

July
2021

समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

खंड : 46 अंक : 128 01 जुलाई 2021

Vol.: 46 Issue : 128 01 July 2021



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalf House, Delhi - 110 054

CONTENTS

S. No.	TITLE	Page No.
DRDO News		1-18
DRDO Technology News		1-18
1.	Explained: How Agni Prime bolsters India's offensive power against Pakistan	1
2.	Agni Prime is the new missile in India's nuclear arsenal. This is why it's special	2
3.	Agni Prime: DRDO's latest ballistic missile has a range of up to 2,000 km	4
4.	DRDO's Anti-Drone System expected to be installed in critical military installations	5
5.	DRDO's anti-drone technology can detect and neutralize aerial threats – All you need to know	7
6.	Drones and the future of warfare	8
7.	'State support' behind drone strike, says top Army officer	10
8.	JNU, DRDO sign pact of cooperation in education and research	11
9.	जेएनयू एवं डीआरडीओ ने शिक्षा, अनुसंधान में सहयोग के लिए एमओयू पर हस्ताक्षर किये	12
10.	Maha Metro redesigns DRDO bio-digesters, no effect on recycling system	13
11.	Sanitation on track	14
12.	LAWDA starts installation of 100-DRDO designed bio-digesters in Telbal	15
13.	प्रधानमंत्री रक्षा क्षेत्र में आत्मनिर्भरता का सपना देख रहे हैं और सैन्य अधिकारियों को विदेशी तोप लेने की जल्दी है	16
Defence News		19-22
Defence Strategic: National/International		19-22
14.	Lt Gen Sanjeev Kumar Sharma takes over as Deputy Chief of Army Staff (Strategy)	19
15.	लेफ्टिनेंट जनरल संजीव कुमार शर्मा ने सेना उप प्रमुख (रणनीति) का पदभार संभाला	20
16.	J&K drone attack: Narendra Modi govt to unveil policy to deal with emerging security threats	21
17.	Air Marshal VR Chaudhari to take over as IAF's new Vice Chief of Air Staff	22
Science & Technology News		23-29
18.	Rebel behaviour of highest energy afterglow of a Gamma-Ray Burst detected in space may help probe stellar evolution	23
19.	Researchers develop wearable sensor to monitor oxygen levels through skin	24
20.	Thermal waves observed in semiconductor materials	25
21.	The world's thinnest technology—only two atoms thick	27
COVID-19 Research News		28-29
22.	Cambridge researchers pinpoint antimalarial, arthritis drugs for COVID-19 repurposing	28

Thu, 01 July 2021

Explained: How Agni Prime bolsters India's offensive power against Pakistan

Agni P is very short and light missile when compared to other missiles in this class

By Pradip R Sagar

On Monday, India test-fired its Pakistan-aimed new generation nuclear capable ballistic missile Agni P or Agni Prime.

Developed by the Defence Research and Development Organisation (DRDO), the flight test was done from Dr. APJ Abdul Kalam island near Balasore, off the Odisha coast at 10.55 am on June 28.

Scientists involved in the development said Agni Prime has a range of 1,000-2,000 km and can be launched from rail and road as the missile is canisterised. With its range, the missile does not have the capability to target the Chinese mainland.

"But, it covers the entire Pakistan territory," an official maintained.

Agni P is the first of the new class of Agni series of missiles, developed by DRDO. The missile weighs 50 per cent less than Agni 3 and has new guidance and a new generation of propulsion.

A new generation advanced variant of Agni class of missiles, Agni P will replace Prithvi, and tactical surface-to-surface short-range ballistic missiles, Agni-1 and Agni-2, as these missiles were built two decades ago and their technologies have become obsolete in the current scenario.

"Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile," DRDO said in a statement while adding that "The missile followed text book trajectory, meeting all mission objectives with high level of accuracy."

Agni Prime is a very short and light missile when compared to other missiles in this class. A lot of new technologies have been incorporated in the new missile, according to DRDO officials. It is a ballistic missile with a rocket-propelled self-guided strategic-weapons system that follows a ballistic trajectory to deliver a payload from its launch site to a predetermined target. The missile is capable carrying conventional high explosives as well as chemical, biological or nuclear munitions. With its high accuracy rate and the ability to contain the collateral damage, the ballistic missile can be used for lower-yield nuke bomb.

India has in its armoury the Agni missile series—Agni-1 with a range of 700 km, Agni-2 with a range of 2,000 km, Agni-3 and Agni-4 with 2,500 km to more than 3,500 km range. The Agni-5, with a range of 5000km, is the most advanced in navigation guidance, warhead and engine. All these missiles are part of the Indian military's Strategic Force Command.

The Agni series of ballistic missiles is being developed under the Integrated Guided Missile Development Programme of the DRDO.



Agni P is the first of the new class of Agni series of missiles, developed by DRDO | PTI

India's first intermediate-range ballistic missile Agni 1 was successfully test-fired in 1989 and inducted into service in 2004. It has a range capability between 700 and 900 kilometres. Since then, four variants of Agni missile have joined the India's arsenal. Agni-V, with its 5,000-plus km range, was developed keeping China in mind.

Agni V made India the eighth nation in the world to have intercontinental ballistic missile (ICBM) capabilities. It can target any target in Asia and half of Europe with its range of 5,000 km and can carry a payload of 1.5 tonnes of nukes.

However, India is lagging behind both its neighbours China and Pakistan in the numbers of nuclear warheads.

According to a recently released report by the Stockholm International Peace Institute (SIPRI), while India has only 156 nuclear warheads, China is way ahead with 350 nukes. Pakistan has 165 warheads. Russia tops the list with 6,255 warheads and the United States has 5,550 nukes.

<https://www.theweek.in/news/india/2021/06/30/explained-how-agni-prime-bolsters-indias-offensive-power-against-pakistan.html>

ThePrint

Thu, 01 July 2021

Agni Prime is the new missile in India's nuclear arsenal. This is why it's special

ThePrint explains the technology behind the next generation, nuclear-capable

ballistic missile Agni P, and what it means for India

By Snehash Alex Philip, Edited by Neha Mahajan

New Delhi: India successfully test-fired Agni-P, also known as Agni Prime, the next generation nuclear-capable ballistic missile in India's nuclear arsenal, from Odisha's Balasore earlier this week.

The missile comes with its own unique technology giving it more accuracy while making it difficult to intercept.

With a range of 1,000-2,000 kilometers, the deadly missile is capable of covering vital targets all across Pakistan.

While it is popularly believed that the new missile will replace Prithvi, Agni 1 and Agni 2 series of ballistic nuclear missiles, government sources told ThePrint it will not.

"It is not a replacement for any of the existing missiles. Agni P is part of the Agni series of missiles with new modern features which makes it very maneuverable and increases the accuracy," a source said.

Sources also said the missile was made using the same technology used in the longer-range Agni 4 and Agni 5 missiles.

ThePrint explains the technology behind the latest ballistic missile, why it is difficult to intercept, and why it is a boost for the Indian armed forces.

Lighter and more agile

The Agni P, initially named Agni-1P, is said to weigh 50 per cent less than Agni 3 and is the lightest and smallest of the Agni series because of technological advancements, sources said.



DRDO successfully flight-tested nuclear capable ballistic missile Agni P from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore | PTI Photo

The missile comes with new composites, propulsion systems, innovative guidance and control mechanisms, besides the latest navigation systems.

Adding to the usefulness of the missile is that it is a canisterised system. This means that the movement and launch options increase for the Strategic Forces Command, which oversees India's nuclear arsenal.

The missile can be launched from rail or road and can be transported to various parts of the country.

The two-stage and solid-fuelled weapon system comes with new propulsion systems, composite motor casings, and inertial navigation systems based on advanced ring-laser gyroscopes. Gyroscopes show the location of the missile and the trajectory it is taking.

Sources said that the ring-laser gyroscopes are more accurate.

"The missile can even be manoeuvred at one point if need be," a source said. This feature, which is usually not available in a ballistic missile, makes it more difficult to intercept.

India's 'No first use' policy

Experts explained that usually, upon launch, the target and the trajectory that the ballistic missile will take can be fairly understood, which makes interception possible.

However, the stress on accuracy has led some, including nuclear policy expert Vipin Narang, to see Agni P as a counterforce weapon.

Counterforce doctrine, in nuclear strategy, is the targeting of an opponent's nuclear weapons infrastructure with a nuclear strike. The counterforce doctrine is differentiated from the countervalue doctrine, which targets the enemy's cities, destroying its civilian population and economic base.

However, government sources insisted that India has a strong 'No first use' (NFU) policy. They added that nuclear weapons are for deterrence, something which Defence Minister Rajnath Singh tweeted too.

eat initiative of Atal Bihari Vajpayee — there is no compromise on that. We are very clear. No first use is a reflection of our cultural inheritance."

But in 2016, the then defence minister Manohar Parrikar had spoken about the nuclear policy saying, "Why should I bind myself? I should say I am a responsible nuclear power and I will not use it irresponsibly. This is my (personal) thinking."

As his comments gathered a storm, the defence ministry issued a clarification stating that it was Parrikar's personal opinion.

"What he said was that India, being a responsible power, should not get into first-use debate. But once again, it is clarified that this was his personal opinion," a ministry spokesperson had said.

In August 2019, Singh had said that while India has strictly adhered to the NFU doctrine, "what happens in future depends on the circumstances".

<https://theprint.in/defence/agni-prime-is-the-new-missile-in-indias-nuclear-arsenal-this-is-why-its-special/687271/>

Agni Prime: DRDO's latest ballistic missile has a range of up to 2,000 km

Agni Prime missile

India on Monday successfully test-fired its new generation nuclear-capable Agni Prime missile from a defence base off Odisha coast.

Range

The surface-to-surface ballistic missile has a range of 1000 to 2000 km.

Sleek missile

The sleek missile, an advanced variant in the Agni series, was test-fired from a mobile launcher off the Abdul Kalam Island in Odisha at 10.55 am, said a DRDO source.

High level of accuracy

Its trajectory was monitored by sophisticated tracking radars and telemetry along the coast line. The nuclear-capable missile, which met all mission objectives with high level of accuracy, has been designed and developed by the Defence Research and Development Organisation (DRDO).

What Rajnath Singh said

Defence Minister Rajnath Singh congratulated the DRDO for successfully flight testing the missile. He said many advanced technologies, including propulsion systems, innovative guidance and control mechanisms and state-of-the-art navigation systems have been introduced in the missile.

<https://economictimes.indiatimes.com/news/defence/agni-prime-drdo-latest-ballistic-missile-has-a-range-of-up-to-2000-km/what-rajnath-singh-said/slideshow/83980815.cms>



Thu, 01 July 2021

DRDO's Anti-Drone System expected to be installed in critical military installations

There is no universal policy to deal with rogue drones in the country and soon the Ministry of Home Affairs and Civil Aviation are expected to review the existing regulations which are related to unmanned aircraft systems

By Huma Siddiqui

The security forces are on high alert in Jammu after more drone-sighting near the Air Force Station. For the first time ever the drones coming from across the border hit a military target. And according to sources the target was the Air Traffic Control (ATC) Tower and not the Mi-17 Helicopters which are based there.

More drones have been spotted flying over several military areas around the Jammu Air Force Station including — Kunjwani Chowk, Kaluchak, Sanjuwan on Tuesday and today too.

The National Security Guard (NSG) has been keeping a stock of the situation. It has been decided that besides special lights for better visibility, Anti-Drone Systems will be soon deployed. According to sources, “Anti Drone System which has been developed by the Defence Research and Development Organisation (DRDO) is likely to be used. DRDO has transferred the technology to the Defence PSU Bharat Electronics Limited (BEL) for the production of the system.”



The Indian Air Force (IAF) will be the nodal authority once the Anti-Drone Technology system has been acquired.

The Indian Air Force (IAF) will be the nodal authority once the Anti-Drone Technology system has been acquired and in the future is likely to coordinate efforts on countering weaponized drones attacks.

What is the DRDO's Anti-drone Technology?

This will help in identifying and eliminating aerial threats. And could provide the Indian Armed Forces an advantage in intercepting, detecting and destroying the enemy drones. The system uses a laser-based kill mechanism to detect and destroy the drones in the air.

It has the capability of detecting and neutralizing UAVs, and the radar system offers 360-degree coverage.

As has been reported by Financial Express Online, the system can identify and jam micro drones up to 3 kilometers away and shoot laser signals at targets up to 1-2.5 kilometers away. With the help of Electro-optical/infrared (EO/IR) sensors this system can detect drones up to 2 km away. A radio frequency (RF) detector can detect RF communications up to 3 km away.

According to reports, DRDO's RF/Global Navigation Satellite System (GNSS) detects the frequency which is being used by the controller and then the signals are jammed.

As has been reported by Financial Express Online, to tackle fast-emerging aerial threats the DRDO anti-drone technology system can provide both “soft kill” and “hard kill” options to the Indian Armed Forces.

What are Soft Kill and Hard Kill?

Mere jamming of hostile drones is referred to as ‘Soft kill’ and ‘Hard kill’ uses a laser-based destruction method.

Since 2020, the DRDO system has been deployed during Independence Day 2020, Republic Day Celebrations 2021 and was also used when the former US President Donald Trump visited Ahmedabad in March 2020.

Drone policy for India soon

There is no universal policy to deal with rogue drones in the country and soon the Ministry of Home Affairs and Civil Aviation are expected to review the existing regulations which are related to unmanned aircraft systems.

Following a drone attack on June 27, a comprehensive counter-drone strategy is in the works to avert attacks like the one that happened at the Jammu airbase.

On Tuesday evening (June 29, 2021), Prime Minister Narendra Modi chaired a meeting attended by Cabinet ministers including Defence Minister Rajnath Singh, Home Minister Amit Shah, and National Security Advisor (NSA) Ajit Doval, among others. The main agenda of the meeting was to expedite the process of devising a drone policy for India.

Also on the agenda were the measures and strategies to be used in the future to counter “weaponised drones used for terror purposes against strategic and commercial assets”.

The drone attack and subsequent spotting of the drones around the Air Force Station is suspected to be the work of Pakistan-based terrorists group Lashkar-e-Taiba (LeT). Soon after the attack on Sunday, the Jammu and Kashmir Police had arrested an alleged Lashkar-e-Taiba operative who had in his possession an improvised explosive device (IED) weighing nearly 5 kg in Jammu.

India-Pakistan Ceasefire

The recent drone attack which is suspected to be the handiwork of LeT, could be an attempt to disrupt the political process in Kashmir as well as put pressure on the ceasefire being maintained at the Line of Control.

India raises the issue at UN

On Tuesday, India called for serious attention of the United Nations over the matter of “use of weaponized drones for terrorist purposes against strategic and commercial assets”.

<https://www.financialexpress.com/defence/drds-anti-drone-system-expected-to-be-installed-in-critical-military-installations/2281271/>

DRDO's anti-drone technology can detect and neutralize aerial threats – All you need to know

DRDO's anti-drone technology can detect and neutralize UAVs, and its radar system offers 360-degree coverage

Key Highlights

- *Anti-drone system can detect, intercept and destroy UAVs*
- *The system was deployed for VVIP protection duties in 2020 and 2021*
- *The radar system can offer 360-degree coverage*

New Delhi: Defence Research and Development Organisation's (DRDO) counter-drone technology can give the armed forces an edge over detecting, intercepting and destroying enemy drones.

This anti-drone system can detect and destroy drones in the air using a laser-based kill system.

This DRDO-developed anti-drone system had earlier been deployed for VVIP protection on Independence Day 2020, US President Donald Trump's visit to Motera stadium in Ahmedabad, and Republic Day 2021.

Can detect and jam micro drones up to 3 kilometres

This system can detect and jam micro drones up to 3 kilometres and fires laser signals to bring down a target up to 1-2.5 kilometres.

In a first, two blasts were carried out by drones in the technical area of Jammu Air Force Station on Sunday morning.

While one blast took place at 1:37 pm the other one was reported at 1.42 am.

One of the blasts caused minor damage to the roof of a building while the other exploded in an open area, the Indian Air Force (IAF) said.

No damage to any equipment was reported; however, two personnel suffered minor injuries.

Drone policy for India soon

Officials suspect Pakistan-based terrorists are behind the attack on the Air Force Station.

The attack on the Air Force Station took place a few hours after Jammu and Kashmir Police arrested an alleged Lashkar-e-Taiba operative with an improvised explosive device (IED) weighing nearly 5 kg in Jammu.

Meanwhile, Prime Minister Narendra Modi chaired a meeting attended by Cabinet ministers on Tuesday to review India's drone policy on Tuesday.

Defence Minister Rajnath Singh, Home Minister Amit Shah and Civil Aviation Minister Hardeep Singh Puri were part of the high-level meeting.

The key agenda of the meeting was to expedite the process of devising a drone policy for India.

<https://www.timesnownews.com/india/article/drdo-s-anti-drone-technology-can-detect-and-neutralize-aerial-threats-all-you-need-to-know/778031>



Drones and the future of warfare

Reports now suggest that India's Defence Research and Development Organization is clearly lagging behind in the race for drones and anti-drone technologies

By Maroof Raza

Even though small-sized drones have been useful in delivering packages to inaccessible areas – medical and food items – especially during an emergency, trust the terrorists and their minders to adopt such technologies for their nefarious purposes. Apparently, this is what Pakistan's 'deep state' has chosen to do, by twin attacks on the IAF base in Jammu, though there is yet to be a formal Indian announcement about Pakistan's role in these attacks.

Why they chose to use the hexacopter-type small drones was easy to gauge; it gave them deniability and allowed them to add to the heightened sense of alarm across India, especially in Jammu & Kashmir, where India's forces are already stretched. Moreover, with the ceasefire still in place along the LOC, this was a possible effort by the hardliners within Pakistan (who oppose General Bajwa's peace initiatives) to convey to their protégées operating within India and their sympathisers in



File picture | Photo Credit: IANS

the Kashmir valley, that Pakistan's Army hasn't abandoned them entirely and any political initiative by New Delhi, will be resisted.

More so as these summer months are usually used by the Pakistan army to push in trained and armed militants across the LOC with heavy firing to distract Indian troops on the lookout for infiltrations. But with the ceasefire in place, drone attacks would now provide the necessary distractions to facilitate infiltrations from another point on the LOC. But though the attack on the Jammu airbase was the first of its kind – and could set the scene for escalation, if more were to follow – Pakistan has been using drones for some time now, especially in the latter part of 2020, to send arms consignments across the LOC, and drugs across the IB in Punjab. However, these attempts were sometimes neutralised by Indian troops, when these drones were sighted.

The problem for the defenders – as India has rarely resorted to the offensive use of drones – is that these drones, of the type used in Jammu, are too small to be picked up by the radars in an air force base. They often pass off as birds. And because these were not regarded as a big enough threat, the Indian establishment was busy preparing to fight the last war, with ships, aircraft and missiles, and have chosen to ignore the minor irritants like drones! But had they attempted to study the trends in warfare, it was clear at least over the past decade that future conflicts would see much greater use of drones. In January 2018, a swarm of 13 armed, fixed-wing unmanned aerial vehicles (that are also commonly referred to as drones) attacked the Russian naval base in Tartus on the Mediterranean sea.

Though they were repulsed by the alert Russian forces, over that year some 47 drones were shot down by the Russians. But these attacks were on military facilities and hence were stalled. But the attack on Saudi Arabia's Abqaiq oil refineries in September 2019, by drones fired by Iran-backed rebels in Yemen, shocked the world, shot up oil prices and made military analysts rush to their drawing boards to find ways to counter swarms of drones that attacked targets both military and civil of critical value. They didn't have the answers then, and perhaps they even don't have them now. It is one thing to use expensive air defence systems to ward off missiles, but the US-made Patriot systems that the Saudis had were unable to take on the drones, since these were too small and flying too low to alert the air defence teams. The US has regularly used its 'Predator' UAV to

fire Hellfire missiles at targets in Afghanistan. This marked the start of a 15-year campaign in which drones carried out hundreds of strikes against al Qaeda and Taliban targets in the Af-Pak region.

However, it was the recent conflict between Armenia and Azerbaijan that presented lessons for the future. Analysts have argued that this war was essentially won by drone warfare. The conflict, fought over the disputed Nagorno-Karabakh region saw the tanks and artillery systems of the Armenians reduced to junk by the forces of Azerbaijan which used a combination of Turkish and Israeli made drones that carried munitions weighing from 50 to 15 kg, and bombed the daylights out of their opposition. As per a blog on Oryx, titled 'The Fight For Nagorno-Karabakh: Documenting Losses on The Sides Of Armenia and Azerbaijan' the losses of the Armenians were six times more than that of Azerbaijan.

Pakistani military observers were present near the battlefields – perhaps encouraged by Turkey, a close friend of the Pakistanis - to draw lessons, and reports suggest that Pakistan has been engaging Turkey and Israel to buy drones, just like it has done for some years with China, the world's largest manufacturer of small-sized drones. In fact, there are also reports that China too has studied the lessons of this conflict, to use for its own military agenda, or to get Pakistan to use drones to divert India's attention over the two front military threats China and Pakistan now present to India.

Having said that, it is still early days to say that drone warfare will define the outcome of all future wars, as drones might help an adversary to attack hilltops and pickets guarded by the soldiers on the borders, but eventually, the adversary would need to send its troops to physically occupy tactically held positions, like the Chinese would need to do on the LAC. Here, a trained and determined army like that of India could certainly hold its own. And while India and Pakistan have in the past battled with Unarmed Aerial Vehicles (UAV) along the LOC – both having shot down one or two of UAVs from the other side – reports now suggest that India's Defence Research and Development Organization (DRDO) is clearly lagging behind in the race for drones and anti-drone technologies. Some rudimentary technologies do exist within India, but the thorough all-encompassing military acquisition process could take at least a few years to put in place across our vast frontiers, since it would require the system to have the ability to detect, track and intercept the smaller drones, unlike intercepting the larger UAVs. Currently, the tools used by militaries, defence organisations and police include GPS spoofing, drone nets, radars and jammers for radio-frequency, electro-optical and acoustic systems and of course the physical shooting down of drones by soldiers. Currently, Indian companies are toying with multiple technologies to deal with all possible contingencies.

An earlier report released by Ernst & Young along with FICCI (Federation of Indian Chambers of Commerce and Industry) had pointed out that drones were a threat to security that shouldn't be ignored. However, the slow-moving machinery of the government has yet to implement their suggestions, as also that of certain other private bodies like Indianeye Security Ltd. Perhaps, as an immediate response New Delhi could involve India's private sector to provide much-needed technology that already exists to counter the threat of mini-drones, like the ones that were used in Jammu. As per the study report of E&Y and FICCI, the market for drones was expected to touch \$100 million by 2020, but the 'instances of misuse of this technology by nefarious entities also heighten the security risk posed by them,' warns the report. That is in the civilian sector, where over 50,000 drones were operating in India in 2018 itself. The national security challenges not just on the borders but even on high-value targets within major cities are now clearly bigger. Thus, the government cannot procrastinate anymore in implementing the 'No Permission No Take-off (NPNT)' requirements mandated in Civil Aviation Regulations (CAR) even though India has already taken the first step towards bringing accountability in drone ownership and operations.

(Maroof Raza is a guest contributor. Views expressed are personal.)

<https://www.timesnownews.com/columns/article/drones-and-the-future-of-warfare/777977>

‘State support’ behind drone strike, says top Army officer

“We have identified some key military installations and activated countermeasures to pre-empt drone attacks. Steps have been taken in coordination with intelligence agencies,” said Lieutenant General DP Pandey, who heads the Srinagar-based HQs 15 Corps

New Delhi: The technology used in the aerial attack on an India Air Force (IAF) facility in Jammu on June 27 indicated “State support and the possible involvement of Pakistan-based Jaish-e-Mohammed and Lashkar-e-Taiba terror groups”, a top Indian Army officer aware of the matter said on Wednesday.

The army has tightened security at its key forward installations in the Kashmir Valley following the attack, he added.

“We have identified some key military installations and activated countermeasures to pre-empt drone attacks. Steps have been taken in coordination with intelligence agencies,” said Lieutenant General DP Pandey, who heads the Srinagar-based HQs 15 Corps.

He said the drones and explosives used for aerial attacks cannot be assembled on the roadside and are likely to be state-supported systems. He said there appeared to be an “element of guidance from State actors” to modify the drones for aerial attacks. “It’s a new and emerging threat that we have to stay prepared for,” Pandey said.

The June 27 attack was the first-ever offensive use of drones to target an Indian military facility. IAF has also beefed up defence at its forward airbases in the western sector to pre-empt fresh drone attacks, as reported by HT on June 29. Snipers, jammers and other countermeasures have been activated at forward IAF bases.

The drone attack is a watershed in asymmetric warfare and underlines the need for the armed forces to build capabilities to deter, detect and neutralise such aerial threats.

Chief of defence staff General Bipin Rawat on Monday said that India has to start preparing for future generation warfare. He said the three services, the Defence Research and Development Organisation (DRDO), academia and other stakeholders were working together to develop technology to counter the threat from drones at the earliest.

DRDO Chief G Satheesh Reddy said that the counter-drone technology developed by his organisation could provide the armed forces with the capability to swiftly detect, intercept and destroy small drones that pose a security threat. He said DRDO’s anti-drone system would give the military both “soft kill” and “hard kill” options to tackle the aerial threat. The first refers to jamming the hostile drone, while the second involves a laser-based kill system

After the aerial attack at the air force station in Jammu on June 27, another attack was thwarted in the early hours of Monday. Drones were also sighted near military installations in Jammu between 1 am and 4.30 am on Tuesday, indicating terrorist groups could be trying to replicate Sunday’s strike. Drones were again seen hovering over Kaluchak and Kunjwani military stations on Wednesday.

The National Investigation Agency has taken over the probe into the June 27 attack and registered a case under the Explosive Substances Act, UAPA, and IPC sections on criminal conspiracy and attempt to murder.



National Investigating Agency (NIA) team arrives at Jammu Air Force Station to investigate the recent drone blasts, in Jammu. (ANI Photo)

Air Vice Marshal Manmohan Bahadur (retd) said: “Jammu is a wake up call but it must be appreciated that the threat has been long in existence, and the anti-dote to terror drones is a whole-of-government approach since it’s not only military installations that are threatened but civilian infrastructure of importance too.”

“Thus, the IB, RAW and other intelligence agencies have to work hand-in-hand to preempt attacks and terminal anti-drone defences have to be provided to key installations. In these Covid crunch times, finances would have to be provisioned from somewhere by the government,” the former additional director general at Centre for Air Power Studies said.

<https://www.hindustantimes.com/india-news/state-support-behind-drone-strike-says-top-army-officer-101625078424968.html>



Thu, 01 July 2021

JNU, DRDO sign pact of cooperation in education and research

The Jawaharlal Nehru University (JNU) on Wednesday signed an MoU with DRDO’s Defence Institute of Physiology and Allied Sciences (DIPAS) for cooperation in education and research, the university said in a statement

New Delhi: The Jawaharlal Nehru University (JNU) on Wednesday signed an MoU with DRDO’s Defence Institute of Physiology and Allied Sciences (DIPAS) for cooperation in education and research, the varsity said in a statement. JNU Vice-Chancellor M Jagadesh Kumar said the objectives of the memorandum of understanding (MoU) with Defence Research and Development Organisation (DRDO) were to focus on joint research activities, faculty and student exchange programmes, and incubating technologies at Atal Incubation Centre of the university.



Jawaharlal Nehru University (JNU) and DRDO’s Defence Institute of Physiology and Allied Sciences (DIPAS) signed an agreement to collaborate in education and research

He said JNU has strength in basic and fundamental research in life sciences and biomedical fields.

“JNU VC emphasised on priorities to undertake joint research projects in the areas of high altitude physiology, genomics, proteomics, metabolomics, medical informatics, health economics, chemoinformatics, drug discovery, application of machine learning and other advanced data analytics in medical research including data repository and data analytics capacity, image analytics, developing and evaluating medical devices and technologies, other area of mutual interest,” the statement said.

“Joint research and academic activities will accelerate and enhance the quality of output in the areas of high altitude and stress biology in extreme conditions faced by our defence forces and inhabitants in that particular area,” it added.

DIPAS Director Rajiv Varshney emphasised on the importance of this collaboration in advancing research at both the institutions.

(This story has not been edited by Careers360 staff and is auto-generated from a syndicated feed.)

<https://www.ndtv.com/education/jnu-drdo-sign-pact-of-cooperation-in-education-and-research>

जेएनयू एवं डीआरडीओ ने शिक्षा, अनुसंधान में सहयोग के लिए एमओयू पर हस्ताक्षर किये

नयी दिल्ली: जवाहर लाल नेहरू विश्वविद्यालय (जेएनयू) ने शिक्षा एवं अनुसंधान के क्षेत्र में सहयोग के लिए बुधवार को रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के डिफेंस इंस्टीट्यूट ऑफ फिजियोलॉजी एंड एलाइड साइंसेस (डीआईपीएस) के साथ एक समझौता ज्ञापन पर हस्ताक्षर किया है। विश्वविद्यालय ने एक बयान में यह जानकारी दी।

जेएनयू के कुलपति एम जगदीश कुमार ने कहा कि डीआरडीओ के साथ समझौता ज्ञापन (एमओयू) का उद्देश्य विश्वविद्यालय के अटल इनक्यूबेशन सेंटर में संयुक्त अनुसंधान गतिविधियों, संकाय और छात्र विनिमय कार्यक्रमों और इनक्यूबेटिंग प्रौद्योगिकियों पर ध्यान केंद्रित करना है। उन्होंने कहा कि जेएनयू के पास जीवन विज्ञान और जैव चिकित्सा क्षेत्रों में बुनियादी और मौलिक अनुसंधान में विशेषज्ञता है।

बयान के अनुसार, “जेएनयू के कुलपति ने हाई एल्टीट्यूड फिजियोलॉजी, जीनोमिक्स, प्रोटीओमिक्स, मेटाबॉलिकमिक्स, मेडिकल इंफॉर्मेटिक्स, हेल्थ इकोनॉमिक्स, केमोइनफॉर्मेटिक्स, ड्रग डिस्कवरी, मशीन लर्निंग के अनुप्रयोग और डेटा रिपोजिटरी सहित चिकित्सा अनुसंधान में अन्य उन्नत डेटा एनालिटिक्स के क्षेत्रों में संयुक्त अनुसंधान परियोजनाओं को शुरू करने की प्राथमिकताओं पर जोर दिया और डेटा विश्लेषण क्षमता, छवि विश्लेषण, चिकित्सा उपकरणों और प्रौद्योगिकियों के विकास और मूल्यांकन के साथ अन्य पारस्परिक हित वाले क्षेत्र में सहयोग पर जोर दिया।”

<https://navbharattimes.indiatimes.com/india/jnu-and-drdo-sign-mou-for-cooperation-in-education-research/articleshow/84000808.cms>

Maha Metro redesigns DRDO bio-digesters, no effect on recycling system

Nagpur: Maha Metro regularly takes steps to become the most environment friendly organization in the country. Now it has successfully reduced the size of the bio-digester systems being installed at Nagpur Metro stations and other buildings without adversely affecting their capacity and efficiency. This new system has been approved by Defense Research and Development Organization (DRDO), which had invented this patented technology.



A memorandum of understanding (MoU) had been signed between DRDO and Maha Metro in July 2016 for installation of DRDO bio-digester patented technology at all metro stations, depots and other establishments. As these water recycling systems were consuming a lot of space at stations, Maha Metro officials decided to redesign them.

The waste water collection tank was shifted to below the reed bed instead of the station thus freeing space at the stations. These changes have not affected the efficiency of the systems. Five redesigned bio-digesters have been successfully functioning at stations since past few months.

The DRDO patented technology is eco-friendly, efficient and economical for onsite treatment of human waste deploying specially designed fermentation tank (bio-digester) with active anaerobic microbial consortium which is used as seed material and reed bed system. The discharge from reed bed is used for flushing and gardening purpose. At present total 14 bio-digesters (both original and new designs) are operational at metro stations and while installation of others is in progress.

Salient features of DRDO Bio-digester:

- Eco-friendly, cost-effective and green technology
- Less space requirement & energy efficient
- Less maintenance, no sludge generation & free from foul odour
- Recycle & reuse of effluent water
- No ground water contamination
- Viability in all geo-climatic conditions prevalent across the country

This DRDO technology is an example of “Think in India and Make in India”. It provides a major fillip to government’s nationwide sanitation initiatives. Maha Metro has further improvised this technology. Influenced by the success of this technology in Nagpur Metro Rail Project, Maha Metro has decided to implement the bio-digester technology in all upcoming projects across Maharashtra.

<https://www.nagpurtoday.in/maha-metro-redesigns-drdo-bio-digesters-no-effect-on-recycling-system/06301626>

Sanitation on track

Railways fulfils pledge of bio-toilets on trains

By Vinayak Chatterjee

The humiliating descriptor for the Indian Railways of being the world's largest institutional free-discharge toilet does not apply any more. As of March 2021, 100 per cent of passenger coaches have been fitted with bio-toilets. A pledge made in 2010 has been fulfilled.

In 2010, the Railways decided to eliminate the direct discharge of human waste from trains. The Railways ran 13,000 passenger trains daily with 55,000 coaches transporting 24 million passengers daily (equal to the population of Australia), covering 7,321 stations across India.

A train with 24 coaches would have 92 toilets resulting in 4,000 tonnes of human waste being dumped daily on rail tracks across the 70,000-km route of the network. The Supreme Court, too, passed strictures on manual scavenging, as the Railways employed around 95,000 workers in the removal of human biological waste from tracks, stations and coaches.

The bio-digester method, developed by the Defence Research and Development Organisation (DRDO), was chosen as the appropriate technology. The Railways' decision to adopt the 'IR-DRDO bio-toilets' came after extensive studies of various other technologies used in advanced countries. These included the Vacuum Flush Technology, Controlled Discharge Systems, Chemical Toilets, and Electrical Incinerating Toilets. All these technologies had complicated issues associated with their usage; and not all of them had to do with the capital costs of installation, but also, largely, the sanitary habits of the Indian travelling public. The efficacy of the IR-DRDO solution had been tested by DRDO in extreme climates and conditions like those at Siachen Glacier.

The current cost of fitting a bio-toilet is about ₹1 lakh. The total programme cost till date is likely to have been in the range of ₹4,000-₹5,000 crore. The implementation phase of this technology threw up a host of operational problems.

In 2017, an IIT-Madras study concluded that these installations were no better than a septic tank. This led to a course correction by the Railways through a dedicated project team.

Tweaks along the route

To address the issue of disposing plastic and non-biodegradable garbage into the toilets, the Railways installed suction machines at major coach depots.

To solve the second challenge, that of flushing system, the Railways decided to go in for bio-vacuum toilets. Bio-vacuum toilets also use bacteria to decompose human waste and operate on vacuum technology, but are not as expensive as traditional vacuum toilets. Feedback from passengers also helped the Railways rectify the deficiencies.

Thanks to these rectification measures, the Railways has fulfilled its 2010 pledge and also bagged the award as the best Ministry for ongoing implementation of the 'Swachhta Action Plan'.

An Indian School of Business study in February documented six beneficial impacts:

One, there has been a noticeable improvement in the level of cleanliness along railway tracks, and especially at stations.

Two, elimination of labourers involved in manual scavenging and cleaning.



Three, enhanced safety of rolling stock and rail tracks as lack of human waste and spatters on rail tracks and under-gears of rolling stock ensure quality in maintenance work.

Four, reduction in the high risk of health hazards due to unclean toilets and waste-discharge.

Five, replicability of the technology in other environs, helping address the national mission against open-defecation.

Six, creation of an innovative platform by significantly expanding the market for this kind of toilet fitment.

This is a significant and laudable achievement for the Railways.

The writer is the Chairman of Feedback Infra

<https://www.thehindubusinessline.com/opinion/sanitation-on-track/article35062255.ece>

Rising Kashmir

Thu, 01 July 2021

LAWDA starts installation of 100-DRDO designed bio-digesters in Telbal

Initiative aimed to treat sewage scientifically & keep Dal clean from effluents: AEE LAWDA

By Irfan A Mir

Srinagar: The Department of Lakes & Waterways Development Authority (LAWDA) on Tuesday kick-started the process of installing Defense Research & Development Organization (DRDO) designed invariant land-based bio-digesters in the Telbal area of Srinagar outskirts.

The initiative was flagged off by Vice-Chairman LAWDA Dr Bashir Ahmad Bhat (IRS) and others who were present at the occasion include SE LAWDA Vineet Gupta and several officers of the Engineering wing of the LAWDA.

Speaking to Rising Kashmir, Bilal Ahmad Malik, Assistant Executive Engineer LAWDA said that earlier several meetings were held by the Committee of Experts (COE) appointed by Hon'ble High Court J&K and it was decided that a pilot project the Department of Lakes & Waterways Development Authority shall take up providing 100-numbers of bio-digesters in the first phase to see the outcome of the initiative.



“This is a pilot project recommended by Committee of Experts (COE) aimed to treat sewage scientifically and keep the Dal clean from effluents”, Malik said and added, “In the first phase 100 bio-digesters would be installed in Telbal area of the Dal Lake to ascertain its results”.

He said there are multiple areas in the peripheries of Dal that are yet to get connected with the existing Sewerage Treatment Plants (STPs) and for this purpose, this initiative will prove a milestone in the history of LAWDA.

“This project was in the pipeline for a long time and experts from DRDO were invited to formulate a program where they were asked to provide design of bio-digesters as per the requirement of the local atmosphere. However after proper e-tendering of the job, the work has been allotted to qualified trainers of DRDO,” Malik said.

The main purpose of these bio-digesters is to scientifically take care of the sewage generated from the households of unconnected areas which otherwise was directly flowing into the main channels of Dal Lake.

“At this point of time we have taken up the initiative and hopefully all 100 bio-digesters would be installed within a month,” the AEE said.

He said if the initiative would prove successful then in future all unconnected areas of the Dal would be included and households would be given bio-digesters free of cost.

Terming the initiative a “new way” of treating sewage, the officer said it is not only limited up to the installation of bio-digesters but the equipment would be taken care of from time to time to check its efficacy.

He said through Anaerobic treatment of the sewerage, the Microbial consortium chemical used in the bio-digesters will convert sewage into water and gas and the components of the effluent will be checked continuously to ascertain its efficacy and influence.

To a query about the failure of some installed in few houseboats a year ago, he said due to harsh weather impressions during the previous year, the initiative could not sustain for a long, however, maintained that after the relocation of the position of bio-digesters inside the houseboats, LAWDA is hopeful it will yield successful results.

“Due to no tourism season in the previous year, the bio-digesters installed in houseboats failed due to imbalance and other reasons. However we have installed 3-4 bio-digesters afresh in houseboats with their positions relocated, and are hopeful it will prove a successful step in future”, he added.

<https://www.risingkashmir.com/LAWDA-starts-installation-of-100-DRDO-designed-bio-digesters-in-Telbal-69325>

अमर उजाला

Thu, 01 July 2021

प्रधानमंत्री रक्षा क्षेत्र में आत्मनिर्भरता का सपना देख रहे हैं और सैन्य अधिकारियों को विदेशी तोप लेने की जल्दी है

By शशिधर पाठक

सार

- प्रधानमंत्री कार्यालय से मांगी तोप खरीदने की अनुमति
- तोपखाना और सैन्य संतुलन पर असर पड़ने का दे रहे हैं तर्क
- डीआरडीओ की 7 वें जोन में फायर करने वाली तोप का इंतजार करने के मूड में नहीं

विस्तार

नयी दिल्ली: सेना को अपना तोपखाना मजबूत बनाने के लिए तोपों की जरूरत है। इसको लेकर सेना ने विदेशी तोप खरीदने का लगातार दबाव बना रखा है। इसके समानांतर प्रधानमंत्री नरेंद्र मोदी और केंद्रीय रक्षा मंत्री राजनाथ सिंह देश को रक्षा क्षेत्र में आत्म निर्भर बनाने का संकल्प ले चुके हैं। इसी प्रतिबद्धता के तहत केन्द्र सरकार ने तोप के निर्यात को प्रतिबंधित सूची (दिसंबर 2021 तक के लिए) में डाल रखा है।

सेना चाहती है कि उसे इस्राइल की तोपे मिल जाए और इसके लिए 400 तोपों के सौदे को हरी झंडी दे दी जाए। हालांकि अभी रक्षा मंत्रालय ने सेना मुख्यालय के प्रस्ताव पर



इस्राइल के एल्बिट सिस्टम द्वारा विकसित 400 आटोनाॅमस टोड हावित्जर तोप - फोटो : Israel defense

कोई निर्णय नहीं लिया है और गंद प्रधानमंत्री कार्यालय के पाले में डाल दी है।

क्या है भारतीय सेना का तर्क?

सेना का कहना है कि उसका तोपखाना और देश का शक्ति संतुलन प्रभावित हो रहा है। इसके पीछे सैन्य अधिकारी चीन और पाकिस्तान से मिल रही दोहरी चुनौती का तर्क दे रहे हैं। उनका कहना है कि तोपों की कमी पूरी करने के लिए सेना के पास दो विकल्प हैं। पहला विकल्प है कि सेना देश में ही निर्मित, विकसित 155 एमएम और 52 कैलिबर की तोप प्राप्त करे। इसके लिए सरकारी क्षेत्र की गन कैरिज फैक्ट्री (सीजीएफ) धुनष तोप को समय पर तैयार करके नहीं दे पा रही है।

इसके अलावा डीआरडीओ की तकनीक पर आधारित टाटा डिफेंस और भारत फोर्ज द्वारा विकसित एडवांस टोड आर्टिलरी गन (एटीएजी) अभी परीक्षण और पीएसक्यूआर प्रक्रिया से गुजर रही है। इसलिए सेना चाहती है कि रक्षा मंत्रालय और प्रधानमंत्री कार्यालय इस्राइल के एल्बिट सिस्टम द्वारा विकसित 400 आटोनाॅमस टोड हावित्जर सिस्टम (एटीएचओएस) सौदे को अंतिम रूप देने की अनुमति दे दे।

क्या है डीआरडीओ के एटीएजी की क्षमता?

एटीएजी डीआरडीओ द्वारा विकसित टोड हावित्जर तोप है। इसे डीआरडीओ की आर्ममेंट रिसर्च एंड डेवलपमेंट इस्टैब्लिशमेंट ने 2013 में इस परियोजना को शुरू करके विकसित किया है। 2019 में इस तोप का प्रोटोटाइप टाटा पॉवर स्ट्रेटजिक इंजीनियरिंग डिवीजन और भारत फोर्ज लिमिटेड ने तैयार किया है। यह तोप -3 से +75 डिग्री के इलेवेशन के साथ 15 सेकेंड में तीन राउंड फायर करने में सक्षम है। डीआरडीओ का दावा है कि उसकी तोप 48.07 किलोमीटर तक मार करने तथा सातवें जोन में फायर करने में सक्षम दुनिया की पहली तोप है। अभी तक की सभी तोपें केवल छठवें जोन तक फायर करने में सक्षम हैं।

डीआरडीओ का वीटो, रक्षा मंत्रालय और सीडीएस भी पक्ष में

रक्षा मंत्रालय के सूत्र बताते हैं कि सेना की यह मांग जनवरी 2021 से लगातार बनी हुई है, लेकिन रक्षा मंत्रालय इस पर कोई निर्णय लेने के मूड में नहीं है। मंत्रालय ने इस सौदे की गंद प्रधानमंत्री कार्यालय के पास डाल दी है। सूत्र बताते हैं कि मामला आत्मनिर्भर भारत अभियान से जुड़ा है। इस सौदे को लेकर डीआरडीओ ने भी वीटो लगा रखा है। करीब 13 साल पहले डीआरडीओ के वैज्ञानिक एम नटराजन ने सेना की जरूरत के आधार पर टोड गन विकसित करने की पहल शुरू कराई थी।

डीआरडीओ के वैज्ञानिक कहते हैं कि उनके द्वारा विकसित की गई एटीएजी दुनिया की बेहतरीन तोप है। यह सातवें जोन तक फायर करने में सक्षम है और इस्राइल की एटीएचओएस से तुलना में काफी अच्छी है। इसे देश की रक्षा क्षेत्र के दो दिग्गज कंपनी टाटा डिफेंस और भारत फोर्ज ने विकसित किया है। डीआरडीओ के वैज्ञानिक बताते हैं कि अभी तक सेना के परीक्षणों में तोप अपने मानक पर पूरी तरह से खरी उतरी है।

डीआरडीओ के वैज्ञानिकों की माने तो दिन और रात दोनों समय युद्ध में सक्षम इस तोप ने शानदार नतीजा दिया है। इसलिए सेना को एक परीक्षण और होने तक (छह महीना) इंतजार करना चाहिए। इससे आत् निर्भर भारत अभियान को काफी ताकत मिलेगी। रक्षा मंत्रालय सूत्रों की माने तो रक्षा मंत्री राजनाथ सिंह, सीडीएस जनरल विपिन रावत भी एटीएजी और आत्मनिर्भर अभियान को बढ़ावा देने के पक्ष में हैं। इसलिए रक्षा मंत्रालय सेना मुख्यालय की मांग पर किसी निर्णायक स्थिति में नहीं पहुंच पा रहा है।

गंद प्रधानमंत्री कार्यालय के पाले में

सेना मुख्यालय के आर्टिलरी डिवीजन की मांग को देखते हुए रक्षा मंत्रालय ने फिलहाल अभी इस्राइल की एटीएचओएस या डीआरडीओ की एटीएजी पर कोई निर्णय नहीं लिया है। बताते हैं रक्षा सचिव डॉ. अजय कुमार से अनुमति लेकर रक्षा खरीद महानिदेशक वीएल कांताराव ने जून के पहले सप्ताह में इस प्रस्ताव (इस्राइल की एटीएचओएस) को प्रधानमंत्री कार्यालय के संयुक्त सचिव रुद्र गौरव श्रेष्ठ के पास भेज दिया है।

प्रधानमंत्री कार्यालय से इस सौदे को अंतिम रूप देने के संदर्भ में मार्ग दर्शन मांगा गया है। सूत्र बताते हैं कि वहां से अनुमति मिलने के बाद इस्राइली तोप सौदे का रास्ता साफ हो सकता है, लेकिन इससे मेक इन इंडिया और रक्षा क्षेत्र में आत्मनिर्भर भारत अभियान को भी बड़ा झटका लगना तय है।

सेना की पसंद रहे हैं विदेशी हथियार, बिना सरकार के दखल के नहीं मिल पाती डीआरडीओ को सफलता पृथ्वी, अग्नि, आकाश मिसाइल कार्यक्रमों को छोड़ दें तो देश का रक्षा अनुसंधान एवं विकास संगठन और इसकी तकनीक कभी भारतीय सैन्य बलों को बहुत रास नहीं आई। इसका सबसे बड़ा उदाहरण मुख्य युद्धक टैंक अर्जुन है। अर्जुन को सेना के बेड़े में शामिल करने को लेकर सैन्य अधिकारियों ने काफी भेदभाव किया था और इसे सेना के बेड़े में शामिल कराने के लिए तत्कालीन रक्षा मंत्री एके एंटनी को काफी मशक्कत करनी पड़ी थी।

तत्कालीन रक्षा राज्यमंत्री राव इंद्रजीत सिंह ने तो परीक्षण के दौरान अर्जुन टैंक के गियर बॉक्स से छेड़छाड़ के आरोप तक का बयान दे दिया था। दूसरा बड़ा उदाहरण हल्का एवं उन्नत लड़ाकू विमान तेजस है। तेजस को आज भी वायुसेना के कुछ अधिकारी दोयम दर्जे का मानते हैं। डीआरडीओ के वैज्ञानिकों का कहना है कि सैन्य बलों का नजरिया रक्षा क्षेत्र में कभी मेक इन इंडिया या आत्मनिर्भर भारत को प्रोत्साहन देने का नहीं रहा है।

डीआरडीओ के वैज्ञानिकों का कहना है कि सेना को देशी तकनीक का इस्तेमाल करना चाहिए और उन्हें उसमें कमियां बतानी चाहिए। उन कमियों को दूर करके उसे उन्नत बनाना वैज्ञानिकों का काम है। एम नटराजन अक्सर कहा करते थे कि इसी तरह से विदेशों में भी इंड यूजर्स (सशत्रु बल) अपने रक्षा तकनीक को उन्नत बनाने में सहायता देते हैं।

<https://www.amarujala.com/india-news/aatam-nirbhar-bharat-central-government-put-the-export-of-artillery-in-the-restricted-list-but-military-officers-demands-foreign-artillery>

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Wed, 30 June 2021 5:24PM

Lt Gen Sanjeev Kumar Sharma takes over as Deputy Chief of Army Staff (Strategy)

Lt Gen Sanjeev Kumar Sharma, AVSM, YSM will assume the appointment of the Deputy Chief of Army Staff (Strategy) on 01 July 2021. Lt Gen SK Sharma takes over the appointment from Lt Gen Paramjit Singh who superannuated on 30 June 2021 after completing thirty nine years of illustrious career in the Army.

The Deputy Chief (Strategy), a third and a new vertical created for overseeing the Indian Army's operations and intelligence directorates, among other important branches, is one of the most crucial appointments within the Indian Army. Lt Gen SK Sharma was the Director General of Military Intelligence prior to assuming this key appointment.

The General officer is an alumnus of Rashtriya Military School, Bengaluru and was commissioned into the Rajputana Rifles in December 1983. The General officer has served across a wide spectrum of conflicts and terrain profiles and tenanted a host of command, staff and instructional appointments. He has commanded an infantry battalion in an active counter-insurgency environment in the North-East, an Infantry Brigade deployed along the Line of Control and thereafter commanded an Infantry Division and a Corps in the Western sector.

An alumnus of the Defence Services Staff College Wellington, Higher Defence Management Course Secunderabad and the National Defence College New Delhi, he has held prestigious staff appointments at the Military Operations Directorate, Headquarters of Northern and Army Training Command, Headquarters Chinara Corps and Headquarters of an Artillery Division. He has been an instructor at the Indian Military Academy and has also served as a Military Observer with the United Nations Mission in Liberia (UNOMIL). The General officer holds a doctorate in Defence and Strategic Studies from the Pune University.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731510>





पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 30 June 2021 5:24PM

लेफ्टिनेंट जनरल संजीव कुमार शर्मा ने सेना उप प्रमुख (रणनीति) का पदभार संभाला

लेफ्टिनेंट जनरल संजीव कुमार शर्मा, एवीएसएम, वाईएसएम 1 जुलाई 2021 को डिप्टी चीफ ऑफ आर्मी स्टाफ (स्ट्रैटजी) की नियुक्ति का प्रभार संभालेंगे। लेफ्टिनेंट जनरल एसके शर्मा ने लेफ्टिनेंट जनरल परमजीत सिंह से इस नियुक्ति का कार्यभार संभाला, जो 30 जून 2021 को सेवानिवृत्त हुए। सेना में उनका 39 साल का शानदार करियर रहा।

उप प्रमुख (रणनीति), भारतीय सेना के अभियानों और खुफिया निदेशालयों के कामकाज की देखरेख के लिए बनाई गई एक नई व्यवस्था है जो अन्य महत्वपूर्ण शाखाओं के बीच भारतीय सेना के भीतर होने वाली सबसे महत्वपूर्ण नियुक्तियों में से एक है। इस अहम नियुक्ति को संभालने से पहले लेफ्टिनेंट जनरल एस के शर्मा मिलिट्री इंटेलिजेंस के महानिदेशक थे।

जनरल ऑफिसर राष्ट्रीय मिलिट्री स्कूल, बंगलुरु के पूर्व छात्र हैं और दिसंबर 1983 में उन्होंने राजपूताना राइफल्स में कमीशन प्राप्त किया था। जनरल ऑफिसर विभिन्न संघर्षरत इलाकों में अलग अलग भूमिकाओं में रहे हैं और उन्होंने अनेक प्रकार की कमान, स्टाफ और इंस्ट्रक्शनल भूमिकाएं संभाली हैं। उन्होंने पूर्वोत्तर में एक सक्रिय विद्रोह विरोधी वातावरण में एक इंफैंट्री बटालियन की कमान संभाली, नियंत्रण रेखा के साथ तैनात एक इंफैंट्री ब्रिगेड और उसके बाद पश्चिमी क्षेत्र में एक इंफैंट्री डिवीजन और एक कोर की कमान संभाली।

वह डिफेंस सर्विसेज़ स्टाफ कॉलेज वेलिंगटन, हायर डिफेंस मैनेजमेंट कोर्स सिकंदराबाद और नेशनल डिफेंस कॉलेज नई दिल्ली के पूर्व छात्र रहे हैं, उन्होंने मिलिट्री ऑपरेशंस डायरेक्टर, सेना की उत्तरी कमान तथा सेना प्रशिक्षण कमान के मुख्यालय, मुख्यालय चिनार कोर और एक आर्टिलरी डिवीजन के मुख्यालय में प्रतिष्ठित भूमिकाएं निभाई हैं। वह भारतीय सैन्य अकादमी में प्रशिक्षक रह चुके हैं और लाइबेरिया में संयुक्त राष्ट्र मिशन (यूएनओएमआईएल) के साथ सैन्य पर्यवेक्षक के रूप में भी काम कर चुके हैं। जनरल ऑफिसर ने पुणे विश्वविद्यालय से रक्षा और सामरिक अध्ययन में डॉक्टरेट की उपाधि भी पाई है।



<https://pib.gov.in/PressReleasePage.aspx?PRID=1731692>

J&K drone attack: Narendra Modi govt to unveil policy to deal with emerging security threats

The Defence Ministry and the three services will play a leading role in the formulation of the policy as well as in its implementation by coordinating with all the leading stakeholders and security agencies

Edited By Ritesh K Srivastava

Highlights

- 1. Modi govt will soon unveil its policy to deal with emerging security threats soon**
- 2. This comes days after a drone attack on the Air Force base in J&K**

New Delhi: In the aftermath of the first-of-its-kind of a drone attack in the country, the Narendra Modi government is expected to soon unveil its policy to deal with the emerging security threats and futuristic challenges facing the country.

According to sources, expeditious framing of a broad-based policy to deal with such security challenges was broadly discussed during a crucial meeting chaired by Prime Minister Narendra Modi on Tuesday, which was also attended by Home Minister Amit Shah, Defence Minister Rajnath Singh and National Security Advisor Ajit Doval.



The meeting took place two days after explosives-laden drones were used to carry out an attack on the Jammu Air Force station in the first such instance of suspected Pakistan-based terrorists deploying unmanned aerial vehicles to strike at vital installations.

"The government is coming out with a policy to collectively deal with the emerging challenges. It was decided to expedite the framing of the policy," a source was quoted as saying by PTI.

Various ministries and departments are working on the policy to effectively counter the new and emerging non-traditional security challenges facing the country.

The Defence Ministry and the three services will play a leading role in the formulation of the policy as well as in its implementation by coordinating with all the leading stakeholders and security agencies. It has also been learnt that the three forces are being told to adequately focus on bridging the gaps in effectively dealing with new-age challenges such as drone attacks and go for the procurement of the necessary hardware to contain those.

The meeting also discussed various other aspects, including equipping the security forces with modern equipment and involving more youngsters, start-ups and the strategic community in the field.

The Army has already been working on incorporating artificial intelligence, cognitive sciences, robotics, drones, quantum computing, nanotechnology and cyber capabilities as part of the efforts to deal with future challenges.

The people said the three services as well as key national security planners will have a series of meetings in the next few weeks and months to speed up the work on the policy.

They said the services have already been told to focus on acquiring anti-drone technologies to deal with attacks by unmanned aerial vehicles. Following the Jammu attack, the Indian Air Force has enhanced the security at all its bases located in the border areas.

The Defence Research and Development Organisation (DRDO) has developed anti-drone technology to shoot down hostile drones in the range of two to three kilometres.

It is expected to conduct more research on extending the range. A day after the attack on the Jammu Air Force station, fresh attempts to target the Ratnuchak-Kaluchak military station in Jammu with drones were thwarted by alert soldiers.

<https://zeenews.india.com/india/jk-drone-attack-narendra-modi-govt-to-unveil-policy-to-deal-with-emerging-security-threats-2372805.html>



Thu, 01 July 2021

Air Marshal VR Chaudhari to take over as IAF's new Vice Chief of Air Staff

*He was commissioned into Fighter Stream of the IAF on 29 Dec 1982
as a fighter pilot and has served nearly 39 years*

By Mayank Singh

New Delhi: The Indian Air Force and Army will see new faces at the top rung assuming charge from Thursday. Apart from the other important appointments, the Indian Air Force (IAF) will get its new Vice Chief and the Indian Army will get its new Deputy Chief of Army Staff (Strategy), a new vertical created last year as part of Army restructuring.

Air Marshal VR Chaudhari is taking over as the new Vice Chief of Air Staff (VCOAS) on Thursday, July 1 with the retirement of Air Marshal HS Arora. Air Marshal Chaudhari was Air Officer Commanding-in-Chief (AOCinC) of Western Air Command from 01 Aug 2020. He was commissioned into Fighter Stream of the IAF on 29 Dec 1982 as a fighter pilot and has served nearly 39 years. He has flown a wide variety of fighter and trainer aircraft with a flying experience of more than 3800 hrs.



Air Marshal VR Chaudhari

Air Marshal BR Krishna who till now was the Director-General Air Operations of the IAF will be taking over as the new AOC in C Western Air Command on Thursday. Air Marshal PM Sinha will be replacing him as the new DG Air Operations.

Air Marshal Richard John Duckworth, who was the Air Officer in-charge Personnel of the Air Force will take charge as the AOC in C Central Air Command.

With Lt Gen Sanjeev Sharma assuming charge on Thursday Army will see a new face as the Deputy Chief of Army Staff (Strategy) which is seen to be important and specially created as part of the restructuring of the Indian Army Headquarters. The first DCOAS (Strategy) Lt Gen Paramjit Singh retired on Wednesday.

The post of DCOAS (Strategy) is a crucial appointment created last year as a third new vertical created to oversee Army's operations, plans and logistics. The other two DCOAS are DCOAS (capability development and sustenance) and DCOAS (information systems & coordination)

Lt Gen SK Sharma, an alumnus of Rashtriya Military School, Bengaluru was commissioned into the Rajputana Rifles in December 1983 and was the DG of Military Intelligence prior to assuming this key appointment.

Lt Gen SP Goswamy will assume the charge of DG of Corps of Army Air Defence (AAD) as Lt Gen AP Singh retired on June 30.

<https://www.newindianexpress.com/nation/2021/jun/30/air-marshal-vr-chaudhari-to-take-over-as-iafs-new-vice-chief-of-air-staff-2323674.html>



Press Information Bureau
Government of India

Ministry of Science & Technology

Wed, 30 June 2021 3:55PM

Rebel behaviour of highest energy afterglow of a Gamma-Ray Burst detected in space may help probe stellar evolution

The highest energy afterglow detected in space so far seems to be a rebel. The emission from the most notable Gamma Ray Burst (GRB) explosion so far traced -- the afterglow from a galaxy 4.5 billion light years away was found to be complex in nature and did not follow the evolution expected in standard afterglow models. The detection of high energy photons (TeV Photons) from this GRB provides new insights and important clues to unravel the underlying physical processes at work which result in such explosions.

The GRB with ultra-high energy photons called GRB 190114C was detected for the first time on 14-January-2019. This discovery was reported in *Nature* by the Major Atmospheric Gamma Imaging Cherenkov Telescopes (MAGIC) collaboration.

As usual, the GRB lasted for a brief period, followed by an initial bright flash in high energies known as the 'prompt emission'. A less luminous but long-lasting counterpart known as the 'afterglow' was detected after the prompt emission and offered scientists the chance to probe the GRBs.

Dr. Kuntal Misra from Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, an autonomous institute of the Department of Science & Technology, along with significant contributions from national and international collaborators, carried out observations of the afterglow from GRB 190114C spanning over nearly 140 days after the burst. The paper has been published in *Monthly Notices of the Royal Astronomical Society (MNRAS)*.

The optical observations of the afterglow from GRB 190114C were carried out with the Growth India Telescope (GIT), Himalayan Chandra Telescope (HCT) (both located in Hanle, Leh, India), and Devasthal Fast Optical Telescope (DFOT, located in Devasthal, Nainital, India) as well as with upgraded Giant Meter wave Radio Telescope (u-GMRT, located in Khodad, Pune, India), Australia Telescope Compact Array (ATCA, located in New South Wales, Australia) and the Atacama Large Millimeter Array (ALMA, located in Atacama Desert, Chile).

Detailed modelling of the afterglow using multi-band data indicates that the parameters describing the fraction of energy in electron population and magnetic field are evolving with time and not constant as generally seen in GRBs. The scientists suggested that the evolution of these parameters, at early times, may play a role in producing the bright TeV emission.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731447>

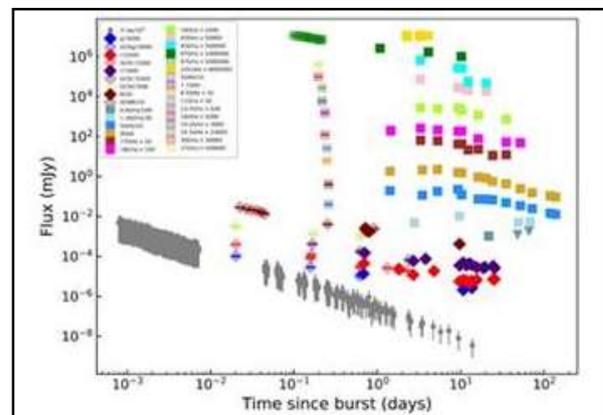


Figure 1: Multi-band lightcurves of the afterglow of GRB 190114C from X-ray to the radio/mm bands.

Researchers develop wearable sensor to monitor oxygen levels through skin

Researchers have combined a new oxygen-sensing film with machine learning to create a wearable sensor capable of measuring tissue oxygenation through skin. The device could be used to monitor a person's oxygen levels on a continuous basis for applications in medicine and sports.

The wireless device is easy to operate and communicates wirelessly, making it well suited for remotely monitoring oxygen levels outside of healthcare settings.

"The device is intended for any scenario where there is a risk of compromised blood flow and a lack of oxygen to limbs and tissues," said Conor Evans, the principal investigator on the project. "The technology is particularly powerful for medical situations where the traditional blood oxygen saturation tools fail to provide adequate information. The applications of this wearable wireless oxygen device range from traumatic injuries such as car accidents and battlefield injuries to post-surgical monitoring and wound care."

Juan Pedro Cascales and Conor L. Evans from Massachusetts General Hospital and Harvard Medical School will present the research at the virtual OSA Imaging and Applied Optics Congress and Optical Sensors and Sensing Congress to be held 19-23 July.

The device, worn like a wristwatch midway up the forearm, consists of a 3D-printed casing, a small sensor head and adhesive oxygen sensing film. Electronic components process data from the sensor and allow the device to send recordings via Bluetooth or Wi-Fi.

The sensor works by detecting the phosphorescence lifetime and intensity of an acrylic oxygen sensing film. Two LEDs in the sensor head excite the oxygen sensing film with ultraviolet light. A photodiode detects the phase of light emitted by the oxygen sensing film in response. Comparing the phase of the light emitted by the LEDs with the phase of light emitted by the oxygen sensing film provides a measure of the oxygen level in the tissue under the film.

"This is the first truly wearable noninvasive transcutaneous oxygen monitor," said Juan Pedro Cascales, lead author on the project. "The simplicity, accuracy, small size, and ease-of-use of the device means it can go just about anywhere and be used by doctors, nurses, paramedics, and well as patients in their own home."

To calibrate the sensor, researchers exposed the device to a variety of temperatures inside a chamber with a mix of nitrogen and air and adjusted the calibrations until the phases aligned with those of a commercial sensor.

The researchers tested the device by attaching it to the front limb of a Yorkshire pig. When a tourniquet was applied over the elbow joint, the sensor detected a drop in oxygen reflecting the reduction in blood flow. The measurements were well aligned with those from a commercial reference sensor and were not affected by variations in temperature, humidity or other environmental factors, making the sensor practical for use outside the lab.

The team used a machine learning approach to train the system to accurately measure oxygen levels under different conditions. This approach also allowed researchers to account for photobleaching, the tendency for light-excited materials to gradually lose their ability to emit light. Photobleaching is a common limitation of devices based on measuring light intensity.

"We are now carrying out first-in-human clinical trials, and are excited to share our results soon," said Evans. "We are also building smaller, more ergonomic and optimized versions of the



Credit: Unsplash/CC0 Public Domain

device that can communicate with any smartwatch, smartphone, tablet, or computer," added Cascales.

The innovate project has been funded by the Department of Defense through both the Military Medical Photonics Program as well as the Transforming Technologies for the Warfighter Program.

Provided by [The Optical Society](#)

<https://phys.org/news/2021-06-wearable-sensor-oxygen-skin.html>



Thu, 01 July 2021

Thermal waves observed in semiconductor materials

A study published in *Science Advances* reports on the unexpected observation of thermal waves in germanium, a semiconductor material, for the first time. This phenomenon may allow a significant improvement in the performance of our electronic devices in a near future. The study is led by researchers from the Institute of Materials Science of Barcelona (ICMAB, CSIC) in collaboration with researchers from the Universitat Autònoma de Barcelona, and the University of Cagliari.

Heat, as we know it, originates from the vibration of atoms, and transfers by diffusion at ambient temperatures. Unfortunately, it is rather difficult to control, and leads to simple and inefficient strategies for manipulation. This is why, for example, large amounts of residual heat can accumulate in our computers, mobile phones and, in general, most electronic devices.

However, if heat was transported through waves, such as light, it would offer new alternatives to control it, especially through the unique and intrinsic properties of waves.

Thermal waves have been observed to date only in few materials, such as solid helium or, more recently, in graphite. Now, the study published in *Science Advances* by researchers from the Institute of Materials Science of Barcelona (ICMAB, CSIC) in collaboration with researchers from the Universitat Autònoma de Barcelona, and the University of Cagliari, reports on the observation of thermal waves on solid germanium, a semiconductor material used typically in electronics, similar to silicon, and at room temperature. "It was not expected to encounter these wave-like effects, known as second sound, on this type of material, and in these conditions," says Sebastián Reparaz, ICMAB Researcher at the Nanostructured Materials for Optoelectronics and Energy Harvesting (NANOPTO) Group and leader of this study.

The observation occurred when studying the thermal response of a germanium sample under the effect of lasers, producing a high-frequency oscillating heating wave on its surface. The experiments showed that, contrarily to what was believed until now, heat did not dissipate by diffusion, but it propagated into the material through thermal waves.

Apart from the observation itself, in the study, researchers unveil the approach to unlock the observation of thermal waves, possibly in any material system.



Amplified frequency-domain thermorefectance setup used to study the existence of second sound in germanium. Two different lasers are focused onto the surface of the samples using a microscope objective. A rather large combination of optical elements allows to control and modify the spot size and shape, as well as the power and harmonic modulation of the lasers. Cold nitrogen gas is used for better visualization of the lasers optical path. Credit: ICMAB, CSIC

What is second sound and how can it be observed in any material

First observed in the 1960s on solid helium, thermal transport through waves, known as second sound, has been a recurrent subject for researchers who have repeatedly tried to demonstrate its existence in other materials. Recent successful demonstrations of this phenomenon on graphite have revitalized its experimental study.

"Second sound is the thermal regime where heat can propagate in the form of thermal waves, instead of the frequently observed diffusive regime. This type of wave-like thermal transport has many of the advantages offered by waves, including interference and diffraction", says ICMAB researcher Sebastián Reparaz.

"Wave-like effects can be unlocked by driving the system in a rapidly varying temperature field. In other words, a rapidly varying temperature field forces the propagation of heat in the wave-like regime" explains Reparaz, and adds, "The interesting conclusion of our work is that these wave-like effects could be potentially observed by most materials at a sufficiently large modulation frequency of the temperature field. And, what is even more interesting, its observation is not restricted to some specific materials."

Applications of second sound in a near future

"The possible applications of second sound are limitless", says Sebastián Reparaz. Achieving these applications, however, will require a deep understanding on the ways to unlock this thermal propagation regime on any given material. Being able to control heat propagation through the properties of waves opens new ways to design the upcoming generations of thermal devices, in a similar way to the already established developments for light. "Specifically, the second sound thermal regime could be used to rethink how we deal with waste heat", he adds.

From a theoretical point of view, "these findings allow unifying the current theoretical model, which until now considered that materials where this type of wave-like behavior was observed (such as graphite) were very different from the semiconductor materials currently used in the manufacture of electronic chips (such as silicon and germanium)" says F. Xavier Álvarez, researcher at the UAB. "Now all these materials can be described using the same equations. This observation establishes a new theoretical framework that may allow in the not too distant future a significant improvement in the performance of our electronic devices," adds Álvarez.

More information: "Observation of second sound in a rapidly varying temperature field in Ge" *Science Advances* (2021). advances.sciencemag.org/lookup...1126/sciadv.abg4677

Journal information: *Science Advances*
<https://phys.org/news/2021-06-thermal-semiconductor-materials.html>

Thu, 01 July 2021

The world's thinnest technology—only two atoms thick

Researchers from Tel Aviv University have engineered the world's tiniest technology, with a thickness of only two atoms. According to the researchers, the new technology proposes a way for storing electric information in the thinnest unit known to science, in one of the most stable and inert materials in nature. The allowed quantum-mechanical electron tunneling through the atomically thin film may boost the information reading process much beyond current technologies.

The research was performed by scientists from the Raymond and Beverly Sackler School of Physics and Astronomy and Raymond and Beverly Sackler School of Chemistry. The group includes Maayan Vizner Stern, Yuval Waschitz, Dr. Wei Cao, Dr. Iftach Nevo, Prof. Eran Sela, Prof. Michael Urbakh, Prof. Oded Hod, and Dr. Moshe Ben Shalom. The work is now published in *Science* magazine.

"Our research stems from curiosity about the behavior of atoms and electrons in solid materials, which has generated many of the technologies supporting our modern way of life," says Dr. Shalom. "We (and many other scientists) try to understand, predict, and even control the fascinating properties of these particles as they condense into an ordered structure that we call a crystal. At the heart of the computer, for example, lies a tiny crystalline device designed to switch between two states indicating different responses—'yes' or 'no,' 'up' or 'down' etc. Without this dichotomy—it is not possible to encode and process information. The practical challenge is to find a mechanism that would enable switching in a small, fast, and inexpensive device."

Current state-of-the-art devices consist of tiny crystals that contain only about a million atoms (about a hundred atoms in height, width, and thickness) so that a million of these devices can be squeezed about a million times into the area of one coin, with each device switching at a speed of about a million times per second.

Following the technological breakthrough, the researchers were able, for the first time, to reduce the thickness of the crystalline devices to two atoms only. Dr. Shalom emphasizes that such a thin structure enables memories based on the quantum ability of electrons to hop quickly and efficiently through barriers that are just several atoms thick. Thus, it may significantly improve electronic devices in terms of speed, density, and energy consumption.

In the study, the researchers used a two-dimensional material: one-atom-thick layers of boron and nitrogen, arranged in a repetitive hexagonal structure. In their experiment, they were able to break the symmetry of this crystal by artificially assembling two such layers. "In its natural three-dimensional state, this material is made up of a large number of layers placed on top of each other, with each layer rotated 180 degrees relative to its neighbors (antiparallel configuration)" says Dr. Shalom. "In the lab, we were able to artificially stack the layers in a parallel configuration with no rotation, which hypothetically places atoms of the same kind in perfect overlap despite the strong repulsive force between them (resulting from their identical charges). In actual fact, however, the crystal prefers to slide one layer slightly in relation to the other, so that only half of each layer's atoms are in perfect overlap, and those that do overlap are of opposite charges—while all others are located above or below an empty space—the center of the hexagon. In this artificial stacking configuration the layers are quite distinct from one another. For example, if in the top layer only the boron atoms overlap, in the bottom layer it's the other way around."

Dr. Shalom also highlights the work of the theory team, who conducted numerous computer simulations "Together we established deep understanding of why the system's electrons arrange themselves just as we had measured in the lab. Thanks to this fundamental understanding, we expect fascinating responses in other symmetry-broken layered systems as well," he says.

Maayan Wizner Stern, the Ph.D. student who led the study, explains that "the symmetry breaking we created in the laboratory, which does not exist in the natural crystal, forces the electric charge to reorganize itself between the layers and generate a tiny internal electrical polarization perpendicular to the layer plane. When we apply an external electric field in the opposite direction the system slides laterally to switch the polarization orientation. The switched polarization remains stable even when the external field is shut down. In this the system is similar to thick three-dimensional ferroelectric systems, which are widely used in technology today."

"The ability to force a crystalline and electronic arrangement in such a thin system, with unique polarization and inversion properties resulting from the weak Van der Waals forces between the layers, is not limited to the boron and nitrogen crystal," adds Dr. Shalom. "We expect the same behaviors in many layered crystals with the right symmetry properties. The concept of interlayer sliding as an original and efficient way to control advanced electronic devices is very promising, and we have named it Slide-Tronics."

Stern concludes that they "are excited about discovering what can happen in other states we force upon nature and predict that other structures that couple additional degrees of freedom are possible. We hope that miniaturization and flipping through sliding will improve today's electronic devices, and moreover, allow other original ways of controlling information in future devices. In addition to computer devices, we expect that this technology will contribute to detectors, energy storage and conversion, interaction with light, etc. Our challenge, as we see it, is to discover more crystals with new and slippery degrees of freedom."

More information: M. Vizner Stern et al, Interfacial ferroelectricity by van der Waals sliding, *Science* (2021). DOI: [10.1126/science.abe8177](https://doi.org/10.1126/science.abe8177)

Journal information: [Science](https://www.science.org)

<https://phys.org/news/2021-06-world-thinnest-technologyonly-atoms-thick.html>

COVID-19 Research News



Thu, 01 July 2021

Cambridge researchers pinpoint antimalarial, arthritis drugs for COVID-19 repurposing

By Angus Liu

By using computational analyses, scientists at the University of Cambridge have identified 200 approved drugs as possible candidates for repurposing against COVID-19 and validated two of them in early tests.

The two drugs, antimalarial therapy proguanil and rheumatoid arthritis medication sulfasalazine, showed they could safely inhibit the replication of the SARS-CoV-2 coronavirus behind COVID-19 in both monkey and human cell lines, according to a new study published in *Science Advances*.

Given both drugs are well established and well tolerated for other human diseases, they should be rapidly advanced into clinical trials to test whether they can prevent or treat COVID-19, the researchers proposed.

The Cambridge team started its research by mapping a network of human proteins that are induced by SARS-CoV-2 infection. The network included over 15,000 host proteins and represented nearly 583,000 interactions.

The researchers zeroed in on 476 key proteins most relevant in viral replication. Using computer simulations, they screened 1,917 approved drugs against the proteins, looking for candidates that could have stronger effects in blocking virus-induced changes.

The virtual screen returned 200 drugs that were predicted to target the key proteins. Among them, 40 are already in COVID-19 clinical trials and another 30 have previously been proposed as potential candidates against the disease, which the researchers said supported the strength of their approach.

Of the many proteins the 200 drugs bind to, the researchers noticed 30 proteins that are targeted by eight or more drugs. They found that all these proteins are related to the production of nitric oxide (NO)—which is known as an important element for viral synthesis—as well as a molecule called NADP, which also affects NO. This finding suggests that NO might be the mechanism by which these drugs work against viral infection, the researchers figured.

The team picked five drugs that operate within the NO pathway for further testing because of their good safety profiles.

In both monkey cell and human respiratory cell cultures, proguanil and sulfasalazine showed significant antiviral effects against SARS-CoV-2 without appearing to damage the cells at their indicated doses, the team reported.

Further analysis showed that both drugs affected an important component of the MAPK signaling pathway, which has been shown to be activated during SARS-CoV-2 infection and involved in inflammatory responses that pose a danger to patients. In lab experiments, the drugs significantly dialed down the cells' expression of key cytokines involved in COVID-19, the team found.

Many drug development efforts around COVID have focused on repurposing existing medicines. Some of the promising candidates that scientists have recently proposed include low-cost leprosy drug clofazimine and Swiss biotech Polyphor's investigational cancer drug balixafortide.

A research team at the University of Pennsylvania recently found that Pfizer's lung cancer drug Vizimpro, the antibiotic salinomycin and anti-rejection therapy cyclosporine were effective against the coronavirus in human cell cultures.

The Cambridge team believes their data-driven approach offers a new resource for screening and repurposing drugs against COVID-19. Because COVID patients may have a broad range of underlying medical conditions, safety is an important consideration. There, both sulfasalazine and proguanil have the potential to be used to either prevent or treat the disease, the researchers said.

Because sulfasalazine is already being used for autoimmune disorders, the current study raises the possibility that it may have both antiviral and anti-inflammatory power against COVID, the researchers noted in the study. In the U.S., proguanil is combined with atovaquone and has an excellent safety profile when used as a prophylactic and in treatment of malaria, they said.

<https://www.fiercebiotech.com/research/computational-studies-pinpoint-antimalarial-arthritis-drugs-for-covid-19-repurposing>



By using computational analyses, scientists at the University of Cambridge found antimalarial drug proguanil and rheumatoid arthritis med sulfasalazine could be repurposed for COVID-19. (MF3d/Getty Images)

