard 105-millimeter L7 gun (the M68 in U.S. Army service), and the 115-millimeter gun of the Soviet T-62 tank, were obsolete by the early 1990s," wrote Kyle Mizokami, a defence and national-security writer.

Now in a boost to 'Aatmanirbhar Bharat' (self-reliant India), the Ministry of Defence (MoD) has released a list of 101 defence impediments. This move can bring back the Arjun as a choice of a battle tank for the Indian Army.

"Arjun MBT presents a great potential to further the "Make in India" and self-reliance vision of the Government. Arjun MBT line has been lying idle since 2010-11 when the last Arjun MK-Is rolled out. Will the renewed emphasis on cutting down imports will bring a fresh lease of life to Arjun, like LCA Mk 1A and Basic Jet Trainer programs is yet to be seen," observed an Indian Army veteran quoted by FE.

According to Brig NK Bhatia (retd), India needs to look into a new tank exclusively for mountains with modern platforms incorporated in it especially now with the ongoing Indo-China standoff. “The requirement of a tank for mountains would essentially encompass agility, mobility and manoeuvrability to facilitate rapid deployment. Mechanised/armour units would primarily be required to act as anti-armour platforms to counter enemy’s armour thrusts through the gaps in the mountainous terrain,” he asserted.

The DRDO is now making necessary modification in the Arjun Mark-II, an improved version of original MK-I after the Army asked for 93 rounds of improvements. Until it can prove its capabilities, the Army is relying on the Russian T-90 tanks and even looking at the deadly T-14 Armata.

<https://eurasianimes.com/mbt-arjun-or-t-14-armata-can-indian-army-opt-for-indigenous-arjun-tanks-over-russia-t-90s-or-t-14s/>

INDIA
TODAY

Sun, 16 Aug 2020

An Indian Odyssey

Under the Atmanirbhhar Bharat campaign, these institutions will now open up their activities to greater private participation, which will not only meet all domestic demand but also tap the rich potential for exports

By Raj Chengappa

There are three crown jewels of Indian science and technology that demonstrated the spirit of Atmanirbhhar Bharat much before Prime Minister Narendra Modi articulated his vision. These three jewels, government-owned scientific institutions, have made the country proud through their achievements. Take the Atomic Energy Commission (AEC) which was established in 1948, it ensured the country’s security by developing and building nuclear weapons of a wide range: atomic bombs, boosted fission weapons and the hydrogen bomb. On the civilian front, the AEC has mastered nuclear power technology, enhancing India’s electricity supply. Meanwhile, the Indian Space Research Organisation (ISRO), has ensured that the country join the big boys of space by mastering both rocket and satellite technology, and even undertaking planetary exploration. Not to be left behind, the Defence Research and Development Organisation (DRDO) has indigenously built both strategic and tactical missiles vital for the defence of the nation. All three organisations have engaged with Indian public and private enterprises to manufacture critical systems and sub-systems and built an ecosystem of hi-tech industries. Under the Atmanirbhhar Bharat campaign, these institutions will now open up their activities to greater private participation, which will not only meet all domestic demand but also tap the rich potential for exports.

DRDO: Established: 1958

Leaning on its arms

In the mid-1980s, no country was willing to sell India the missiles it needed to launch nuclear warheads. It was then that the Defence Research and Development Organisation (DRDO) was tasked with building not only strategic missiles but also critical tactical ones to make India truly atmanirbhhar in this aspect of defence research. The man responsible for helping India achieve that goal was former DRDO chief Dr A.P.J. Abdul Kalam, who later became the President of India. Under Kalam’s guidance, DRDO was able to develop Agni as the country’s main nuclear strike weapon to meet the threats posed by both China and Pakistan. Today, DRDO has even mastered



inter-continental ballistic missile (ICBM) capability with both the Agni-V and the planned Agni-VI versions bringing all of China in its range. The Agni sub-systems are now manufactured by a range of public and private sector companies with DRDO increasingly playing the role of integrator.

It is not just strategic missiles that DRDO has excelled in. In the tactical range, it has indigenously developed surface-to-air missiles like Akash and its sophisticated radar Rajendra to track and target fighter aircraft flying 30 km away at an altitude of up to 18,000 metres. It has now been inducted into the Indian armed forces. So has Astra, the all-weather, beyond visual range air-to-air missile that has been approved for use by the various fighter platforms of the Indian Air Force. Both these missiles as well as others have helped India save thousands of crores of rupees in imports apart from ending technological dependency. DRDO has also built India's Light Combat Aircraft, the Arjun tank and a host of other equipment for the armed forces, though some with limited success.

The DRDO's efforts at indigenisation got a boost when Union defence minister Rajnath Singh, as part of the Atmanirbhar Bharat initiative, recently announced that 101 weapons systems will be progressively banned from the import list to bolster the domestic defence production sector. Dr G. Satheesh Reddy, secretary, defence R&D, and DRDO chairman, says it would be "a big benefit" as his organisation has developed many of the technologies and systems. These will now be manufactured by Indian industry as there is an assurance that they will not be imported. Not only will this help meet domestic demand but also enable industry to export to other countries if the government permits it, making them internationally competitive. Reddy believes such a development will free up DRDO to concentrate on developing even more advanced systems and transferring the technology to domestic industry to manufacture systems.

Expert view: Dr G. Satheesh Reddy Chairman, DRDO

A Homegrown Defence Ecosystem

Atmanirbhar Bharat will be fantastic for the country. It means we will develop our own systems, products and technologies which will instil confidence in our scientists, engineers and industrialists. Simply put, when we grow and develop our own technology, industry will flourish to the country's benefit. In defence, if you develop your own systems, you can provide and produce those systems for Indian industry to make and equip the armed forces.

Missiles are a good example. After the Integrated Guided Missile Development Programme (IGMDP) was launched in 1983, the DRDO developed missile systems that have strengthened India. Whether it is the Agni or Prithvi strategic missiles series, the Nag anti-tank systems, Akash and Astra tactical missiles or the Brahmos cruise missile, we were able to master the many technologies required, be it materials, rocket motor, navigation, computers, software, radars or seekers. For all these building block technologies, we involved indigenous industries to make these to our specifications and brought in quality control systems. For instance, over 80 per cent of Akash's systems are manufactured by public and private industry; DRDO is now just an integrator. Today, we have over 1,800 public and private industries working with us at both the systems and sub-systems levels. In doing so, we have developed an entire ecosystem for missile development in India. It's why the country has confidence in our missile programme. We can now even consider exporting some of these systems. The mantra for our success has been dedication, hard work, commitment and the sincerity of our scientists and engineers.

ISRO: Established: 1972

Carving a Space

Ever since the Indian Space Research Organisation (ISRO) was set up in 1972, it has earned a reputation for delivering constantly apart from propelling India into the exclusive club of spacefaring nations that have the full range of technological capability. Satish Dhawan, its first chairman, pioneered ISRO's mission approach—breaking silos and hierarchy to work as a team to accomplish a task. Initially, India depended on the US, Europe and the erstwhile Soviet Union on technology for rocket launchers and satellites. Within decades, ISRO became self-sufficient not only in rocket technology but also built state-of-the-art satellites. Given that an average rocket

launcher and satellite cost Rs 500 crore to build and launch, with over 60 successful indigenously-built launchers and an equal number of satellites, ISRO has over the years saved the country thousands of crores in precious foreign exchange.

The pride of its rocketry is its heavy lift launcher GSLV-Mk3 that is capable of putting a payload weighing four tonnes in a geosynchronous orbit. The organisation builds satellites for a whole range of uses—earth observation, communications, navigation and military. ISRO has also successfully conducted planetary explorations, sending missions to the Moon and Mars.

It has also encouraged both public and private sector industries to build the sub-systems it needs. As part of its Atmanirbhar initiative, the government recently announced a total opening up of the space sector to private industry. This will include allowing private players to build and own rockets and satellites, with ISRO even willing to share its hi-tech research and launch facilities. In turn, it will enable Indian industry to compete actively for the \$360 billion space industry.

Meanwhile, ISRO will continue to build launchers and satellites while simultaneously developing advanced rocket technology like semi-cryogenic engines and building even more sophisticated satellites apart from conducting manned space missions. As ISRO chairman K. Sivan puts it aptly, “By these measures, we are unlocking India’s space potential.”

Expert view: Dr K. Sivan, Chairman, ISRO

As part of Atmanirbhar Bharat, the government has cleared private players to carry out space activities. Right now, all space activities in India are carried out only by the Indian Space Research Organisation (ISRO), including building rockets and satellites, launching them and using them to provide services to the country. Now, opportunities have been given to the private industry to carry out these activities via a new body called IN-SPACe, or the Indian Space Promotion and Authorisation Centre, through which they can apply and get permissions for these activities. Also, if they want to utilise ISRO’s facilities for this, we will share it with them. So now the private industry is on a level playing field with ISRO.

We can do this with confidence because ISRO has developed self-reliance in rocket technology and satellites on par with the best in the world. You must remember that most of these technologies were not available to us. They were guarded by their countries. If they did give us the technology, it was for a lot of money. So, we had to do it ourselves. The reason we were able to achieve such success is because we work as a team and treat it as a national mission.

Atomic energy commission: Established: 1948

Our Nuke Muscle

Much of the work that the organisation which visionary Homi J. Bhabha founded does, especially on the strategic front, is top secret. For nuclear power technology, it remained highly reliant on the US and Canada. But when these countries broke off technological collaboration to protest India’s 1974 nuclear test and ostracised the the country, the AEC (Atomic Energy Commission) mastered the technology to indigenously build Pressurised Heavy Water Reactors (PHWR) to meet India’s growing power needs. Today, 16 of the 22 operating reactors have been made fully in India. Last month, the Nuclear Power Corporation of India Limited (NPCIL) announced that its first 700 MW reactor in Kakrapar had achieved criticality, demonstrating India’s ability to scale up nuclear power technology from its workhorse 500 MW reactors.

After the Indo-US nuclear deal fructified in 2008, the government has permitted Russia, France and the US to bid for building new power plants, but has ensured that NPCIL has been given sanction to build 16 700 MW power plants, totalling 11,200 MW, apart from other plants. Under the Atmanirbhar initiative, the government has for the first time permitted public-private partnership with the Department of Atomic Energy to produce radio isotopes for food preservation and cancer treatment. As AEC chairman K.N. Vyas says, “It is a significant decision that will boost both domestic production and exports of these isotopes in the pharma and food sectors.”

Expert view: Dr K.N. Vyas, Chairman, Atomic Energy Commission

Setting an Example

The Department of Atomic Energy has been doing indigenous development for some time now; a majority of components used in any activity we are involved in are made in India. We have been following the atmanirbhar principle to a great extent all along. In nuclear power, our pressurised heavy water reactor is as good as that of any other country that makes them. Some of the power plants built by Nuclear Power Corporation have neared world records for continuous operation, which is proof of our quality standards. In our quest for indigenisation, we have involved the Indian industry to work with us as a team rather than as partner and supplier.

We were able to inspire confidence in our country's capability to build high precision and quality equipment. We have gained, as has the Indian industry. We have, in the process, developed solutions to complex engineering challenges and are now in a position to help other institutions to do so. The Union finance minister recently announced a PPP model for food irradiation plants, and also to collaborate with the ministries of food processing, agriculture and consumer protection and agriculture on this. Apart from radio isotopes for the pharma industry. We believe it is a win-win situation for all.

<https://www.indiatoday.in/magazine/cover-story/story/20200824-an-indian-odyssey-1711052-2020-08-15>

THE TIMES OF INDIA

Sun, 16 Aug 2020

Course launched for NSTL Scientists

Visakhapatnam: In a first-of-its kind programme, the Indian Institute of Management, Visakhapatnam (IIM-V) has launched a 'Certificate Programme in Research and Development (R&D) Management' for the scientists of Naval Science & Technological Laboratory (NSTL)/Defence Research and Development Organisation (DRDO) on Saturday. It is being offered by IIM-V jointly with the Institute of Technology Management (ITM), DRDO.

In his inaugural address, KS Varaprasad, Distinguished Scientist and DG-HR, spoke about the importance of managerial skills in addition to technical skills. Dr Samir V Kamat, Distinguished Scientist and DG – NS&M, stressed on the importance of risk assessment and mitigation in his keynote address.

Prof M Chandrasekhar, director of IIM-V in his opening remarks, Dr OR Nandagopan, Director of NSTL and Sanjay Tandon, director of ITM in their respective addresses emphasised the need of continuous learning to become 'Atmanirbhar,' echoing the ideas of Prime Minister Narendra Modi.

Prof B Srirangacharyulu, dean and programme director, IIM-V, while giving the programme details mentioned that it will be rich in content and delivery. He said project management, concepts of R&D Management, R&D process, R&D support function, technology management, innovation, risk management, organisational behaviour are some of the topics that will be covered in the programme.

<https://timesofindia.indiatimes.com/city/vijayawada/course-launched-for-nstl-scientists/articleshow/77566561.cms>

Deal to buy 83 LCA Tejas Mark 1A Jets and indigenous attack Helicopters for IAF close to fruition

Prime Minister Narendra Modi while addressing the nation from the Red Fort on the occasion of India's 73rd Independence Day said that the deals to buy LCA Tejas aircraft and indigenous attack helicopters for the Indian Air Force (IAF) are close to fruition.

As per defence news website *Livefist*, this is the first time that either the LCA Tejas aircraft or the light combat helicopter have been mentioned in an Independence Day speech.

Under the indigenous defence deals, the government is expected to procure 83 indigenous Light Combat Aircraft (LCA) Tejas Mk.1A jets from HAL in a deal worth \$5.2 Billion.



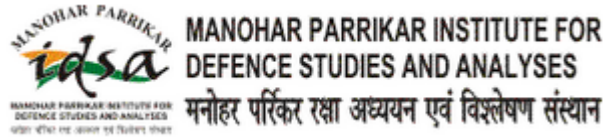
The final paperwork for the deal is reportedly complete and awaiting clearance from the Ministry of Finance.

LCA Mark 1A will be a more capable fighter than the original Mark 1 variant.

Mark 1A variant of the LCA will come with around 40 major and minor improvements over Mark 1. These improvements include the introduction of an active electronically scanned array radar for detection of enemy aircraft at greater ranges and resistance to jamming, and a faster turnaround of each aircraft after each sortie.

It was earlier reported that the HAL had ramped up production for the Light Combat Helicopter (LCH) in Bengaluru after getting a signal that a contract for the same is near.

<https://swarajyamag.com/insta/deal-to-buy-83-lca-tejas-mark-1a-jets-and-indigenous-attack-helicopters-for-iaf-close-to-fruition>



Sat, 15 Aug 2020

Impact of embargo on defence imports

By Amit Cowshish

The Ministry of Defence (MoD) announced an embargo on the import of 101 items through a press release issued on August 9, 2020¹. The annexure to this press release lists a wide range of embargoed ammunition, weapon systems, radars, simulators, and other platforms. The embargo will come into effect in December 2020 for 69 of the 101 items, and in phases between December of 2021 and 2025 for the remaining 32.

The objective of this exercise in self-restraint is to apprise the Indian defence industry about the anticipated requirements of the armed forces and offer it the opportunity “to manufacture the items in the negative list by using their own design and development capabilities or adopting the technologies designed and developed by Defence Research and Development Organisation (DRDO)”². The Technology Perspective and Capability Roadmap (TPCR) first issued in 2013 and later revised in 2018 had a similar objective,³ which is also the case with 53 ‘Make’ projects notified by the MoD.⁴

A second press release issued on August 10 clarifies that “for a product to be considered as an indigenous system, the percentage of indigenous content has to meet the minimum laid down specifications”, adding another dimension to the negative list.⁵ Read together, the two press releases indicate that the embargoed items must not only use technologies designed and developed by the Indian defence industry or the DRDO but also meet the specified requirement of indigenous content (IC).

In effect, it all boils down to one thing: from the date the embargo takes effect in respect of a particular item on the list, it can be procured only under the ‘Buy (Indian – Indian Designed, Developed and Manufactured)’ category, or ‘Buy (IDDM)’ for short, with IC of 40 per cent as stipulated in the Defence Procurement Procedure (DPP) 2016 but proposed to be raised to 50 per cent in the draft Defence Acquisition Procedure (DAP) 2020.

All other procurement categories envisaged in DPP-2016 – ‘Buy (Indian)’, ‘Buy and Make (Indian)’, ‘Buy and Make’, and ‘Buy (Global)’, or even ‘Make’ – or in DAP 2020 which includes a new category – Buy (Global – Manufacture in India) – would be irrelevant as all of them entail, or could potentially entail, procurement of products that are not designed and developed by the Indian industry or the DRDO. In most cases processed under these categories, the basic design and development are by foreign Original Equipment Manufacturers (OEMs).

If procurement of the embargoed items under ‘Buy (IDDM)’ category indeed constitutes the core of the exercise, the promulgation of the negative list may have little additional impact on furthering the cause of self-reliance in defence – a goal which is being pursued at least for the past 27 years since a committee headed by late Dr APJ Abdul Kalam recommended a plan in 1993 “to improve our self-reliance quotient from 30% in 1992 to 70% by 2005”.⁶ There is enough empirical evidence to support this.

The August 9 press release says that the negative list has been prepared by the MoD “after several rounds of consultations with all stakeholders, including Army, Air Force, Navy, DRDO, Defence Public Sector Undertakings (DPSUs), Ordnance Factory Board (OFB) and (the) private industry to assess current and future capabilities of the Indian industry for manufacturing various ammunition/weapons/platforms/equipment in India”.⁷

This leaves no doubt that the indigenously designed and developed items that figure in the negative list, with IC of 50 per cent (as proposed in DAP 2020), will be available when the embargo comes into effect.⁸ That being the case, the MoD will anyway have no option but to procure these items under the ‘Buy (IDDM)’ category which is the first of the five prioritised procurement categories prescribed in DPP-2016. The existing procedure will not allow the MoD to opt for any category that is lower down in the hierarchy of prioritised categories, like ‘Buy and Make’ or ‘Buy (Global)’.

The most likely impact of the negative list would, therefore, be on the number of procurement proposals getting approved under the ‘Buy (IDDM)’ category in the coming years. This should not affect proposals involving collaboration between the Indian industry and the foreign OEMs under other procurement categories and even the Strategic Partnership Model if the proposal does not relate to any item on the negative list.

Whatever be the advantage, the MoD has boxed itself into a corner by promulgating the negative list. If, for whatever reason, an indigenously designed and developed embargoed item with requisite qualitative requirements and IC is not available in the domestic market after the embargo comes into effect, and it is operationally imperative to procure it, there may be no choice left but to waive the self-imposed restriction. This could be time consuming, depending on what procedure is laid down to deal with such a situation.

Besides promulgation of the negative list, the August 9 press release also announced the bifurcation of the capital procurement budget 2020-21 for domestic and foreign procurements, earmarking nearly Rs. 52,000 crore for domestic capital procurement under a separate budget head. This amounts to roughly 50 per cent of the total capital budget allocated to the three services (excluding the allocation for DRDO, OFB and the Director General for Quality Audit) for the current year.⁹

Considering that the capital budget allocated to the services this year is approximately Rs. 59,416 crore less than what the services had asked for¹⁰ and the extent to which the allocated amount is already blocked for defraying expenditure on committed liabilities, the advantage of carving out a separate budget head to back up the negative list is not quite clear. It is also not known if this bifurcation is intended to be made a permanent feature of the capital budget in the coming years.

Formal bifurcation of the capital budget into two moieties could be problematic. For example, in a situation where funds remain unspent under one segment while the other segment is in dire need of additional funds, shifting of funds will require going through the time-consuming process of re-appropriation. The proposed bifurcation would also reinforce the unseemly practice of judging the efficacy of budgetary allocations through the prism of allocation and utilisation of funds, rather than with reference to the intended outcomes, measured in terms of accretion to the capability of the armed forces.

It would help if the MoD issues a formal order addressing the concerns expressed by various stakeholders about certain aspects of the negative list, especially its impact on ongoing and forthcoming projects that involve cooperation with the foreign OEMs, as well as the purpose of bifurcating the capital budget without increasing the overall allocation, which is the core problem besetting modernisation of the armed forces.

(Views expressed are of the author and do not necessarily reflect the views of the Manohar Parrikar IDSA or of the Government of India.)

1. [“MoD’s Big Push to Atmanirbhar Bharat initiative; Import embargo on 101 items beyond given timelines to boost indigenisation of defence production”](#), Press Information Bureau, Government of India, August 09, 2020.
2. Ibid.
3. See [TPCR-2013](#) and [TPCR-2018](#), Ministry of Defence, Government of India.
4. For details, see [‘Make-I’ Projects](#), [‘Make-II’ Projects - AIP Projects](#) and [‘Make-II’ Projects - Exploratory Projects](#), Make in India, Department of Defence Production, Ministry of Defence, Government of India.
5. [“Clarification: Indigenously manufactured items amongst negative list for imports”](#), Press Information Bureau, Government of India, August 10, 2020.
6. S. N. Misra, [“Self Reliance Index and the Enduring Legacy of Kalam”](#), Indian Defence Review, October 15, 2015.
7. Press Information Bureau, no. 1.
8. See Manoj Joshi, [“Make things, arms later: Why India needs to make its weapon system at home to extent it can”](#), The Economic Times, August 10, 2020.
9. [“Capital outlay on Defence Services”](#), Demand No. 20, Union Budget 2020-2021, Ministry of Finance, Government of India.
10. [“Demand for Grants \(2020-21\)”](#), Demand No. 20, Standing Committee on Defence (2019-20), Seventeenth Lok Sabha, Seventh Report, Lok Sabha Secretariat, March 2020, Para 1.7, p. 14. https://idsa.in/idsacomments/impact-embargo-on-defence-imports-acowshish-140820#footnoteref1_q5dlhur



Sat, 15 Aug 2020

If enemy attacks us, we'll give befitting reply like every time: Defence Minister Rajnath Singh

Addressing the armed forces of the country, he added that if the enemy country ever attacked India, like every time India will give it a befitting reply

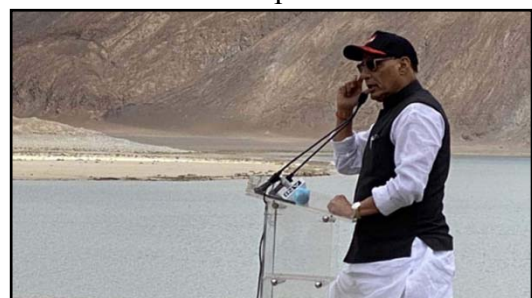
Edited By Ananya Das

Highlights

- **Rajnath Singh on Friday stated that whatever step India takes in the realm of national security, it is always for self-defence and not for attacking others.**
- **Addressing the armed forces of the country, he added that if the enemy country ever attacked India, like every time India will give it a befitting reply.**
- **The Defence Minister asserted that India has never attacked any place to capture the land of another country, adding that India believes in winning hearts, not land.**

Union Defence Minister Rajnath Singh on Friday stated that whatever step India takes in the realm of national security, it is always for self-defence and not for attacking others. Addressing the armed forces of the country, he added that if the enemy country ever attacked India, like every time India will give it a befitting reply.

The Defence Minister asserted that India has never attacked any place to capture the land of another country, adding that India believes in winning hearts, not land. Taking to micro-blogging site Twitter, the Defence Minister also added that this doesn't mean that India will let its self-esteem get hurt.



History is a witness to the fact that India has never attacked anywhere and anytime to capture the land of another country. India believes in winning hearts, not land. But this does not mean that we will let our self-esteem come. Whatever we do in the realm of national security, we always do it for self-defence and not for attacking others. If the enemy country ever attacked us, like every time we will give it a befitting reply," Singh tweeted in Hindi.

He also said, "Our forces are pioneers in the defence of the nation, so I assure you that the government is doing all that is necessary to maintain your high morale and fulfill your Operational Requirement.

The Defence Minister paid special tribute to the soldiers who sacrificed their lives in Galwan Valley. "This country can never forget his bravery and his supreme sacrifice. I want to assure their families that they are not alone but the whole country stands with their families," he said.

"Today the country is confident that no force can occupy our one inch of land while you are deployed. If someone dares to do this, then he has to suffer heavy consequences and will have to suffer even further," Singh said to the armed forces.

"My dear brothers and sisters of the armed forces, India is going to celebrate 74th Independence Day from midnight tonight. On this auspicious occasion, I extend my heartiest congratulations to all the soldiers and military officers working in the armed forces on behalf of the grateful nation. I wish all the serving personnel as well as ex-servicemen of the Army, Navy, Air Force and Coast Guard. I also congratulate the families whose loved ones are far away from them not only in difficult and inaccessible areas but also in the deep sea, said the Defence Minister.

"Prime Minister Narendra Modi while accepting the demand for reform in the field of defence, made a historic announcement on the Independence Day last year to form the CDS from the ramparts of Lal Qila. The formation of the CDS has also ensured better coordination between the armies. It will have far-reaching results," said the Defence Minister.

"You will remember that for a long time there was a lack of new modern combat aircraft in the Indian Air Force. As soon as our government arrived, respected Prime Minister, Narendra Modi, started a government-to-government agreement with France to procure 36 Rafale as soon as possible. It is good news that Rafale's consignments have started arriving. Five Rafale aircraft arrived at Ambala Air Base two weeks ago. The rest are also coming soon. Touch down of Rafale fighter aircraft in India marks the beginning of a new era in our military history," he stated.

He added, "In addition, 222 Squadron of Sukhoi MKI has been stationed at Thanjavur in Tamil Nadu which is equipped with BrahMos missile. This gives us Strategic Depth in the Indian Ocean."

"On May 2020, the 18th Squadron of Air Force Station Salur has been revived through the second camp of LCA Tejas. This is a major step towards self-sufficiency. Also, to make the Air Force's capability stronger, it has also been approved to purchase 21 MiG-29 aircraft," Singh stated.

Speaking on the coronavirus pandemic, he said, "The Armed Forces have always played a decisive role in any kind of disaster in the country from time to time. The year 2020 will be known as COVID-19 year in the pages of history. The whole world has stopped because of this epidemic. India is also not untouched by this. Ministry of Defense and its various organs viz. Armed Forces, AFMS, DRDO, DPSUs, OFB, Cantonment Council, Ex-Servicemen Welfare Board, National Cadet Corps and other autonomous units of the Ministry have been active from the very beginning for the prevention of coronavirus."

"The service work that the armed forces have done in times of crisis fills us with pride. DRDO in collaboration with Ministry of Home Affairs, Ministry of Health and Family Welfare, Armed Forces, and industry groups built the Sardar Vallabhbhai Patel COVID Hospital in New Delhi in a record time of 12 days. Border Road Organization personnel also deserve congratulations, who started a new era by establishing Kailash-Mansarovar Yatra and border area connectivity even in the most inaccessible conditions," said the Defence Minister.

He added, "With the completion of this important road connectivity, decades-old dreams and aspirations of local people and pilgrims have been fulfilled. With the completion of the

connectivity road, this Mansarovar Yatra can be completed in a week which used to take 2-3 weeks to complete."

"Last year, in honour of former prime minister Atal Bihari Vajpayee, on his birthday, Prime Minister Narendra Modi named the Rohtang Tunnel as 'Atal Tunnel'. This 8.8 km long tunnel is likely to be completed by September 2020. Due to its construction, the road distance between Manali and Leh will be reduced by 46 kilometres and the road will remain open for twelve months between Lahaul and Spiti," he further said.

Singh said, "Empowerment of women in the armed forces has been a major focus in the last five years. Prime Minister Narendra Modi has always supported the idea of the permanent commission of women and during his Independence Day speech of 2018, he also announced this. The Ministry of Defence has issued a formal government approval letter to provide a permanent commission to women officers in the Indian Army on July 23 and thus paved the way for empowering women officers to discharge large roles in the organization."

"The government has also decided to give invalid pension to our Armed Forces personnel who become disabled during the unequalled service of the nation under 10 years. Earlier this pension was only given to Armed Forces personnel serving 10 years or more. Apart from this, the amount of ex-gratia has been increased four times per Battle Casualty (fatal) and Battle Casualty (Disability 60 per cent and above) has been increased from the current Rs two lakh to Rs eight lakh," he added.

He concluded saying, "With these words, I once again extend my heartfelt congratulations to you and your family on the eve of the 74th Independence Day. We have got this freedom after hundreds of years of efforts and the sacrifice of our lives of millions of young people."

<https://zeenews.india.com/india/if-enemy-attacks-us-well-give-befitting-reply-like-every-time-defence-minister-rajnath-singh-2302820.html>

THE ECONOMIC TIMES

Sat, 15 Aug 2020

BEML teams up with IIT-Kanpur for Pilotless aircraft & Unmanned Aerial Vehicles

Synopsis

Both the organisations would synergise respective capabilities and undertake feasibility study, design and development, testing and validation of tactical UAVs and PTA, BEML said in a statement. BEML's MoUs with IIT-Kanpur and NASSCOM were signed in the virtual presence of Defence Minister Rajnath Singh and Chief of Defence Staff General Bipin Rawat, among others.

Bengaluru: Bengaluru-headquartered BEML said on Friday it would collaborate with IIT-Kanpur for joint indigenous development of pilotless target aircraft (PTA) and tactical unmanned aerial vehicles (UAVs).

Both the organisations would synergise respective capabilities and undertake feasibility study, design and development, testing and validation of tactical UAVs and PTA, BEML said in a statement.

"The jointly developed products will substitute the currently imported UAVs and PTA and aims to achieve self-reliance at a reduced cost," it said.

This, it said, would also help foster innovation and technology development in defence and aerospace by



Representative Image

engaging various industries, including MSMEs, start-ups, individual innovators, R&D institutes and academia.

"This will enable BEML achieve a quantum jump in defence and aerospace business and provide a big thrust in 'Atmanirbharta' in the defence sector. The potential customers will constitute the armed forces, paramilitary and civilian," the statement said.

Also, BEML announced that it is teaming up with NASSCOM CoE (Centre of Excellence) for artificial intelligence (AI) and Internet of Things (IoT)-related areas.

This tie-up aims at technical support for implementation of AI and IoT in BEML products and to set up incubation centre for start-ups, it stated.

BEML's MoUs with IIT-Kanpur and NASSCOM were signed in the virtual presence of Defence Minister Rajnath Singh and Chief of Defence Staff General Bipin Rawat, among others, the statement added.

<https://economictimes.indiatimes.com/news/defence/beml-teams-up-with-iit-kanpur-for-pilotless-aircraft-unmanned-aerial-vehicles/articleshow/77548921.cms>

BusinessLine

Sat, 15 Aug 2020

Atmanirbhar Bharat: BEL develops indigenous products used in strategic applications

Bengaluru: Bengaluru-based public sector Bharat Electronics Limited (BEL) has, indigenously developed Linear Variable Differential Transducer-LVDT (a motion sensing and feedback control device) that finds application in aerospace, missiles, solar, aircraft engines, wind energy and naval systems, and works in adverse climatic conditions.

The development of this product is a huge step for India towards self-reliance and is an import substitute which can save the country's foreign exchange of ₹ 100 crore over the next 2-3 years.

The company's products were launched by Defence Minister Rajnath Singh, on Thursday, through video conference as an Atmanirbhar Bharat initiative. Along with LVDT, 1kW Transmitter Aerial Switching Rack (ASR), indigenously developed for use in various strategic applications was also launched. The ASR is an import substitution for the HF Aerial switching Unit from USA and is likely to bring in FE savings of about ₹ 30 lakh per unit.

Gowtama MV, Chairman & Managing Director, BEL, gave a presentation to the Defence Minister on the products, which have been indigenously developed by BEL.

LVDT has been developed primarily for supply to DRDO labs Gas Turbine Research Establishment (GTRE) and Research Centre Imarat (RCI).

While the 1kW Transmitter Aerial Switching Rack (ASR) has been designed completely in-house by BEL, to be supplied as part of the Advanced Composite Communication System (ACCS) onboard Indian Naval ships.

The configuration caters for switching four numbers of High Frequency (HF) Transmitters to four numbers of HF Antenna with Antenna Tuning Unit (ATU) in any combination. This enables users to switch any radio to any of the Antenna for redundancy. The system can be remotely controlled in the IP based Network.

<https://www.thehindubusinessline.com/companies/atmanirbhar-bharat-bel-develops-indigenous-products-used-in-strategic-applications/article32353760.ece#>



दुश्मनों के युद्धपोतों पर रहेगी भारतीय नौसेना की पैनी नजर, खरीदने जा रही है 10 खास तरह के ड्रोन

रक्षा सूत्रों ने बताया कि नौसेना की योजनाओं के अनुसार

ड्रोंनों को बड़े आकार के युद्धपोतों पर तैनात किया जाएगा।

नई दिल्ली: हिंद महासागर क्षेत्र में दुश्मनों पर पैनी नजर रखने के लिए भारतीय नौसेना अपनी उच्च क्षमता को और अधिक बढ़ाने में लगी हुई है। दुश्मनों के युद्धपोतों पर निगरानी रखने के लिए भारतीय नौसेना ने तत्काल 10 जलपोत ड्रोन खरीदने के लिए प्रस्ताव पारित किया है, इन ड्रोंनों से दुश्मनों के युद्धपोतों पर कड़ी नजर रखी जा सकेगी।

समाचार एजेंसी एएनआइ के सरकारी सूत्रों के अनुसार 'रक्षा मंत्रालय के समक्ष भारतीय नौसेना द्वारा फास्ट ट्रेक मोड में एक प्रस्ताव लाया गया है, जिसके तहत भारतीय नौसेना 10 जलपोत मानवरहित ड्रोन खरीदने की योजना बना रही है।'

अन्य विरोधी गतिविधियों का पता लगाने में मिलेगी मदद

रक्षा सूत्रों ने बताया कि नौसेना की योजनाओं के अनुसार, ड्रोंनों को बड़े आकार के युद्धपोतों पर तैनात किया जाएगा और उन्हें चीनी और साथ ही भारतीय प्रादेशिक जल में और आसपास के अन्य विरोधी गतिविधियों का पता लगाने में मदद मिलेगी। योजना के अनुसार, नौसेना को इन ड्रोंनों को खुली बोली के माध्यम से हासिल करने और फिर निगरानी और सैन्य परीक्षण की गतिविधियों के लिए अपने युद्धपोतों पर तैनात करने की संभावना है।



रक्षा सूत्रों ने बताया कि नौसेना की योजनाओं के अनुसार ड्रोंनों को बड़े आकार के युद्धपोतों पर तैनात किया जाएगा।

बता दें कि भारतीय नौसेना संयुक्त राज्य अमेरिका से सी गार्डियन ड्रोन का अधिग्रहण करने के लिए अलग से एक परियोजना पर काम कर रही है, जो देश के क्षेत्रों में अपनी निगरानी को मेडागास्कर से लेकर मलक्का जलडमरूमध्य तक और उससे आगे बढ़ाने के लिए है।

गौरतलब है कि नौसेना को अपने मौजूदा ड्रोंनों को अपग्रेड प्रोग्राम के हिस्से के रूप में अपग्रेड किया जा रहा है, जिसे हाल ही में रक्षा मंत्रालय में चर्चा के लिए लिया गया था।

वहीं, दूसरी ओर भारत चीन तनाव के बीच डीआरडीओ ने एक उच्च क्वालिटी का ड्रोन विकसित किया है। इस ड्रोन का नाम भारत रखा गया है। पूर्वी लद्दाख के वास्तविक नियंत्रण रेखा (LAC) के ऊंचाई वाले क्षेत्रों और पहाड़ी इलाकों में सटीक निगरानी रखने के लिए भारत नाम का अपना स्वदेशी ड्रोन बनाया गया है। भारत ड्रोन को इंडियन आर्मी को सौंप दिया गया है।

https://www.jagran.com/news/national-indian-navy-to-urgently-buy-10-ship-based-drones-20627988.html?itm_source=website&itm_medium=homepage&itm_campaign=p1_component

Indian Navy to urgently procure 10 ship-based drones

Indian Navy has pushed forward a proposal to urgently acquire 10 ship-borne drones that will help the force keep a close eye on the activities of the adversaries

By Sangeeta Nair

Indian Navy has pushed forward a proposal to urgently acquire 10 ship-borne drones that will help the force keep a close eye on the activities of the adversaries.

The procurement order is aimed at boosting the surveillance capabilities of the Indian Navy against enemy warships operating in the Indian Ocean Region.

The proposal has been fast-tracked by the Indian Navy before the Defence Ministry. The proposal comprises plans to procure 10 naval ship-based Unmanned Aerial Systems for over Rs 1,240 crores.

Why does the Indian Navy require the drones urgently?

As per reports, the Indian Navy plans to deploy the drones on big size naval warships. The drones will help the warships in the detection of activities by Chinese as well as other adversaries in and around Indian territorial waters.

Significance

The Indian Navy is likely to procure the drones through an open bid as per plans and deploy them on its warship for surveillance purposes and reconnaissance activities.

Background

The Indian Navy is also working on a project to acquire 'Sea Guardian Drones' from the United States to expand its surveillance capabilities. The Navy is also getting its existing drones upgraded as a part of an upgrade programme that was recently implemented after talks with the Union Defence Ministry.

<https://www.jagranjosh.com/current-affairs/indian-navy-to-urgently-procure-10-shipbased-drones-1597411030-1>



This Independence Day, India must commit to long-pending defence reforms

The need for consistency and objectivity in handling the defence forces and their employment, including maintaining the status they deservedly ask for, needs to be urgently addressed by the government

By Amrit Pal Singh

With the nation catapulted into the Galwan face-offs and ugly Stone Age fighting in the desolate heights of Ladakh, the lack of a coherent policy and a lackadaisical approach to national security came back to haunt us once again.

The following of border management protocols in a purely military confrontation that led to hand to hand combat, and the proverbial intelligence miss on the Chinese buildup have led to the defence forces either being surprised or unprepared in the face of aggressive Chinese action.

The events on the LAC since May 2020 have clearly highlighted the ‘fits-and-starts’ approach that defence policy makers and planners have towards strengthening India’s defence preparedness.

Daniel Byman a senior fellow as Brookings institution has commented, “The fear that terrorism generates can distort public debates, discredit moderates, empower political extremes and polarise societies.”

The Uri and Balakot strikes did just that – they generated national fervour and were exploited to the hilt by political parties for their own vote garnering rather than fostering capacity building within the forces. The only visible and obvious result of the actions have been to drum up fear and justify polarisation by painting the dispensation as being patriotic and strong on national security – all well timed to coincide with crucial national and regional electoral exercises.

Apathy towards Defence Modernisation

Successive governments have short shifted the defence forces despite proclaiming them to be the holy cow.

Defence spending, procurements and modernisation have all been victims of government apathy and a propensity to go for populist schemes such as debt waiver and subsidies have all been to garner votes and power. A larger than life importance has been attributed to countering terror and insurgencies with conventional war fighting and modernisation of equipment has been given the go by.

Consistent pressure for reduction in defence budget and raised eyebrows at the ‘high’ costs of defence pay and pensions have taken primacy. Why blame the politicians and bureaucrats, there is a massive military constituency of self-proclaimed experts which also subscribes to the ‘there-won’t-be conventional-conflict’ theory and thrives on its benefits.

The case of shelving of the mountain strike corps highlights inconsistency in planning and implementation. Hopefully, China’s latest forays on our northern borders have shaken the establishment out of this stupor.

Bureaucratic interference in the garb of ‘Civilian Control’ which rightfully means control of armed forces by the elected representatives (and not bureaucrats) presents a strong case for curbing them bureaucrats from taking actions that exacerbate and vitiate the working climate in the Ministry of Defence.

The strong urge of the bureaucratic fraternity to maintain supremacy over the defence forces focuses more on seniority and power play issues rather than comprehensive security needs.

Contrasting reforms

The present government kickstarted major restructuring when it approved in March 2019 what is seen as a first phase of reforms in the Indian Army.

A few more noticeable actions have been the creation of the Defence Procurement Committee (DPC) headed by the NSA to streamline defence procurement. This move has not been supported by budgetary provisions. 'Make in India' especially in the defence sector is largely JV-based with indigenous capacity taking a hit.

There, however, is one obvious noticeable difference in the Chinese 'transformation' and Indian 'reforms'. The reforms while suggesting new structures and reductions stem primarily from a realistic assessment of the restrictions on defence spending and budgetary constraints.

In all, there has been a drastic reduction in defence spending as ruling political dispensations have without exception relegated national security to overtures by diplomats and showcasing of joint training of defence forces with foreign armies. The underlying theme and hope is that of conflict avoidance. However, given the hostile neighbourhood that India is saddled with, these hopes are pipe dreams despite a few personalised one-on-one summits and lofty declarations of peace and friendship.

Meanwhile, the Chinese PLA in the intervening years has undergone a drastic reduction in size in exchange for leaner and more mobile battle formations. The PLA has reduced its size by half by retrenching and restructuring to strengthen its Air Force and Navy and created new strategic units. The 'transformational changes,' as they have been termed, have seen the rocket force and the strategic support force gain in prominence in line with China's thrust to make the PLA less a homeland defence force and more of a force that can project its might overseas.

The speed and range of the reforms stem from Xi- Jinping's personal involvement and impetus to them, albeit to consolidate his and the Chinese Communist Party's hold on the PLA. Pakistan too has initiated reorganisation of its rapid reaction forces and frontline formations. Apparently, both China and Pakistan are far ahead in their respective restructuring of forces.

Gaps in Intelligence, Surveillance and Reconnaissance capabilities (ISR) have always been a concern and have led to the present massive build up and stand-off. Severe shortages in major equipment such as fighter aircraft, artillery guns and ammunition for weapon systems have manifested over years due to low priority for defence procurements. Some of these have figured prominently in the purchase agreements inked during the defence Ministers visit to Moscow for the RIC summit.

Ammunition shortfalls have been a limiting factor for Indian conventional force operations in the past, especially for the Indian Army.

India's official audit agency assessed in 2016 that India lacked sufficient reserves in around 85 out of 170 critical ammunition categories for a scenario of an intense 10-day war.

The defence forces have now ostensibly been given a free hand to go shopping for their shortfalls in a crisis mode. Obviously, we will procure items by paying enormous premiums for what could have been procured by sensible and long term contracts placed well in time had we resorted to prioritised capacity building.

These short term measures notwithstanding, it is the mid and long term focus that needs to be calibrated without any political agenda and with an all-party consensus.

Restructuring of the existing command and control organisations, integrating all ISR resources, modernisation of equipment, creating a robust logistics network and the incorporation of technological advances in war fighting needs impetus. While defence spending is likely to be capped at the present levels, the in-house expertise in space and software development can be honed to provide a battle winning edge.

The means and structures to tackle emerging and existing non-conventional threats such as cyber and space based threats need to be addressed as the Chinese have built a formidable capacity in these domains.

The nation's security structure has to be based on modern weapons and equipment wielded by a committed fighting force. The need for consistency and objectivity in handling the defence forces and their employment, including maintaining the status they deservedly ask for, needs to be urgently addressed by the government.

Defence reforms will need to be comprehensive and in synchronisation with each other. The government will have to ensure that one reform does not fall by the wayside for the other. There is a long road ahead but a committed start has to be made.

Maintaining continuity with a long term perspective in capability development must stand the test of leadership changes both in the hierarchy of the army and in government over the long run.

Major General Amrit Pal Singh (Retd) was Divisional Commander of an Army division in Northern command and Chief of operational logistics in Ladakh (2011 to 2013). He has experience in counter insurgency operations in J&K and conventional operations in Ladakh and is co-author of a book 'Maoist Insurgency and India's Internal Security Architecture'.

<https://thewire.in/security/defence-procurement-reforms-army-armed-forces>

hindustantimes

Sat, 15 Aug 2020

Military talks with China hit roadblock as Indian Army plays hardball, say top officials

Five rounds of top-level military talks have failed to break the border deadlock due to serious differences between the two sides in the Finger Area near Pangong Tso and the PLA's reluctance to vacate positions held by it in what New Delhi claims as Indian territory

By Rahul Singh

New Delhi: Military talks with China on reducing tensions along the Line of Actual Control (LAC) have hit a roadblock, with the Indian Army playing hardball with the People's Liberation Army (PLA) in its attempts to restore status quo ante of early April in eastern Ladakh.

The Indian Army has also asserted that the sanctity of the LAC is non-negotiable, top government officials said on Friday on condition of anonymity.

Five rounds of top-level military talks have failed to break the deadlock due to serious differences between the two sides in the Finger Area near Pangong Lake and the PLA's reluctance to vacate positions held by it in what New Delhi claims as Indian territory.

"Talks are stuck in a stalemate because of the India Army's insistence that the PLA must withdraw to positions held by it as of April 2020, and the Chinese reluctance to restore status quo ante in some areas," said one of the officials cited above.

The Finger Area—a set of eight cliffs jutting out of Sirijap range overlooking Pangong Lake—has emerged as the hardest part of the disengagement process with little hope of immediate resolution. Disengagement has progressed somewhat smoothly at friction points in Galwan Valley and Hot Springs, but its pace remains sluggish in Gogra area.

"The Indian Army has clearly told the PLA that shifting of the LAC in any area is not acceptable. This was most recently conveyed on August 2, when corps commanders from the two sides met. There is no question of us budging," said a second official.

There is growing consensus among Indian officials and China experts that military talks are unlikely to deliver further results, and the resolution of the issue will require politico-diplomatic intervention.

"The PLA is facing unanticipated consequences of its misadventure in Ladakh because of the Indian Army's strong response. It will ultimately have to look for a face-saving exit strategy. We have made preparations for a long haul," said a third official.

De-escalation along the disputed border can only begin after complete disengagement between the two armies on the LAC. The ground situation remains unchanged in Ladakh sector, where both armies have deployed almost 100,000 soldiers and weaponry in their forward and depth areas.

On August 10, chief of defence staff Gen Bipin Rawat informed a committee of lawmakers that de-escalation in Ladakh could be a long-drawn process but the Indian military is prepared for this and has made all arrangement for the long haul through the harsh winter.

“Our posturing is unambiguous – status quo ante has to be restored and we will not accept any shifting of the LAC. The ball is in China’s court now. Achieving our goal will take time and we will have to be patient,” said Lt Gen (retired) Vinod Bhatia, a former director general of military operations.

The August 2 military negotiations between corps commanders came three days after Chinese ambassador Sun Weidong said his country’s traditional boundary line on the northern bank of Pangong Lake was in accordance with the LAC and there was no case of Beijing expanding its territorial claim.

Sun’s contention was a clear indication of the Chinese hard line on its claims in the Finger Area. Before PLA grabbed positions on Finger Four overlooking Indian deployments, the Indian Army would patrol right up to Finger Eight that New Delhi considers within Indian territory.

The new positions held by PLA have curtailed the scope of Indian patrols. Fingers Four and Eight are 8 km apart.

During a visit to Ladakh on July 17, defence minister Rajnath Singh said progress in negotiations should help resolve the border dispute but added he “couldn’t guarantee to what extent the situation will be resolved”.

The sizeable Chinese troop presence at friction points, particularly Pangong Lake and Depsang, remains a concern, with Beijing yet to deliver on understandings regarding disengagement reached during the July 5 phone conversation of the Special Representatives on the border issue and meetings of corps commanders.

<https://www.hindustantimes.com/india-news/military-talks-with-china-hit-roadblock-as-indian-army-plays-hardball-say-top-officials/story-VwfgQ11txXNRg4JFYH29YO.html>



Sun, 16 Aug 2020

Women in the force: Steady, slow steps

With the Indian Army deploying ‘Rifle Women’ near the Line of Control in Jammu and Kashmir, the debate about women being allowed in combat roles in the three forces has come back in focus

By Krishn Kaushik, Deeptiman Tiwary

New Delhi: On July 3, in his address to soldiers in Nimu, barely 40 km from Leh, Prime Minister Narendra Modi, while referring to women personnel of the Army and paramilitary, said, “I am looking at women soldiers in front of me. In the battlefield at the border, this view is inspiring.”

With the Indian Army deploying ‘Rifle Women’ — the women’s unit of the Assam Rifles, a paramilitary force over which the Army has operational control — near the Line of Control in Jammu and Kashmir, the debate about women being allowed in combat roles in the three forces has come back in focus.

Earlier this year, when the Supreme Court asked the Army to open the doors of Permanent Commission to women in all non-combat streams, it had elicited a similar debate about the possibility of women participating in combat roles, including as leaders, in the future.

In a first step, the government had last year announced that it would start recruiting women in the Corps of Military Police, which is responsible for the security of military establishments.

The government started the process in April 2019, by recruiting the first batch of 100 women on soldier general duty in the Military Police. The Army has now sought applications for the second batch of women personnel. The government intends to recruit 1,700 women soldiers in a phased manner over the years till they make up 20 per cent of the Corps of Military Police.

On November 18 last year, responding to a question in the Rajya Sabha, Defence Minister Rajnath Singh mentioned that the “Indian Army has a plan for phased induction of women in below Officer Rank in the Corps of Military Police,” and added that “presently, there is no proposal for additional recruitment of women in Army”.

Even as women are recruited in all other non-combat streams in the Army, the options for women in Navy and Air Force are broader. Prime Minister Narendra Modi mentioned this on Saturday, in his speech for the 74th Independence Day.

“Today if women are working underground, in coal mines, then the daughters of my country are also kissing the limits of the sky by flying fighter planes. Today India is one of those nations where women are being included in combat roles in Navy and Air Force.”

At different stages, women have been given combat roles in the Central Reserve Police Force (CRPF), Border Security Force (BSF), Central Industrial Security Force (CISF), Indo-Tibetan Border Police (ITBP) and the Sashastra Seema Bal (SSB), with all these forces now allowing women entry at the officer level.

The last force to do so was ITBP, which notified rules for entry of women officers in 2018. Among the five paramilitary forces, called the Central Armed Police Forces (CAPFs), the CRPF and the CISF have been allowing women to apply as direct-entry officers through the UPSC for a long time.

Two other forces — BSF and SSB — were allowed to directly induct women officers in 2013 and 2014 respectively.

The Union Home Minister, Rajnath Singh, had in 2016 announced that women would account for 33 per cent of constable-rank personnel in CRPF and CISF, and 15 per cent in the BSF, SSB and ITBP.

However, no force has so far been able to give more than 5% representation to women.

The five CAPFs have around nine lakh personnel. However, only 25,878 of these are women, according to an answer provided by the Ministry of Home Affairs in Lok Sabha on November 19, 2019.

<https://indianexpress.com/article/india/pm-speech-narendra-modi-women-soldiers-military-police-6556487/>



In a first step, the government had last year announced that it would start recruiting women in the Corps of Military Police, which is responsible for the security of military establishments. (File photo)

Russia to modify Sukhoi-30 fighters to carry 1,000km-range missile: Report

The Kh-32 missile is estimated to have a speed of over 3 times the speed of sound

The Sukhoi Su-30 fighter is considered to be one of the most successful Russian defence export programmes in the past two decades. The Su-30 is the backbone of the Indian Air Force, which operates around 250 Su-30MKI jets, a unique version specifically designed for India.

The Su-30 is in service with about 12 nations including China, Vietnam, Malaysia, Algeria and Venezuela.

The Russian Air Force also purchased a version of the Su-30 fighter, called the Su-30SM. The Su-30SM first flew in 2012 and the Russian military has ordered around 116 jets. Russia has already announced it plans to upgrade the Su-30SM fighter.

Izvestia, a Russian media outlet, reported this week the Su-30SM fighters will receive new "heavy" air-to-surface missiles. *Izvestia* reported the Russian military plans to modify the Su-30SM to carry the Kh-32 supersonic air-to-surface missile. The Kh-32 missile is believed to have a range of up to 1,000km and can be used against both ships and ground targets.



An Su-30SM | Ministry of Defence of the Russian Federation

US analysts have claimed the Kh-32 missile, which uses radar guidance, would allow Russian aircraft to target US Navy aircraft carriers without getting in range of defending fighters. The Kh-32 can carry either a nuclear or conventional warhead. In its 2018 *Nuclear Posture Review* document, the US Department of Defence categorised the Kh-32 as a nuclear weapons delivery system.

The Kh-32 missile is estimated to have a speed of over 3 times the speed of sound, while some Russian media outlets have even claimed it is hypersonic (at least five times speed of sound). The Kh-32 is a heavy weapon, with an estimated weight of nearly six tonnes. The Kh-32, reportedly, became operational in 2016 and is primarily carried by the Tu-22M3 bomber.

Izvestia reported the Kh-32 can be carried on the 'centreline' hardpoint under the fuselage of the Su-30SM. Typically, aircraft can carry their heaviest weapons or fuel tanks under the fuselage.

Russia has already mounted hypersonic air-to-surface weapons on a smaller warplane. In 2018, it unveiled the Kinzhal missile, which is believed to have a range of around 2,000km. The Kinzhal is mounted on the MiG-31 heavy fighter, with the aircraft carrying one missile on its centreline. However, the MiG-31 is an ageing platform, which has been in service since the 1980s.

Adding the Kh-32 to the Su-30SM would bring a considerable boost to the Russian military's offensive capabilities.

Interestingly, the Indian Air Force is modifying the Su-30MKI to carry the air-launched version of the BrahMos cruise missile.

<https://www.theweek.in/news/world/2020/08/14/russia-to-modify-sukhoi-30-fighters-to-carry-10-00km-range-missile-report.html>

Sun, 16 Aug 2020

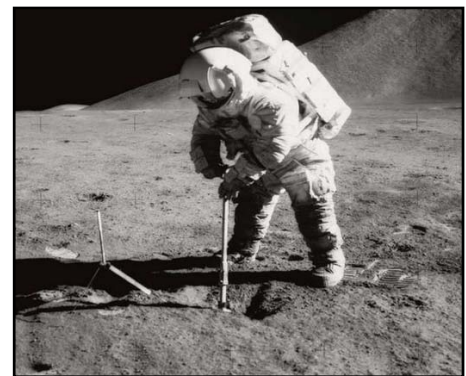
ISRO and IISc scientists make ‘space bricks’ from urea for buildings on Lunar surface

According to the statement of IISc, the newly developed brick-like structures exploit lunar soil and uses bacteria and guar beans to consolidate the soil into possible load-bearing structures

New Delhi: In a first, Indian scientists from Indian Institute of Science (IISc) and the Indian Space Research Organisation (ISRO) has developed a sustainable process for making brick-like structures on the moon.

According to the statement of IISc, the newly developed brick-like structures exploit lunar soil and uses bacteria and guar beans to consolidate the soil into possible load-bearing structures.

"These space bricks could eventually be used to assemble structures for habitation on the moon's surface, the researchers suggest. It is really exciting because it brings two different fields biology and mechanical engineering together," says Alope Kumar, Assistant Professor in the Department of Mechanical Engineering, IISc, one of the authors of two studies recently published in "Ceramics International" and "PLOS One".



Representational Image

The statement by IISc further stated that the cost of sending one pound of material to outer space is about Rs 7.5 lakh. The process developed by the IISc and ISRO team uses urea which can be sourced from human urine and lunar soil as raw materials for construction on the moon's surface, which helped in decreasing the overall expenditure considerably.

The process also has a lower carbon footprint because it uses guar gum instead of cement for support. This could also be exploited to make sustainable bricks on Earth, it was stated. Some micro-organisms can produce minerals through metabolic pathways.

One such bacterium, called "Sporosarcina pasteurii" produces calcium carbonate crystals through a metabolic pathway called the ureolytic cycle: it uses urea and calcium to form these crystals as byproducts of the pathway.

"Living organisms have been involved in such mineral precipitation since the dawn of the Cambrian period, and modern science has now found a use for them," says Alope Kumar.

To exploit this ability, Kumar and colleagues at IISc teamed up with ISRO scientists Arjun Dey and I Venugopal. They first mixed the bacteria with a simulant of lunar soil. Then they added the required urea and calcium sources along with gum extracted from locally-sourced guar beans.

To exploit this ability of the bacteria, IISc scientists and ISRO researchers teamed up and first mixed the bacteria with simulant of lunar soil. Then they added the urea and calcium sources along with gum extracted from locally-sourced guar beans to increase the strength of the material.

The final product obtained after a few days of incubation was found to possess significant strength and machinability, the statement said.

"Our material could be fabricated into any free form shape using a simple lathe. This is advantageous because this completely circumvents the need for specialised moulds a common problem when trying to make a variety of shapes by casting.

This capability could also be exploited to make intricate interlocking structures for construction on the moon, without the need for additional fastening mechanisms," explains Koushik Viswanathan, Assistant Professor in the Department of Mechanical Engineering, IISc, another author.

After testing different soil samples in Bengaluru, the researchers found an ideal candidate with similar properties: "Bacillus velezensis".

"We have quite a distance to go before we look at extra-terrestrial habitats. Our next step is to make larger bricks with a more automated and parallel production process," says Kumar.

"Simultaneously, we would also like to further enhance the strength of these bricks and test them under varied loading conditions like impacts and possibly moonquakes," he added.

(With PTI Inputs)

<https://english.jagran.com/trending/isro-and-iisc-scientists-make-space-bricks-from-urea-for-buildings-on-lunar-surface-10015318>

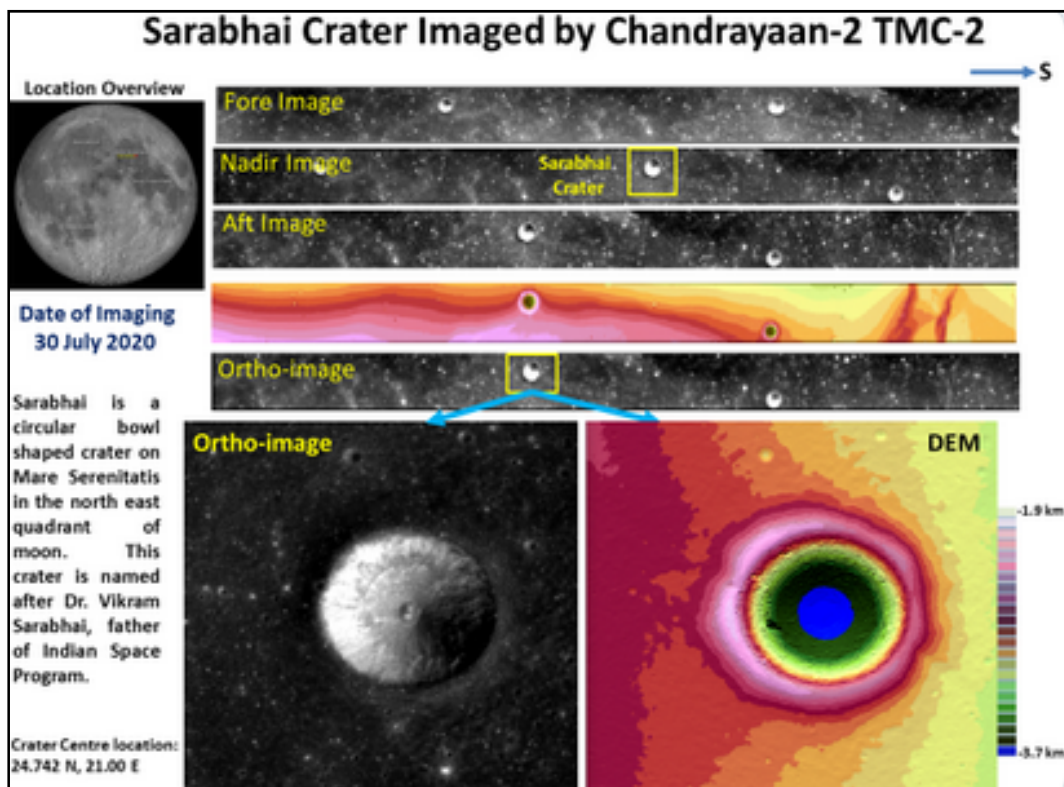
The Tribune

Sat, 15 Aug 2020

Chandrayaan-2 captures image of crater on Moon; ISRO names it after Vikram Sarabhai

Recent achievements of the ISRO have placed India as a frontline nation of the world and is a vindication of Sarabhai's visionary dream

New Delhi: Chandrayaan-2 has captured images of the Moon and one of the craters has been named after Vikram Sarabhai, the father of the Indian space programme, a statement said on Friday.



Minister of State in the Prime Minister's Office Jitendra Singh said as Sarabhai's birth centenary year completed on August 12, this is a thanksgiving tribute to the scientist.

Singh added that the recent achievements of the ISRO, which have placed India as a frontline nation of the world, is a vindication of Sarabhai's visionary dream.

The Department of Space directly comes under the Prime Minister's Office.

"The Indian Space Research Organisation (ISRO) has sought to pay tribute to him in a special way by announcing that Chandrayaan-2 Orbiter has captured the Moon images of 'Sarabhai Crater'," the statement quoting Singh said.

The Sarabhai Crater is around 250 to 300 kilometres east of the crater where the Apollo 17 and Luna 21 Missions had landed.

The statement said: "The Sarabhai Crater, captured in 3D images, shows that it has a depth of around 1.7 kilometres taken from its raised rim and the slope of crater walls is between 25 to 35 degrees. These findings will help space scientists understand further the process on the lunar region filled with lava."

"Chandrayaan-2 continues to perform as per the design and provides valuable scientific data. The public release of scientific data from Chandrayaan-2 for global use will begin in October 2020," it added.

Planned to land on the South Pole of the Moon, Chandrayaan-2 was launched on July 22. However, the lander Vikram hard-landed on September 7, crashing India's dream to become the first nation to successfully land on the lunar surface in its maiden attempt.

The orbiter of the mission is working fine and has been sending data. PTI

<https://www.tribuneindia.com/news/nation/chandrayaan-2-captures-image-of-crater-on-moon-isro-names-it-after-vikram-sarabhai-126509>



Sat, 15 Aug 2020

Investigation of five-layered cuprate reveals Fermi pockets

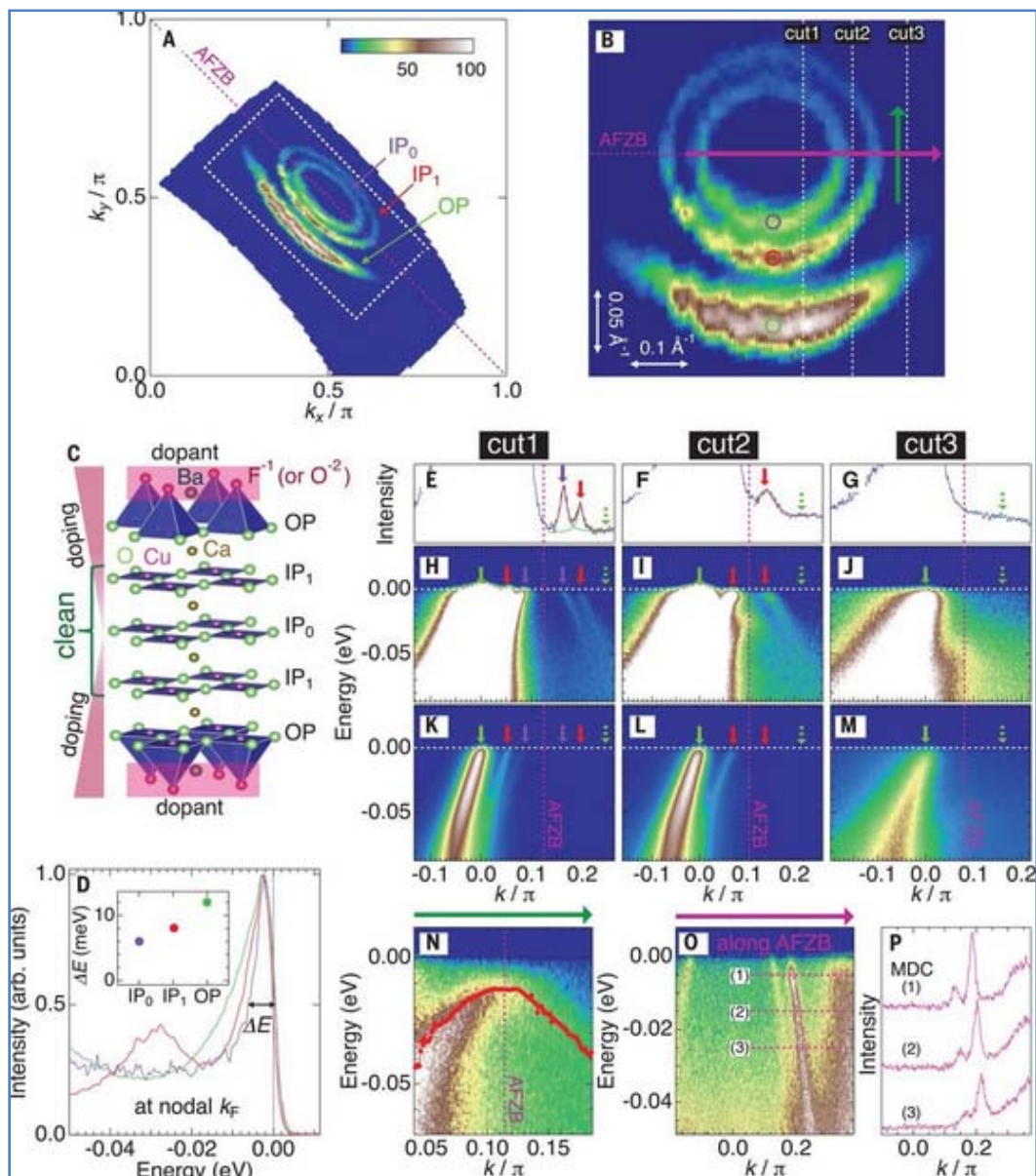
By Bob Yirka

A team of researchers affiliated with a host of institutions in Japan and one in the U.K has observed Fermi pockets during experiments with a five-layered cuprate, confirming theories. In their paper published in the journal *Science*, the group describes their study of the cuprate $\text{Ba}_2\text{Ca}_4\text{Cu}_5\text{O}_{10}(\text{F},\text{O})_2$ and what they learned about superconductivity. Inna Vishik with the University of California Davis, has published a Perspective piece in the same journal issue giving background on superconductivity research involving cuprates and their transition temperatures and outlining the work done by the team in Japan.

Cuprates are defined by their anionic copper complexes. They also have the highest transition temperatures for superconducting materials. Superconductors are, of course, materials that allow electricity to pass through them without resistance. Most materials must undergo treatment to become superconducting, such as being chilled. Such materials thus have a transition stage when they change from a regular conductor to a superconductor.

As Vishik notes, prior research has shown that cuprates possess some of the highest transition temperatures, making them inviting targets of investigation. Over the past several years, a considerable amount of work has shed light on the factors that contribute to superconductivity, but thus far, it is still not very well understood. Vishik notes that researchers have studied just a few cuprates, despite the hundreds of cuprates to choose from. It was for this reason that the team in

Japan chose to study a cuprate that has seen little to no research, the quintuple-layer cuprate, $\text{Ba}_2\text{Ca}_4\text{Cu}_5\text{O}_{10}(\text{F},\text{O})_2$.



Small Fermi pockets revealed by laser-ARPES. Credit: Science (2020). DOI: 10.1126/science.aay7311

The work involved doping the cuprate in a Mott insulator—a task that in the past has proved challenging. Theory has suggested that if a small concentration of charge carrier is added to a Mott insulator, Fermi pockets should become observable. The researchers were able to overcome problems experienced by other researchers due to their choice of cuprate. It has a unit cell with five copper oxide planes instead of the normal two, making it much easier to observe the pockets as they became visible. The researchers were able to see two of them in their work, bolstering the theories that predicted them.

More information: "Observation of small Fermi pockets protected by a clean CuO_2 sheet of a high- T_c superconductor" *Science* (2020). [science.sciencemag.org/cgi/doi ... 1126/science.aay7311](https://science.sciencemag.org/cgi/doi/10.1126/science.aay7311)

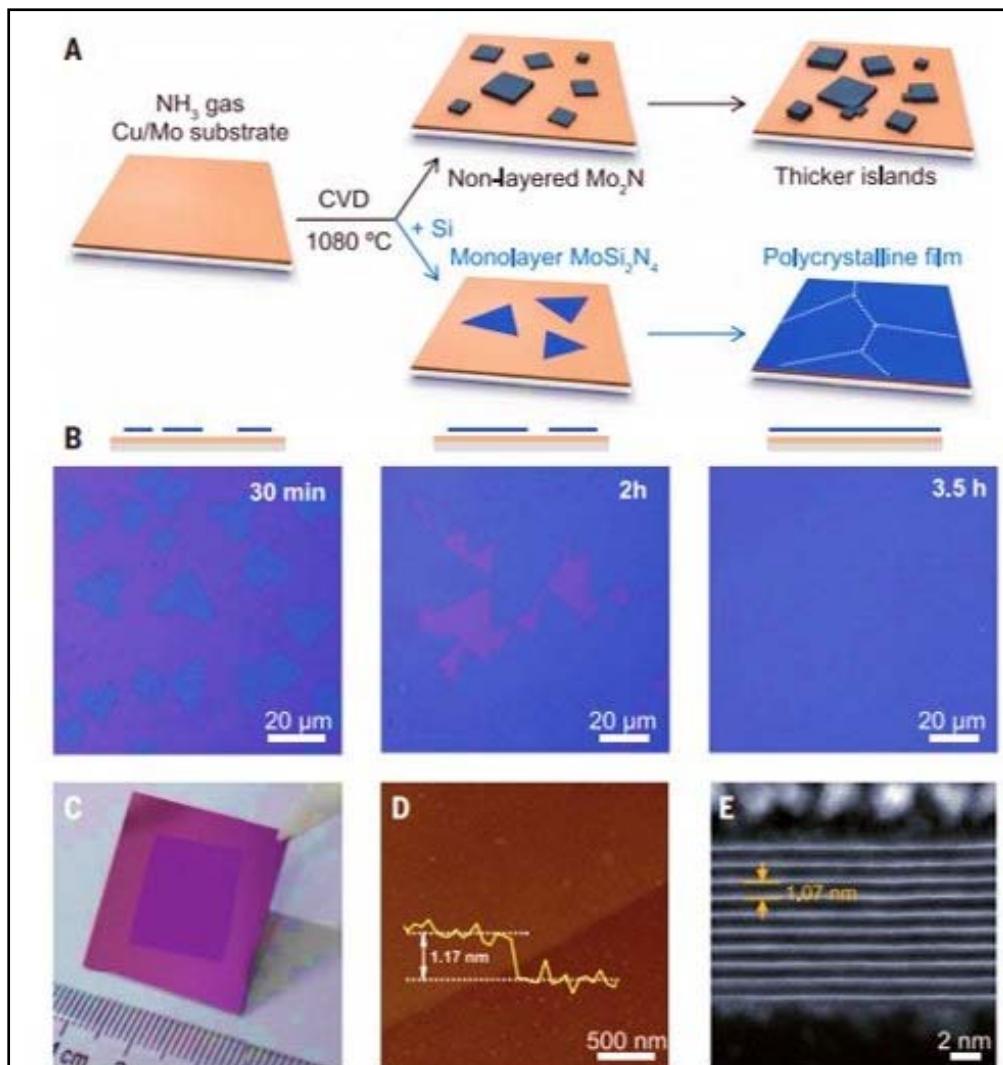
Journal information: *Science*

<https://phys.org/news/2020-08-five-layered-cuprate-reveals-fermi-pockets.html>

Stabilizing monolayer nitrides with silicon

By Thamarasee Jeewandara

In a new report published in *Science*, Yi-Lun Hong and a group of research scientists in materials science, engineering, and advanced technology in China and the U.K. investigated two-dimensional (2-D) materials to discover new phenomena and unusual properties. The team introduced elemental silicon during chemical vapor deposition-based growth of molybdenum nitride to passivate its surface and develop centimeter-scale, monolayer nitride films with silicon such as MoSi_2N_4 . They built the monolayer film with seven atomic layers in the order of nitrogen-silicon-nitrogen-molybdenum-nitrogen-silicon-nitrogen (N-Si-N-Mo-N-Si-N), and the resulting material showed semiconducting behavior and excellent stability under ambient conditions. Using density functional theory (DFT) calculations, the scientists predicted a large family of such monolayer structured 2-D materials to exist with useful applications as semiconductors, metals and magnetic half-metals.



Chemical vapor deposition growth of MoSi_2N_4 . (A) Schematic of two CVD growth processes, showing that layered MoSi_2N_4 is formed by simply adding Si during the growth of nonlayered 2D Mo_2N . (B) Optical images of MoSi_2N_4 grown by CVD for 30 min, 2 hours, and 3.5 hours, illustrating the formation process of a monolayer MoSi_2N_4 film (schematic shown at top). The samples were transferred onto SiO_2/Si substrates. (C) Photograph of a CVD-grown 15 mm \times 15 mm MoSi_2N_4 film transferred onto a SiO_2/Si substrate. (D) A typical AFM image of MoSi_2N_4 film, showing thickness of ~ 1.17 nm. (E) Cross-sectional HAADF-STEM image of a thick MoSi_2N_4 domain, showing a layered structure with an interlayer spacing of ~ 1.07 nm. Credit: *Science Advances*, doi: 10.1126/science.abb7023

Two-dimensional materials

Two-dimensional materials have attractive properties that are suited for a variety of technical applications. Of these, transition metal carbides and nitrides (TMCs and TMNs) can form a large family of non-layered materials to combine properties of ceramics and metals. The MAX phase, where M stands for an early transition metal, A is an A-group element such as aluminum or silicon and X is carbon, nitrogen or both, forms the basis for monolayer MXenes. Such monolayer films can be selectively synthesized by etching the A-element layer. These materials have a hydrophilic (water-loving) surface and high electrical conductivity with promising applications including energy storage, sensors and catalysis. Scientists have recently developed a chemical vapor deposition (CVD) method to grow high-quality, nonlayered 2-D TMC and TMN crystals with diverse structures. But the surface energy constraints caused the nonlayered materials to grow as islands instead of layers. In this work, Hong et al. therefore grew 2-D molybdenum nitride and the MoSi_2N_4 compound using chemical vapor deposition.

Developing and characterizing the newly formed 2-D materials

During the experiments, the scientists used a copper/molybdenum (Cu/Mo) bilayer as the substrate and ammonia (NH_3) gas as the source of nitrogen. When they introduced elemental silicon to the experimental setup, the growth of the substrate markedly changed to form a uniform polycrystalline film. The team determined the thickness of the material surface using atomic force microscopy (AFM) and noted the surface growth process to be robust. Typically, the addition of an element to a growing 2-D material can only cause doping without changing the crystal structure of the matrix. But in this instance, adding silicon led to a new monolayered compound instead of simply doping the substrate. Hong et al. identified the crystal structure of the newly formed 2-D material using advanced transmission electron microscopy (TEM) and tested its surface elements using energy dispersive x-ray spectroscopy (EDS), electron energy-loss spectroscopy (EELS) and X-ray photoelectron spectroscopy (XPS).

Confirming the MoSi_2N_4 formula and highlighting the material properties.

Since it was difficult to image the exact positions of nitrogen atoms using transmission electron microscopy, the team performed density functional theory (DFT) calculations of the compound to reveal its structural formula. The process confirmed the presence of a van der Waals (vdW) layered 2-D material containing the MoSi_2N_4 formula. Then using molecular dynamics calculations, they observed the structure to be dynamically and thermodynamically stable – while Raman spectra indicated high crystal quality of the MoSi_2N_4 structure. Using DFT calculations again, Hong et al noted the MoSi_2N_4 monolayer to maintain semiconductor properties (optical and electrical properties) alongside a carrier mobility that relied on the elastic modulus of the material.

To study the optical properties of the monolayer MoSi_2N_4 film, Hu et al. transferred it onto a sapphire substrate and measured its bandgap, where the semiconducting monolayer maintained a high optical transmittance comparable to graphene. To test the electrical transport properties of the materials, Hong et al. fabricated back-gated field-effect transistor devices to observe typical semiconductor behavior. The scientists then measured the mechanical properties of the monolayer film using nanoindentation to highlight the elastic behavior of the membrane. The newly formed material showed long-term stability for handling, storage, and processing under ambient conditions without a protective environment in contrast to other materials.

Creating a broad class of 2-D van der Waals (vdW) layered materials

Hong et al. showed how diverse transition metal elements could potentially replace the corresponding elements in MoSi_2N_4 based on additional DFT calculations to create a broad class of 2-D van der Waal layered materials with similar crystal structure. In this instance, they represented the materials with the general formula of MA_2Z_4 , where M represented an early transition metal, A was silicon or Germanium and Z stood for nitrogen, phosphorous or arsenic. The elemental diversity in MA_2Z_4 , allowed wide tunability of their bandgap and magnetic properties with applications in optoelectronics, electronics and spintronics. Using such materials, the scientists will be able to investigate hitherto unknown exciting properties and applications that exist within

layered materials. In this way, the chemical vapor deposition method described here will pave the way to synthesize diverse materials in 2-D and monolayer forms.

More information: Hong Y. et al. Chemical vapor deposition of layered two-dimensional MoSi₂N₄ materials, *Science Advances*, 10.1126/science.abb7023

A. K. Geim et al. The rise of graphene, *Nature Materials* (2007). DOI: [10.1038/nmat1849](https://doi.org/10.1038/nmat1849)

Wang Q. H. et al. Electronics and optoelectronics of two-dimensional transition metal dichalcogenides, *Nature Nanotechnology*, 10.1038/nnano.2012.205

Journal information: [Science](#) , [Nature Materials](#)

<https://phys.org/news/2020-08-stabilizing-monolayer-nitrides-silicon.html>



Sat, 15 Aug 2020

Fracture toughness of the material for aircraft construction is increased by 1.5 times

Scientists from NUST MISIS have found a way to increase the fracture toughness of silicon carbide, a promising structural material for the production of refractory parts, by 1.5 times. These results were achieved due to the formation of reinforcing nanofibers in the structure. In the future, the technology will expand the scope of silicon carbide application as a structural and refractory material, including for the aircraft construction. Articles about the development have been published in *Ceramics International* and *Materials*.

The global silicon carbide market as of 2019 is estimated at \$ 2.58 billion and is projected to grow by 16% per year. Silicon carbide is rarely found in nature; therefore, this promising material is synthesized artificially.

Silicon carbide is increasingly used in various industries as a semiconductor, construction material, abrasive and refractory material. For example, its use for the manufacture of turbine blades and parts for internal combustion engines would significantly raise the operating temperatures in engines and significantly increase their characteristics: power, tractive power, efficiency, environmental friendliness, etc. Also, silicon carbide ceramics produced from cheap feldspar and quartz sand can successfully replace parts from alloys containing scarce cobalt, nickel, and chromium, which are used in motor engineering.

The key problem of silicon carbide ceramics is that it works well in compression, but is very sensitive to structural defects and therefore often has low tensile and bending strengths, as well as low crack resistance.

Scientists from NUST MISIS have found a way to improve sintering ability and increase the flexural strength and fracture toughness of silicon carbide ceramics by forming reinforcing nanofibers in it using the technology of self-propagating high-temperature synthesis. The synthesis was carried out in several stages. First, powders of silicon, carbon, tantalum and PTFE were mixed in a planetary mill, then the resulting mixture was burned in a reactor. Nanofibers formed during the combustion process. At the last stage, the product was sintered in a vacuum oven.

"Thanks to the effect of the combined addition of tantalum and PTFE, we were able to synthesize a material with a silicon carbide matrix reinforced with silicon carbide nanofibers. These nanofibers activate the sintering of the ceramic and increase the sintered material strength characteristics since they serve as a barrier to fracture propagation," says the main author, Dr. Stepan Vorotilo from SHS Center in NUST MISIS.

Nanofibers decreased the required sintering temperature and duration from multiple hours at 1800-2000°C to 60 min at 1450°C.

The scientists plan to continue work on increasing the fracture toughness and strength of the material. The combination of good mechanical characteristics and cost-effectiveness of the production process will expand the scope of silicon carbide application as a structural and refractory material.

More information: S. Vorotilo et al. Combustion synthesis of SiC-based ceramics reinforced by discrete carbon fibers with in situ grown SiC nanowires, *Ceramics International* (2019). DOI: [10.1016/j.ceramint.2019.12.005](https://doi.org/10.1016/j.ceramint.2019.12.005)

Stepan Vorotilo et al. Effect of In Situ Grown SiC Nanowires on the Pressureless Sintering of Heterophase Ceramics TaSi₂-TaC-SiC, *Materials* (2020). DOI: [10.3390/ma13153394](https://doi.org/10.3390/ma13153394)
<https://phys.org/news/2020-08-fracture-toughness-material-aircraft.html>



Sat, 15 Aug 2020

New method for late-stage functionalization of carbon-hydrogen bonds

National University of Singapore chemists have developed a photo-induced method for late-stage functionalization of carbon-hydrogen (C-H) bonds in organic molecules.

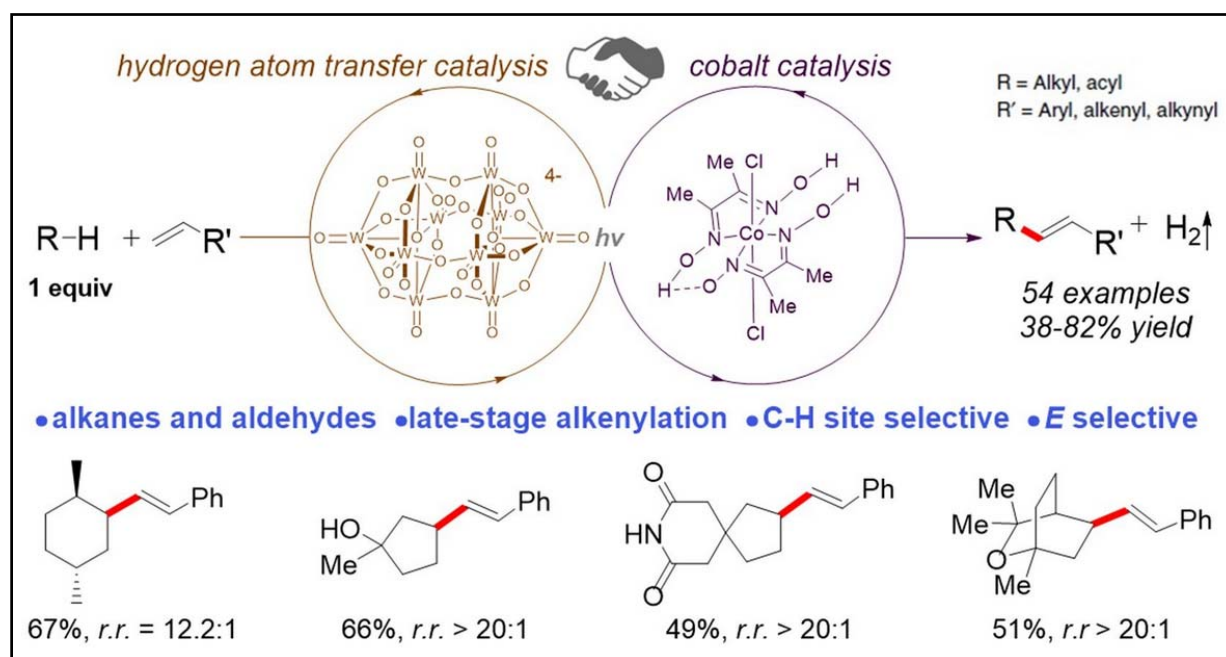


Illustration showing (top) the site-selective late-stage C-H alkenylation through the use of synergistic hydrogen atom transfer and cobalt catalysis in the presence of light (hv). (Bottom) Selection of chemical products that can be synthesised from this

The replacement of H in C-H bonds with other atoms or substituents is one of the most coveted ways to create new and useful molecules. While the C-H bond can be found in almost all organic molecules, it is typically inactive and therefore difficult to functionalise. Direct transformation of C-H bonds to versatile alkene functional groups represents an economical approach for olefin synthesis and molecular editing. In drug discovery and development, late-stage C-H functionalisation offers an efficient way to facilitate the preparation of structural analogs of targets with enhanced structure-activity relationships or other desired physicochemical properties without de novo approaches.

A research team led by Prof Wu Jie from the Department of Chemistry, NUS, has developed a photocatalytic process for direct alkenylation of C-H bonds in alkanes and aldehydes. In recent

decades, transition-metal-catalyzed alkenylations of arenes and heteroarenes have been extensively studied. However, analogous transformations of alkanes and aldehydes remain challenging. The existing methods generally suffer from the use of noble metal, stoichiometric amounts of oxidants and large excess of C-H substrates. To solve these issues, the research group used a combination of two types of catalytic methods, the direct hydrogen atom transfer catalysis (with a decatungstate anion, $[W_{10}O_{32}]^{4-}$) and the cobaloxime catalysis, for the direct activation and alkenylation of alkanes and aldehydes. When these two catalysts work synergistically in the presence of light, a diverse range of cheap feedstocks can be easily transformed into valuable olefins. Other advantages of this strategy include a broad substrate scope, high C-H site selectivity, excellent trans selectivity of the alkene products, and the use of the C-H substrate as the limiting reagent. Moreover, this strategy can be applied in the selective late-stage functionalisation of natural products and important pharmaceutical molecules.

Prof Wu said, "The site-selective late-stage functionalisation of C-H bonds in complex molecules developed from our studies is a very useful class of reactions. This method could potentially find broad application in olefin synthesis, structural modification of pharmaceuticals and natural product synthesis."

The research team plans to develop more advanced catalytic processes for the late-stage functionalisation of carbon-hydrogen bonds.

More information: Hui Cao et al. Photoinduced site-selective alkenylation of alkanes and aldehydes with aryl alkenes, *Nature Communications* (2020). [DOI: 10.1038/s41467-020-15878-6](https://doi.org/10.1038/s41467-020-15878-6)

Journal information: [Nature Communications](https://phys.org/news/2020-08-method-late-stage-functionalization-carbon-hydrogen-bonds.html)
<https://phys.org/news/2020-08-method-late-stage-functionalization-carbon-hydrogen-bonds.html>



Sat, 15 Aug 2020

Black silicon photodetector breaks the 100% efficiency limit

Aalto University researchers have developed a black silicon photodetector that has reached above 130% efficiency. Thus, for the first time, a photovoltaic device has exceeded the 100% limit, which has earlier been considered as the theoretical maximum for external quantum efficiency.

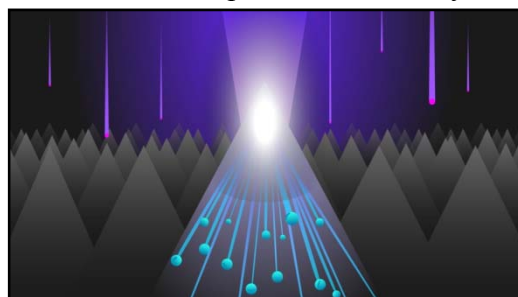
"When we saw the results, we could hardly believe our eyes. Straight away we wanted to verify the results by independent measurements," says Prof. Hele Savin, head of the Electron Physics research group at Aalto University.

The independent measurements were carried out by the German National Metrology Institute, Physikalisch-Technische Bundesanstalt (PTB), which is known to provide the most accurate and reliable measurement services in Europe.

Head of the PTB Laboratory of Detector Radiometry, Dr. Lutz Werner comments, "After seeing the results, I instantly realized that this is a significant breakthrough—and at the same time, a much-welcomed step forward for us metrologists dreaming of higher sensitivities."

The secret behind the breakthrough: Unique nanostructures

The external quantum efficiency of a device is 100% when one incoming photon generates one electron to the external circuit. 130% efficiency means that one incoming photon generates approximately 1.3 electrons.



UV-light triggers electron multiplication in nanostructures. Credit: Wisa Förbom

The researchers found out that the origin of the exceptionally high external quantum efficiency lies in the charge-carrier multiplication process inside silicon nanostructures that is triggered by high-energy photons. The phenomenon has not been observed earlier in actual devices since the presence of electrical and optical losses has reduced the number of collected electrons.

"We can collect all multiplied charge carriers without a need for separate external biasing as our nanostructured device is free of recombination and reflection losses," Prof. Savin explains.

In practice, the record efficiency means that the performance of any device that is utilizing light detection can be drastically improved. Light detection is already used widely in our everyday life, for example, in cars, mobile phones, smartwatches and medical devices.

"Our detectors are gaining a lot of attraction at the moment, especially in biotechnology and industrial process monitoring," says Dr. Mikko Juntunen, CEO of Aalto University spin-off company, Elfys Inc. They are already manufacturing the record detectors for commercial use.

The results leading to the record efficiency has been accepted for publication in *Physical Review Letters* in an article titled "Black-silicon ultraviolet photodiodes achieve external quantum efficiency above 130%."

More information: Garin et al. Black-silicon ultraviolet photodiodes achieve external quantum efficiency above 130%, *Physical Review Letters* (2020). [journals.aps.org/prl/accepted/...234ffbc06f4a5ba1ac5](https://journals.aps.org/prl/accepted/10.1103/PhysRevLett.124.033801), arxiv.org/abs/1907.13397

Journal information: *Physical Review Letters*
<https://phys.org/news/2020-08-black-silicon-photodetector-efficiency-limit.html>



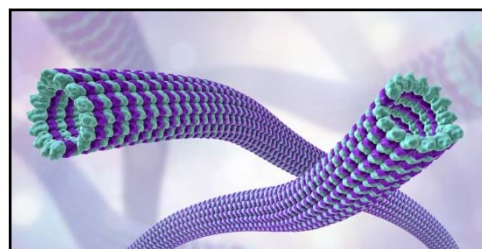
Sat, 15 Aug 2020

Exponential scaling of frictional forces in cells

AMOLF researchers have presented a theory that describes the friction between biological filaments that are crosslinked by proteins. Surprisingly, their theory predicts that the friction force scales highly nonlinearly with the number of crosslinkers. The authors believe that cells use this scaling not only to stabilize cellular structures, but also to control their size. The new findings are important for the understanding of the dynamics of cellular structures such as the mitotic spindle, which pulls chromosomes apart during cell division.

Motor proteins versus frictional forces

Many cellular structures consist of long filaments that are crosslinked by motor proteins and non-motor proteins (see figure). These so-called cytoskeletal structures not only give cells their mechanical stability, but also enable them to crawl over surfaces and to pull chromosome apart during cell division. Force generation is typically attributed to motor proteins, which, using chemical fuel, can move the filaments with respect to one another. However, these motor forces are opposed by frictional forces that are generated by passive, non-motor proteins. These frictional forces are a central determinant of the mechanical properties of cytoskeletal structures, and they limit the speed and efficiency with which these structures are formed. Moreover, they can even be vital for their stability, because if the motor forces are not opposed by the friction forces generated by the passive crosslinkers, the structures can even fall apart.



A polymer composed of a protein tubulin, it is a component of the cytoskeleton involved in intracellular transport, cellular mobility and nuclear division. Credit: AMOLF

Exponential increase

To understand the dynamics of these cytoskeletal structures and the forces they can generate, it is essential to understand how the frictional forces scale with the length of the filaments and the

number of crosslinkers between them. Existing theories predict that friction increases linearly with the number of crosslinkers, which is what one would expect intuitively. However, recent experiments have vividly demonstrated that the friction forces scale non-linearly, i.e. exponentially, with the number of crosslinkers. Due to the COVID-19 crisis, we all know what a dramatic difference an exponential versus a linear increase can make. Up until now, the origin of this highly unusual exponential scaling behavior of the friction between filaments was not understood.

Explanation

AMOLF group leader Ten Wolde and Ph.D. student Wierenga have now developed a theory that explains these experimental observations. Their theory is based on the observation that biological filaments consist of a regular lattice of subunits, yielding a discrete set of binding sites for the crosslinkers. Ten Wolde and Wierenga predict that the filaments can only move if the linkers reorganize collectively. As a result of this collective reorganization, the friction forces increase very rapidly, i.e., exponentially, with the number of linkers.

The work of the authors has major implications for our understanding of the dynamics of cytoskeletal structures. In particular, the exponential scaling means that these structures essentially freeze when the crosslinker density exceeds a certain threshold; the frictional forces become so high that they prohibit any further movement. Cells may use this strong scaling to control the size and stability of cellular structures.

More information: Harmen Wierenga et al. Diffusible Cross-linkers Cause Superexponential Friction Forces, *Physical Review Letters* (2020). DOI: [10.1103/PhysRevLett.125.078101](https://doi.org/10.1103/PhysRevLett.125.078101)

Journal information: [Physical Review Letters](https://phys.org/news/2020-08-exponential-scaling-frictional-cells.html)
<https://phys.org/news/2020-08-exponential-scaling-frictional-cells.html>

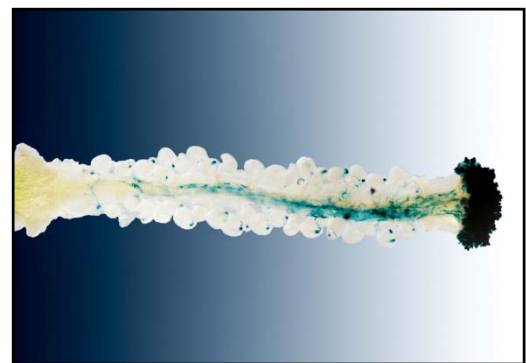


Sat, 15 Aug 2020

Team discovers a new role for a well-known molecule as a plant hormone

Researchers at the University of Maryland (UMD) have discovered an entirely new role for a well-known plant molecule called ACC, providing the first clear example of ACC acting on its own as a likely plant hormone. Just like in humans and animals, hormones in plants carry messages to signal and trigger essential processes for plant health and functionality, from reproduction to defense. Without these processes, crops can't reproduce and thrive to provide the food we need to feed a growing global population. In a new publication in *Nature Communications*, researchers show that ACC has a critical role in pollination and seed production by activating proteins similar to those involved in nervous system responses in humans and animals. These findings could not only change textbooks that have previously attributed plant responses to the hormone ethylene instead of ACC, but could also open the door for new research to improve plant health and crop yield.

"There are several novel things about this paper," explains Caren Chang, UMD. "But the main impact is that it introduces a new plant growth regulator or plant hormone, alongside a small handful of other publications. It isn't a newly identified molecule, but it has never been



ACC facilitates fertilization. The pollen tubes (stained in blue) fertilize only some of the ovules when there is less ACC. Successful fertilization is seen as blue dots inside the white ovules. Credit: Dr. Wangshu Mou

thought of before as a plant hormone, only as the precursor to ethylene."

Chang, a professor in Cell Biology & Molecular Genetics and affiliate professor of Plant Science & Landscape Architecture supported by the Maryland Agricultural Experiment Station (MAES), explains that ethylene is one of the five major plant hormones and has been studied for over a century. It is important for many processes that are vital to plant health and crop production, including fruit ripening, stress responses to flooding and drought, plant disease defenses, germination, and flowering.

"In much of the research, ACC has been used in place of ethylene, knowing that it's a precursor that plants convert into ethylene. This is because ACC is easy to work with in powder form and can even be sprayed on the plant, but working with ethylene is very difficult because it is a gas. So researchers have used ACC for decades in place of ethylene, and the literature would interpret the observed responses as ethylene responses. What our paper shows is that an ACC response is not necessarily an ethylene response. While ethylene is an important plant hormone with its own set of functions, some of these responses that have been attributed to ethylene through ACC may actually be separate ACC responses, acting as a growth regulator or hormone itself."

This finding opens the door for many papers across decades of research, as well as textbooks and future education on plant hormone responses, to be revised in the event that ACC is actually triggering important plant processes previously attributed to ethylene.

According to Chang, the paper also presents advances in plant reproduction. "In the plant reproduction field, there are many steps that are critical in pollination, and one of these steps requires the pollen to reach the ovules to actually produce a seed," says Chang. "Our paper shows that ACC signaling in the ovule is involved in getting the pollen tube to turn and effectively deliver the pollen, which makes it essential for seed production. It's probably the first example showing how the maternal ovule tissue actually helps attract the pollen tube." And this isn't a small effect, Chang stresses. "The seed number pretty much doubles in the presence of ACC. There is potential here to improve the seed number, which can increase food production in certain crops and have an impact on food security long-term."

Led by José Feijó, another professor in Cell Biology & Molecular Genetics and affiliate professor of Plant Science & Landscape Architecture, another major finding of this paper shows clear connections between human, animal, and plant hormone signaling pathways by identifying a potential receptor for ACC activity.

"The most interesting parallel is cell-cell communication," explains Feijó. "Animal glutamate receptors are proteins which are needed for information to jump from one neuron to the next, either through an electric impulse or through calcium signaling, which is essential for things like memory. Problems in the processes mediated by glutamate receptors are known to be related to neurodegeneration and depression."

Chang adds, "These receptors have been found in the human nervous system, and neuroscientists have been studying them for drug development to treat nervous system issues like depression. They found that ACC can actually affect the nervous system in humans. So we decided to look for the same receptors, named glutamate-like receptors (GLRs) in plants, to see if they respond to ACC in plants. We found that ACC can actually affect GLRs in plants as well."

This finding opens an entirely new avenue of research in plant biology and points to similarities in plants and humans that are currently not well understood. "In plants, GLRs all seem to convey functions related to communication, either to bring male and female genes into an egg, or in pathogen or stress alert systems and defenses," says Feijó.

"Emerging trends suggest that GLRs underlie long distance electric signaling through the plant vascular system, where injury to tissues in one leaf inform the whole plant to create nasty substances to deter insects. All these lines seem to point into the existence of electric communication within plant tissues and organs, and that these functions involve GLRs. This is an interesting parallel evolution of a function for glutamate receptors as they evolved to be associated with the animal nervous systems to perform similar functions."

With ACC as a new candidate activating GLRs and all the newly discovered roles it is playing as a plant hormone, Chang and the team are excited about the directions this work can go. "There is still a lot of research to be done to see how this is all happening and can be used in different crops, but all that new research can happen now."

More information: "Ethylene-independent signaling by the ethylene precursor ACC in Arabidopsis ovular pollen tube attraction," *Nature Communications* (2020). [DOI: 10.1038/s41467-020-17819-9](https://doi.org/10.1038/s41467-020-17819-9)

Journal information: [Nature Communications](https://www.nature.com/articles/s41467-020-17819-9)
<https://phys.org/news/2020-08-team-role-well-known-molecule-hormone.html>

COVID-19 Research News

 **The Indian EXPRESS**

Sun, 16 Aug 2020

Covid-19 vaccine tracker, August 15: UK books another 90 million doses; half of Novavax could be used in India

Coronavirus (COVID-19) vaccine tracker August 14 update: Vaccine development is a costly affair. Richer countries are doling out billions of dollars to the leading contenders to fast-track the development process, and in return pre-booking their supplies

Pune: The United Kingdom has entered into advance Coronavirus vaccine deals with two more developers, securing a supply of another 90 million doses, should these vaccines become a reality. Before this, the UK had agreements with four other developers, for a combined supply of 250 million doses.

Friday's deals were for 30 million doses of vaccine candidate being developed by Janassen, the pharmaceutical company of Johnson & Johnson, and 60 million doses of that being developed by the US biotech company Novavax. Its earlier agreements were for vaccines being developed by AstraZenca and Oxford University (100 million doses), Pfizer and BioNtech (30 million), GlaxoSmithKline and Sanofi (60 million), and French biotech company Valneva (60 million).

If all these vaccine candidates become successful, the UK would have a stockpile of 340 million doses of Coronavirus vaccines, more than five for each of its citizens. But vaccine development is an extremely uncertain process, and traditionally a very small percentage of vaccine candidates that started out have become a reality. Countries are therefore diversifying their stakes across developers and across the different types of vaccines that are under development. The six companies that the UK government has entered into agreements with are using four different methods to produce the vaccine.

Vaccine development is also a very costly affair. Richer countries are doling out billions of dollars to the leading contenders to fast-track the development process, and in return pre-booking their supplies.

The United States has got into multi-billion dollar agreements with several companies to secure at least 800 million doses of potential vaccines. That is more than two for each one of its 330 million people.

On Friday, the European Union also entered into a deal with AstraZeneca for supply of 300 million doses of the vaccine it is developing in collaboration with Oxford University. The

AstraZeneca/Oxford University vaccine candidate is one of the most in-demand. According to a Reuters report on Friday, the company has so far struck supply deals for about three billion doses.

Amongst the takers for that vaccine is India, which has already approved late-phase human trials for the vaccine, a regulatory requirement before it can be used in the country. The Oxford University vaccine is being brought by Pune-based Serum Institute of India, the world's largest manufacturer of vaccines by volume.

Serum has also entered into a deal with Novavax for producing 100 million doses of its vaccine at its Pune facility. It is expected that 50 per cent of that would be consumed within India, the remaining going to other low and middle income countries.

The Oxford University vaccine has been ordered by Mexico as well, which on Friday asked for 150 million doses.

Hunt for coronavirus vaccine: The story so far

- More than 160 vaccine candidates in pre-clinical or clinical trials
- 29 of them in clinical trials
- Six in final stages, phase-III of human trials
- At least eight candidate vaccines being developed in India. Two of these have entered phase -II trials after completing phase-I.

(As on August 13; source: WHO Coronavirus vaccine landscape of August 13, 2020)

<https://indianexpress.com/article/explained/covid-19-vaccine-tracker-updates-august-15-6555392/>

live**mint**

Sun, 16 Aug 2020

Russia starts production of world's first Covid-19 vaccine: Report

- *Russia's first coronavirus vaccine is developed jointly by Gamaleya Research Institute and the Russian Defence Ministry*
- *Russian ministry said industrial production was expected from September and that 20 countries had made 'preliminary applications for over one billion doses'*

Pune: The United Kingdom has entered into advance Coronavirus vaccine deals with two more developers, securing a supply of another 90 million doses, should these vaccines become a reality. Before this, the UK had agreements with four other developers, for a combined supply of 250 million doses.

After announcing the first Covid-19 vaccine, also touted as world's first such vaccine against the novel coronavirus, Russia has now begun manufacturing the vaccine, according to a report, citing health ministry.

"The production of the vaccine against the novel coronavirus infection developed by the Gamaleya Scientific Research Institute of Epidemiology and Microbiology has started", the statement said, as reported by Sputnik News.

Russia's first coronavirus vaccine is developed jointly by Gamaleya Research Institute and the Russian Defence Ministry.

Russia has said the vaccine will be rolled out by the end of this month, according to Reuters. Some scientists said they fear Moscow may be putting national prestige before safety.

Earlier, Russian president Vladimir Putin launched a coronavirus vaccine dubbed "Sputnik V" after the Soviet satellite on 11 August, saying that the vaccine had underwent the necessary tests.



Russia has said the vaccine will be rolled out by the end of this month (Reuters)

He added that one of his two daughters has received a dose of the vaccine and is feeling well, according to Associated Press reports.

The announcement came in the wake of the novel coronavirus pandemic that has infected more than 20 million people and killed nearly 750,000 worldwide, thus, crippling world's economy.

Moreover, the chief of Russia's sovereign wealth fund, which is financing and helping to coordinate the vaccine efforts, told reporters that Phase 3 trials on a large group of people would start on Wednesday.

Kirill Dmitriyev, who heads the Russian Direct Investment Fund (RDIF), said industrial production was expected from September and that 20 countries had made "preliminary applications for over one billion doses" of the vaccine, according to reports.

He said that along with foreign partners Russia was ready to manufacture 500 million doses of vaccine per year in five countries.

Moreover, a top Russian official said that the vaccine developed by the country will offer protection from covid for at least two years.

"Effective period of the vaccine, its protective properties will last not during a short term, half a year - one year but for at least two years," said Alexander Gintsburg, the director of Gamaleya research center, according to Russian news agency TASS.

Gintsburg, also said that volunteers taking part in the final stage testing of the vaccine's safety and efficacy would have two inoculations.

Russia has said that industrial production is expected from September and that it plans to manufacture 5 million doses per month by December or January.

Health Minister Mikhail Murashko said this week that the vaccine would first be made available to medics and would later be available to all Russians on a voluntary basis.

In April, Putin ordered state officials to shorten the time of clinical trials for a variety of drugs, including potential coronavirus vaccines.

However, various industry bodies and pharmaceutical companies have called Russia's rushed registration dangerous. They have questioned its extensive push to develop a vaccine as soon as this year's end. The roll-out of this vaccine has stirred concerns that it may be putting national prestige before science and safety.

However, the World Health Organization says the vaccine approved by Russia this week is not among the nine that it considers in the advanced stages of testing.

WHO and partners have included nine experimental COVID-19 vaccines within an investment mechanism it is encouraging countries to join, known as the Covax facility. The initiative allows countries to invest in several vaccines to obtain early access, while theoretically providing funding for developing countries.

"We don't have sufficient information at this point to make a judgment" on the Russia vaccine, said Dr. Bruce Aylward, a senior adviser to WHO's director-general, as per reports.

"We're currently in conversation with Russia to get additional information to understand the status of that product, the trials that have been undertaken and then what the next steps might be."

With more than 917,000 confirmed infections, Russia's coronavirus caseload is currently fourth in the world after the United States, Brazil and India. Currently Russia has 92,000 people hospital.

(With inputs from agencies)

<https://www.livemint.com/news/world/russia-starts-production-of-world-s-first-covid-19-vaccine-report-11597485436730.html>

India's first COVID-19 vaccine COVAXIN appears safe in early trials, to begin phase 2 study in Sept: Report

Preliminary results of the phase 1 human clinical trial suggest that COVAXIN, India's first indigenously developed coronavirus vaccine, is safe

Key Highlights

- **Bharat Biotech-ICMR developed COVAXIN is India's first indigenous vaccine against COVID-19**
- **Preliminary results of the phase 1 clinical trial suggest the vaccine is safe**
- **COVAXIN is derived from a strain of the SARS-CoV-2 virus isolated in NIV, Pune, and transferred to Bharat Biotech to develop into a vaccine candidate**

New Delhi: Preliminary results of the phase 1 human clinical trial suggest that India's first indigenously developed vaccine against novel coronavirus, is safe, according to a report. COVAXIN, an inactivated vaccine against SARS-CoV-2 (the virus that causes COVID-19 disease), developed by Bharat Biotech in partnership with the Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV) is expected to enter the next phase of testing next month.

A report in *The Economic Times*, citing Dr Savita Verma, the principal investigator who is leading the trial at PGI, Rohtak, said that no adverse events have been observed in volunteers who received the vaccine at the site, indicating that COVAXIN is safe. According to the report, trial investigators are collecting blood samples to assess the vaccine's immunogenicity while volunteers are being vaccinated with the second dose.

"As of now, we know that it is safe. The second step is to know how effective the vaccine is for which we have started collecting the samples," said Verma.

The phase 1 trial involving 375 volunteers being conducted at 12 sites across the country is expected to be completed by the end of August. If trials succeed, the vaccine could be ready in the first half of 2021, another investigator told the paper.

"We are in the process of giving a second dose to the healthy volunteers and so far, we have not seen anything unusual event in patients. It is safe," Sanjay Rai, the principal investigator at All India Institute of Medical Sciences, Delhi, was quoted as saying by the publication. The phase 1 trials are underway at AIIMS, Delhi.

Meanwhile, an *India Today* report stated that the trial sites are now gearing up for the phase 2 studies scheduled to start in the first week of September - with most centres having completed the phase 1 trial. According to the report, findings from the phase 1 trials will be submitted soon.

The Health Ministry had said that three vaccine candidates against COVID-19 are currently in different phases of clinical testing – this includes Bharat Biotech-ICMR's COVAXIN, Zydus Cadila's ZyCoV-D, and the Oxford/AstraZeneca's candidate ChAdOx1 nCoV-19 (called Covishield in India) being tested and manufactured by the Pune-based Serum Institute. Serum Institute has been granted permission by the DCGI to conduct the phase 2/3 clinical trials in India and the world's largest vaccine maker is likely to start the trial soon.

<https://www.timesnownews.com/health/article/india-s-first-covid-19-vaccine-covaxin-appears-safe-in-early-trials-to-begin-phase-2-study-in-sept-report/636835>



India's first COVID-19 vaccine COVAXIN appears safe in early trials, to begin phase 2 study in Sept: Report

From Oxford clinical trial to Russian candidate, latest on Covid-19 vaccine

According to the World Health Organisation, over 160 Covid-19 vaccine candidates are in pre-clinical or clinical trials at present, 29 of them are in the clinical trials phase

Edited By Sparshita Saxena

New Delhi: On the occasion on Independence Day, Prime Minister Narendra Modi on Saturday said that India is ready to mass-produce Covid-19 vaccine as and when the scientists give it a nod.

“Not one, not two, as many as three coronavirus vaccines are being tested in India,” he said from the ramparts of the Red Fort in the national capital. “The country is also ready for mass production of those vaccines,” PM Modi added.

The race to developing a vaccine for Covid-19 is intensifying by the day with new contenders joining in and the front runners making great strides.

According to the World Health Organisation, over 160 vaccine candidates are in pre-clinical or clinical trials at present, 29 of them are in the clinical trials phase. Six contenders are in final stages, phase-III of human trials. At least eight candidate vaccines are being developed in India of which two are in phase -II trial phase.

The latest to create ripples is Russia which recently announced giving a regulatory approval for the “Sputnik V” vaccine for Covid-19. On Saturday, Moscow said it has started manufacturing the new vaccine, the Interfax news agency reported, citing the health ministry. The vaccine, developed by Moscow’s Gamaleya Institute and the first for the coronavirus to go into production, is expected to be rolled out by the end of this month.

Oxford University’s Covid-19 vaccine trial, which is in phase-III, is expected to get completed by the end of this year. The University of Oxford joined hands with British Swedish firm Astrazeneca to make a vaccine against coronavirus. The vaccine had shown promising results in the first phase of clinical human trial.

Pune-based vaccine manufacturer Serum Institute of India (SII) has already received a nod from for India’s top drug regulatory body for conducting phase-II and III clinical trials on the Oxford Covid-19 vaccine.

Meanwhile, Argentine biotech firm working on the production of 400 million doses of an AstraZeneca Covid-19 vaccine for Latin America said it could begin shipping the active substance of the product to Mexico for completion. Esteban Corley, director of mAbxience, the biotech firm, said he foresaw the finished product could be distributed in Latin America between April and May, news agency Reuters reported.

The US government has entered into a \$1.5 billion deal with biotechnology company Moderna for the manufacturing and delivery of 100 million doses of its potential Covid-19 vaccine, mRNA-1273.

The United States has allocation agreements with Johnson & Johnson, Pfizer Inc, BioNTech SE, Sanofi SA, and GlaxoSmithKline Plc. It also has a claim on 300 million doses of AstraZeneca Plc’s vaccine in exchange for helping finance its research and development efforts.

(With inputs from agencies)

<https://www.hindustantimes.com/world-news/covid-19-vaccine-update-from-oxford-clinical-trial-to-russian-candidate-latest-on-covid-19-vaccine/story-oRaHScOZPvLGUyBfWuuHxN.html>

Scientists identify potential drug candidate against Covid-19

Washington: Using state-of-the-art computer simulations, scientists have identified a preexisting drug, used to treat multiple diseases, including bipolar disorders and hearing loss, that could prevent the novel coronavirus from replicating in host cells, an advance that may lead to a therapeutic solution against Covid-19.

The study, published in the journal *Science Advances*, assessed the molecule main protease, Mpro, of the novel coronavirus which is a key enzyme that plays a central role in its life cycle.

According to the researchers, including those from the University of Chicago in the US, Mpro facilitates the virus' ability to make proteins from its genetic material - RNA - and enables the pathogen to replicate within the host cell.

Using their expertise in modelling biological molecules, the scientists rapidly screened thousands of existing compounds for potential use against the virus.

"By virtue of the large number of compounds considered in high throughput screens, those calculations must necessarily involve a number of simplifications, and the results must then be evaluated using experiments and more refined calculations," explained study co-author Juan de Pablo from the University of Chicago.

They found that the pharmaceutical drug that shows promise as a weapon against Mpro is Ebselen - a chemical compound with anti-viral, anti-inflammatory, anti-oxidative, bactericidal, and cell-protective properties.

According to the researchers, Ebselen is used to treat multiple diseases, including bipolar disorders and hearing loss.

They said several clinical trials have proven its safety for use in humans.

In the research, de Pablo and his team developed detailed models of the enzyme and the drug, and with sophisticated supercomputer simulations they discovered that Ebselen is able to decrease Mpro's activity in two different ways.

"In addition to binding at the catalytic site of the enzyme, Ebselen also binds strongly to a distant site, which interferes with the enzyme's catalytic function by relying on a mechanism in which information is carried from one region of a large molecule to another region far away from it through subtle structural reorganisations," de Pablo said.

According to the scientists, this finding is particularly important since it helps explain Ebselen's potential efficacy as a repurposed drug, and reveals a new vulnerability in the virus that was previously not known and that could be useful in developing new therapeutic strategies against Covid-19.

While the researchers believe further studies are needed to test the drug against Covid-19, they believe the two binding sites on Mpro look promising for Ebselen to be a new drug lead.

"The main protease is one of many proteins in the virus that could be targeted with existing, repurposed drugs, and there are thousands of compounds to be considered," de Pablo said.

"We are systematically investigating each of the proteins involved in the virus function and investigating their vulnerabilities and their responses to a wide range of drugs," he added.

<https://timesofindia.indiatimes.com/home/science/scientists-identify-potential-drug-candidate-against-covid-19/articleshow/77560980.cms>

COVID-19 patients with heart problems more likely to die: Study

Researchers have found that COVID-19 patients with cardiovascular comorbidities or risk factors are more likely to develop heart complications while hospitalised, and more likely to die from the virus

In a major study, researchers have found that COVID-19 patients with cardiovascular comorbidities or risk factors are more likely to develop heart complications while hospitalised, and more likely to die from the virus.

According to the study, published in the journal PLOS ONE, it is crucial for clinicians working with cardiovascular patients to understand the clinical presentation and risk factors for COVID-19 infection in this group.

"For most people, the Novel Coronavirus Disease 2019 (COVID-19) causes mild illness, however, it can generate severe pneumonia and lead to death in others," said study authors from the Magna Graecia University in Italy.

In the new study, the research team analysed data from 21 published observational studies on a total of 77,317 hospitalised COVID-19 patients in Asia, Europe and the US.

At the time they were admitted to the hospital, 12.89 per cent of the patients had cardiovascular comorbidities, 36.08 per cent had hypertension and 19.45 per cent had diabetes.

The findings showed that cardiovascular complications were documented during the hospital stay of 14.09 per cent of COVID-19 patients.

According to the researchers, the most common of these complications were arrhythmias or palpitations; significant numbers of patients also had myocardial injury.

Myocardial injury is considered acute if there is a rise and fall of cardiac troponin concentrations exceeding biological and analytical variation.

When the researchers analysed the data, they found that pre-existing cardiovascular comorbidities or risk factors were significant predictors of cardiovascular complications, but age and gender were not.

The study showed that both age and pre-existing cardiovascular comorbidities or risk factors were significant predictors of death.

"Cardiovascular complications are frequent among COVID-19 patients and might contribute to adverse clinical events and mortality," the study author concluded.

<https://www.nationalheraldindia.com/health/covid-19-patients-with-heart-problems-more-likely-to-die-study>

