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Focus on advanced defence technologies: DRDO Chief

Dr G Satheesh Reddy said that defence corridors and clusters should develop adequate testing facilities which could be developed in the PPP (public-private-partnership) model

Hyderabad: Indian aerospace and defence companies should build capabilities in design, development, production and testing of products and systems to be part of the global supply chain to tap exports as well as achieve self-reliance in order to bring down the imports in the sector. There is a need to develop niche and advanced defence technologies to stay competitive, said a top defence official.

“Prime Minister is pushing for self-reliance in the defence sector across design, development, manufacturing and testing of products. India has come a long way with improvement in the overall ecosystem. There are 2,000 companies in India which are able to develop and manufacture systems and sub-systems while there are 10,000 companies in the component development, evolved in the last 10-15 years,” Dr G Satheesh Reddy, secretary, Department of Defence and chairman of Defence Research and Development Organisation (DRDO) said.



Dr Satheesh Reddy, DRDO Chairman and Secretary, Department of Defence.

Speaking at the fourth edition of Telangana Defence Conclave on Wednesday, he said, India today has achieved self-reliance in the areas such as missiles, radars, sonars, torpedos, electronic warfare systems, airborne early warning and control, and communication systems.

“There is however need to improve capabilities and self-reliance in areas such as aircraft engines. Clusters such as Hyderabad and Bengaluru have done well in the sector and can contribute towards filling the current market gaps,” Reddy added.

Several private companies are taking part in the system and sub-system development in the missile space, playing a key role in Brahmos and Akash missiles, contributing about 85-87% of the system and sub-system requirements, in value terms.

DRDO’s efforts

Highlighting the need to bring private sector into large system development, where historically collaborations were only done with defence PSUs, the DRDO chairman said, “DRDO has initiated efforts in this direction. We have rolled out an initiative by bringing private companies as ‘development cum production partner (DCPP)’. We have begun the implementation. In Hyderabad, the labs have already come out with 2-3 tenders to integrate the missile sub-parts.”

DRDO is also reducing the overall time of trials through integration of development and user trials to speed up product development.

Infrastructure push

Dr Reddy said defence corridors and clusters should develop adequate testing facilities which could be developed in the PPP (public-private-partnership) model. The Government of India can back such initiatives financially. DRDO from its side is already allowing industry to use its testing facilities.

R&D culture

Industry should up efforts in research and development as the government is supporting that with due incentives. “What activity industry will do, DRDO will not do,” he added.

India still imports a lot of spare parts for aircraft and there is a need for indigenisation in this space. The way India has become self-reliant in radars, efforts should be made in other areas as well.

On the exports front, he said, Indian industry should compete with global companies by developing niche and advanced technologies. There is also a need to step up efforts in the area of developing successful marketing strategy, by identifying where the potential markets exist and what systems are in demand and market systems accordingly.

There will be opportunities for the private industry to take part in future missile programmes such as Astra in its second phase, so in the coming years, companies in Telangana and other States should gear up.

<https://telanganatoday.com/focus-on-advanced-defence-technologies-drdo-chief>



Thu, 26 Nov 2020

‘TS emerging as tech leader in defence, aerospace’

DRDO Chairman G. Satheesh Reddy speaks at CII-Telangana’s Defence Conclave

Hyderabad: Telangana is emerging as a tech leader in defence and aerospace in the country with a focus on innovation and research, Defence Research and Development Organisation (DRDO) Chairman G. Satheesh Reddy said on Wednesday.

Addressing CII-Telangana’s Defence Conclave, he said presence of many defence research labs in Hyderabad served as a big boost to development of defence suppliers companies in the State.

A CII release said he told the conference that in many technologies such as missiles, radars and electronic warfare systems India had become self-reliant and many critical products were being manufactured in Hyderabad. The Centre through its proactive policies was promoting indigenous technology development through Make in India and Atmanirbhar Bharat, he said.

The conference had ‘Revisiting Strategies for Self Reliance by Integrating India’s Defence Value Chain’ as its theme and was held on a virtual platform.

Industries and IT Secretary Jayesh Ranjan said Hyderabad was home to many defence and aerospace companies supplying products to globally renowned companies.

There is a need for the entire spectrum to go up in the value chain through element of specialisation, invest in improved technology to reach the top level in defence manufacturing. The local companies need to mutually support each other and big companies need to pull up the small companies to move in the ladder, he said.

Director – Aerospace and Defence of Ernst and Young LLP Colonel KV Kuber said while defence manufacturing has matured in Hyderabad, there is a need for more testing facilities in the State. Testing facilities need to be considered as national assets.

<https://www.thehindu.com/news/cities/Hyderabad/ts-emerging-as-tech-leader-in-defence-aerospace/article33179316.ece>

India test-fires BrahMos supersonic cruise missile from Andaman and Nicobar Island: Report

BrahMos Aerospace, an India-Russian joint venture, produces the lethal weapon that can be launched from submarines, ships, aircraft, or from land platforms

Edited By Victor Dasgupta

India on Wednesday test fired BrahMos, a supersonic land attack cruise missile, from Andaman and Nicobar Island, as part of the launches undertaken by the Indian Air Force. The testfiring of the surface-to-surface variant of the BrahMos supersonic cruise missile with a strike range of 300 Km was successful. The Indian Air Force has both land and air-launched versions of the missile.

This is the second launch in last two days. On Tuesday, India “successfully” test fired the surface-to-surface supersonic cruise missile BrahMos as part of a series of planned trials of the weapon, known for its precision strike capabilities, official sources said.

The range of the new land-attack version of the missile has been extended to 400 km from the original 290 km but its speed has been maintained at 2.8 Mach or almost three times the speed of sound, they said.

Posting a video of the test, the Pune-headquartered Southern Command of the Indian Army tweeted, “Indian Army successfully launched its BrahMos supersonic cruise missile on November 24 in a top-attack configuration, hitting a target in the Bay of Bengal with pin point accuracy.”

According to official sources, in the next few days, the Indian Air Force and the Indian Navy are scheduled to carry out separate test-firing of the new version of the air-launched and naval versions of the supersonic cruise missile respectively.

BrahMos Aerospace, an India-Russian joint venture, produces the lethal weapon that can be launched from submarines, ships, aircraft, or from land platforms.

India has already deployed a sizeable number of the original BrahMos missiles and other key assets in several strategic locations along the Line of Actual Control with China in Ladakh and Arunachal Pradesh.

In the last two-and-half months, India has test fired a number of missiles including an anti-radiation missile named Rudram-1 which is planned to be inducted into service by 2022.

On October 18, a naval version of the BrahMos missile was successfully test fired from an indigenously-built stealth destroyer of the Indian Navy in the Arabian Sea. The Indian Air Force on October 30 test-fired the air launched version of the weapon from a Sukhoi fighter aircraft in the Bay of Bengal.

The BrahMos missile provides the IAF a much-desired capability to strike from large stand-off ranges on any target at sea or on land with pinpoint accuracy by day or night and in all weather conditions.

The IAF is also integrating the Brahmos supersonic cruise missile on over 40 Sukhoi fighter jets which is aimed at bolstering overall combat capability of the force.

<https://www.india.com/news/india-test-fires-brahmos-supersonic-cruise-missile-from-andaman-and-nicobar-island-report-4223381/>



BrahMos Launch (File Image)

India continues missile tests as crisis with China remains unabated

According to reports, the Indian military will test multiple Brahmos cruise missiles this week

By Abhijnan Rej

The Times of India reported on November 24 that the Indian military is likely to carry out a series of Brahmos supersonic cruise missiles tests this week. Tuesday morning (around 10 a.m. Indian Standard Time), the Indian Army carried out a test of the 290-kilometer range Brahmos missile from the Car Nicobar Islands against a target 200 kilometers away in the Bay of Bengal, according to an Indian Army statement. The statement adds (all sic): “The land attack version of BrahMos with capability of cruising at 2.8 Mach speed is the cutting edge of the Indian Army since 2007. The present Block III version of the missile has successfully executed four operational launches in the past. With the upgraded capability the missile can hit targets at a range of upto 400 Km [kilometers] with precision.”

Indian media reports also note that the Indian Navy and the Air Force will also carry out similar tests during the week, with a Defense Ministry source telling the Times of India, “The requisite advance warnings to aircraft and ships in the Arabian Sea and the Bay of Bengal has been issued.”

On October 18, a naval variant of the Brahmos missile was launched in a test from stealth destroyer INS Chennai, a Kolkata-class stealth guided missile destroyer, against a target in the Arabian Sea. All Kolkata-class ships are equipped with a 16-cell universal vertical launcher module capable of launching anti-ship Brahmos missiles; they have been tested from such ships on several occasions in the past few years.

On October 30, the Indian air force tested a Brahmos air-launched cruise missile (ALCM) from a Su-30 MKI jet, which took off from an airbase in Punjab in India’s west, and after travelling for over three hours, launched the missile that struck a target in the Bay of Bengal. The Indian air force tested the Brahmos ALCM for the first time last May, again from a Su-30 MKI aircraft. The strategic import of the October test was clear: to demonstrate Indian air superiority in the Indian Ocean relative to China. Analogously, a Su-30 MKI could take off from central or eastern India and hold large Chinese vessels over large swathes of eastern Indian Ocean at risk.

In January this year, Indian air force chief Air Marshall R K S Bhadauria had announced that those aircraft equipped with the Brahmos ALCM will be deployed on India’s northern borders “per threat analysis and plan” even though he noted “I would not say where.”

On September 1, Brahmos Aerospace, the India-Russia joint venture firm that builds the eponymous cruise missiles, tested a Brahmos with a range of 400 kilometers. While the Missile Control Technology Regime (MTCR) prohibits member states, which includes Russia, from transferring technologies for missiles with ranges greater than 300 kilometers, India’s MTCR membership since 2016 has ensured that India can acquire such missiles without running afoul of that regime, albeit uneasily. A source told The Print on November 24, India is also planning on developing a Brahmos missile with a 1,500-kilometer range, with an 800-kilometer range Brahmos in line to be tested next year. According to the outlet, India is also seeking to acquire hypersonic Brahmos missiles.



Credit: Flickr/Yuriy Lapitskiy

On September 30, the DRDO had tested a Brahmos land-attack cruise missile with an indigenous booster and air frame.

Along with cruise missile tests, over the past couple of months India has also tested a short-range nuclear capable ballistic missile on September 23 (Prithvi-II) and a medium-range nuclear-capable ballistic missile (Shourya) on October 3; an anti-radiation missile (Rudram), which is designed to be used against enemy radar and air defense systems, on October 9; anti-tank missiles, including laser guided ones to be used from India's ingeniously developed Arjun main battle tank, in September and October; as well as a technology demonstrator that could make way for a hypersonic missile capability for India on September 7. The Indian Defense Research and Development Organization (DRDO) also tested a Supersonic Missile Assisted Release of Torpedo (SMART) on October 5, a system through which a torpedo is mounted on a missile and launched from it once the enemy boat is in range.

A flight test of an intermediate range subsonic cruise missile, Nirbhay, failed on October 12.

Many have already wondered what lies behind this embarrassment of riches when it comes to recent Indian missile tests. According to one expert connected with the missile projects who was quoted in a Hindustan Times report, "The DRDO was quietly told to fast-track its missile programme in the early part of the [Ladakh] standoff because the Indian government had doubts about China's commitment to peace on the border." Others have speculated that tests in rapid successions, especially those from aircraft or ships, stand to signal to China that India can horizontally escalate any conflict with China across the Indian Ocean. And yet others have pointed to more quotidian reasons, arising out of a COVID-19 induced delay in scheduled tests, even though a DRDO scientist told the Indian Express, strategic signaling of this magnitude "can not happen without a deliberate push from the government even if the COVID factor is considered."

So, if this is indeed "strategic signaling," so far it has not made much difference on the ground. Recent news reports suggest that China has not only dug in in Ladakh but has also increased military activity across the entire Line of Actual Control, including in the central and eastern sectors. The simple fact of the matter is that signaling is hard. During the 2001-02 India-Pakistan "Twin Peaks" crisis, Pakistan carried out seven tests of nuclear-capable missiles. Yet, it remains unknown if this display of resolve on Pakistan's part was perceived as credible in India or not, with a spokesperson for the Indian Ministry of External Affairs dryly remarking of Pakistan's tests, "We are not impressed."

It cuts both ways when it comes to India and China. During the ongoing Ladakh standoff, the People's Liberation Army (PLA) too has tested multiple weapon systems, with the Chinese Communist Party tabloid Global Times (GT) ostentatiously promoting videos of PLA tests and preparedness on social media. Yet, there is very little evidence that India has sought to fold even as these threats – sometimes bordering on ludicrous, especially as GT presents them – have mounted.

In any event, China is likely to be aware of India's extant missile capabilities, including those in the Brahmos family. Therefore, the question remains whether the recent barrage of Indian missile tests is for strategic signaling or a check of combat capabilities in preparation of a military contingency, however that might arise – or is to assuage a domestic audience in India.

Perhaps a bit of all of them.

(Abhijnan Rej is Security & Defense Editor at The Diplomat.)

<https://thediplomat.com/2020/11/india-continues-missile-tests-as-crisis-with-china-remains-unabated/>

BrahMos hits target with 'pinpoint precision' during test fire

By Rajat Pandit

New Delhi: India on Wednesday conducted two more “live operational firings” of the BrahMos supersonic cruise missile in the Andaman and Nicobar archipelago, amidst the continuing military confrontation with China in eastern Ladakh.

The land-attack variant of the “deep-strike precision missile” hit the target on an island almost 300-km away with pinpoint precision in the tests conducted by the Army at 1.30 pm and then by the IAF at 4pm.

The firings are part of the continuing tests of the air-breathing missile, whose range is now being enhanced to almost 450-km from the existing 290-km. Flying at almost three times the speed of sound at Mach 2.8, the BrahMos missile is considered to be the best in its class in the world.



“The first test from a mobile autonomous launcher was conducted on Tuesday. Both the tests on Wednesday followed different trajectories to hit the target from different directions, with the Army firing the missile in full-combat mode. A naval warship will also fire the anti-ship version of the missile in the next few days,” said an official.

The enhanced version of BrahMos with a strike range of almost 450-km, which has been successfully tested three to four times, is on course to be made operational soon. There are also plans underway for India and Russia to test an even longer version of BrahMos, with 800-km range, by middle of next year, as was earlier reported by TOI.

The armed forces have inducted the missile in huge numbers over the years, with contracts worth over Rs 36,000 crore already inked till now. BrahMos missile batteries have also been deployed in Ladakh and Arunachal Pradesh as part of the operational readiness posture against China.

Similarly, some Sukhoi-30MKI fighters armed with BrahMos missiles are also deployed in airbases closer to the Line of Actual Control. With a combat radius of almost 1,500-km without mid-air refueling, the Sukhois with BrahMos missiles constitute a formidable long-range weapons package.

<https://timesofindia.indiatimes.com/india/brahmos-hits-target-with-pinpoint-precision-in-test-firing/articleshow/79411952.cms>

चीन से तकरार के बीच भारत ने किया ब्रह्मोस

सुपरसोनिक क्रूज मिसाइल का सफल परीक्षण

भारत ने बुधवार को ब्रह्मोस सुपरसोनिक क्रूज मिसाइल का सफल परीक्षण किया। इस दौरान मिसाइल ने लक्ष्य को सफलतापूर्वक भेद लिया। यह परीक्षण अंडमान और नीकोबार द्वीप समूह पर किए गए।

By Himanshu Tiwari

हाइलाइट्स:

- भारत ने बुधवार को ब्रह्मोस सुपरसोनिक क्रूज मिसाइल का किया परीक्षण
- ब्रह्मोस सुपरसोनिक क्रूज मिसाइल ने देखते ही देखते भेद दिया टारगेट
- मिसाइल के ये परीक्षण अंडमान और नीकोबार द्वीप समूह पर किए गए

नई दिल्ली: चीन के साथ भारत की तनातनी जारी है। इस बीच भारत ने बुधवार को ब्रह्मोस सुपरसोनिक क्रूज मिसाइल (BrahMos supersonic cruise missile) के दो और सफल परीक्षण किए। यह परीक्षण अंडमान और नीकोबार द्वीप समूह से किए गए। न्यूज एजेंसी एएनआई के सूत्रों के हवाले से कहा गया है कि यह परीक्षण भारतीय वायुसेना (Indian Air Force) की ओर से किए जा रहे लॉन्च का हिस्सा है।

सतह से किए गए परीक्षण के तौर पर मिसाइल ने 300 किलोमीटर दूर अपने टारगेट को सफलतापूर्वक भेद लिया। इसका एक टेस्ट आर्मी की ओर से 1:30 बजे किया गया, फिर भारतीय वायुसेना ने अगला टेस्ट शाम 4 बजे किया। हवा से हवा में मार करने वाली मिसाइल का लगातार परीक्षण किया जा रहा है। इसकी मौजूदा सीमा अब 290 किमी से लगभग 450 किमी तक बढ़ाई जा रही है।



ब्रह्मोस सुपरसोनिक क्रूज मिसाइल का किया गया सफल परीक्षण

एंटी-शिप वर्जन फायर की तैयारी

आधिकारिक बयान में कहा गया, 'पहला परीक्षण मोबाइल ऑटोनॉमस लॉन्चर से मंगलवार को किया गया था। बुधवार को किए गए दोनों टेस्ट में अलग-अलग दिशाओं से लक्ष्य को निशाना बनाया गया। सेना ने फुल कॉम्बैट मोड में मिसाइल दागे। इसके साथ ही नौसेना के युद्धक पोत के द्वारा अगले कुछ दिनों में मिसाइल का एंटी शिप वर्जन भी फायर किया जाएगा।'

...और रेंज बढ़ाने की है तैयारी

ब्रह्मोस की मारक क्षमता को बढ़ाकर 450 किलोमीटर किया गया है। इसका भी तीन से चार बार सफलतापूर्वक परीक्षण कर लिया गया है। भारत और रूस की योजना है कि अगले साल के मध्य तक 800 किलोमीटर की रेंज के साथ ब्रह्मोस के एक और विस्तृत संस्करण का परीक्षण किया जाए। इस बात की जानकारी पहले ही हमारे सहयोगी अखबार टाइम्स ऑफ इंडिया की ओर से दी जा चुकी है।

<https://navbharattimes.indiatimes.com/india/indian-army-successfully-fired-a-brahmos-missile-in-the-bay-of-bengal-and-hit-the-designated-target-at-over-250-km-with-pinpoint-accuracy/articleshow/79416548.cms>

अंडमान-निकोबार से Brahmos सुपरसोनिक मिसाइल का एक और टेस्ट, 300 KM की रेंज हासिल

ब्रह्मोस सुपरसोनिक क्रूज मिसाइल के सतह से सतह तक वार करने का टेस्ट 300 किलोमीटर की स्ट्राइक रेंज तक सफल रहा। अब भारतीय वायु सेना के पास मिसाइल के लैंड और हवा संबंधित वार करने वाले दोनों ही वर्जन मौजूद हैं।

By Nitin Arora

पोर्ट ब्लेयर: कोरोना महामारी से लड़ाई के बीच भारत देश की सुरक्षा को भी चुनौती की तरह देख रहा है। सीमा पर चल रहे तनाव के चलते भारत रक्षा क्षेत्र में आए दिन इजाफा कर रहा है। भारत ने आज अंडमान-निकोबार द्वीप समूह से ब्रह्मोस सुपरसोनिक क्रूज मिसाइल का परीक्षण किया। सूत्रों ने बताया कि भारतीय सेना द्वारा इन दिनों कई प्रकार के टेस्ट किए जा रहे हैं, जहां बुधवार को किए गए मिसाइल का परीक्षण भी उसी प्रोग्राम के अंतर्गत था।

बताया गया कि ब्रह्मोस सुपरसोनिक क्रूज मिसाइल के सतह से सतह तक वार करने का टेस्ट 300 किलोमीटर की स्ट्राइक रेंज तक सफल रहा। वहीं, अब भारतीय वायु सेना के पास मिसाइल के लैंड और हवा संबंधित वार करने वाले दोनों ही वर्जन मौजूद हैं।

बीते दिन मंगलवार को भी भारत ने आज अंडमान-निकोबार द्वीप समूह से ब्रह्मोस सुपरसोनिक क्रूज मिसाइल के लैंड अटैक वर्जन का परीक्षण किया था। यह परीक्षण मंगलवार सुबह 10 बजे किया गया, जिसने एक अन्य द्वीप पर मौजूद लक्ष्य को सफलतापूर्वक नष्ट किया। वहीं, इसके साथ ही ब्रह्मोस मिसाइल की स्ट्राइक रेंज 400 किमी से अधिक हो गई थी। बता दें कि ब्रह्मोस सुपरसोनिक क्रूज मिसाइल अपनी श्रेणी में दुनिया की सबसे तेज परिचालन प्रणाली है। डीआरडीओ ने मिसाइल प्रणाली की सीमा को मौजूदा 298 किमी से बढ़ाकर लगभग 450 किमी कर दिया है।

डीआरडीओ पिछले कुछ समय में कई नई और मौजूदा मिसाइल प्रणालियों सहित शौर्य मिसाइल प्रणाली का परीक्षण करने में सफल रहा है। बता दें कि भारत, चीन और पाकिस्तान के साथ सीमा पर जारी तनाव के बीच अपनी ताकत में इजाफा करने में जुटा हुआ है। भारत लगातार क्रूज और बैलेस्टिक मिसाइलों का परीक्षण कर रहा है।



ब्रह्मोस सुपरसोनिक क्रूज मिसाइल के सतह से सतह तक वार करने का टेस्ट 300 किलोमीटर की स्ट्राइक रेंज तक सफल रहा। अब भारतीय वायु सेना के पास मिसाइल के लैंड और हवा संबंधित वार करने वाले दोनों ही वर्जन मौजूद हैं।

<https://www.jagran.com/news/national-another-test-of-brahmos-supersonic-missile-from-andaman-and-nicobar-achieved-300-km-range-21099534.html>

India's BrahMos missile test sends message to China

The surface-launched, land-attack version of the missile was launched from the remote Andaman Islands

By Dave Makichuk

India took another major step in strengthening its already potent military arsenal with the successful test-launch of its BrahMos supersonic missile in a “top attack” configuration on Nov. 24, defense website DefPost reported.

The surface-launched, land-attack version of the missile was launched from the remote Andaman and Nicobar Islands at 10 am local time.

According to the Army, the missile successfully hit its target in the Bay of Bengal “with pin point accuracy.”

Translation? It could also hit a target in China ... with extreme prejudice.

Most modern missiles, including BrahMos, can be fired in both top-attack and direct attack modes, The Indian Express reported.

In top attack mode, the missile is required to climb sharply after launch, travel at a certain altitude and then plunge on top of the target. In direct attack mode, the missile travels at a lower altitude, directly striking the target.

The launch is said to be the first in a series of various versions of the missile in the coming days, in a display of India's tactical cruise missile triad, The Indian Express reported.

The test by the Army comes over a month after the Naval version of BrahMos was successfully test fired from Indian Navy's indigenously-built stealth destroyer INS Chennai, hitting a target in the Arabian Sea.

Posting a video of the test, the Pune-headquartered Southern Command of the Indian Army tweeted, “Indian Army successfully launched its BrahMos supersonic cruise missile on November 24 in a top-attack configuration, hitting a target in the Bay of Bengal with pin point accuracy.”

BrahMos is an Indo-Russian ramjet-powered supersonic cruise missile based on the Russian P-800 Oniks supersonic anti-ship cruise missile, DefPost reported.

The missile is designed and developed by BrahMos Aerospace, a joint venture between India's DRDO and Russia's Federal State Unitary Enterprise NPO Mashinostroyeniya (NPOM).

The three-ton missile can be launched from submarines, ships, aircraft or land-based platforms, DefPost reported.

The land-launched and ship-launched versions are already in operation, with the air and submarine-launched versions currently in the testing/induction phase.

While versions of the BrahMos missile have been in India's arsenal for long, the weapon system is continuously tested for examining its hardware and software systems, The Indian Express reported.

The present supersonic version can reach a speed of 2.8 times that of sound (2.8 Mach). A hypersonic version of the missile, capable of reaching a speed of 5 Mach, is under development.



BrahMos is an Indo-Russian ramjet-powered supersonic cruise missile based on the Russian P-800 Oniks supersonic anti-ship cruise missile. Credit: Twitter.

The Indian Air Force also successfully test fired the BrahMos air version missile from its frontline Su-30 fighter jet aircraft on May 22, 2019.

<https://asiatimes.com/2020/11/india-flexes-muscle-with-test-of-brahmos-supersonic-missile/>

नवभारत टाइम्स

Thu, 26 Nov 2020

हर मौसम में टैंक के परखच्चे उड़ा सकती है 'नाग' मिसाइल, चीन-पाकिस्तान के लिए इसमें खास इंतजाम

By Deepak Verma

डिफेंस रिसर्च एंड डिवेलपमेंट ऑर्गनाइजेशन (DRDO) के साइंटिस्ट्स ने सालों की मेहनत से नाग मिसाइल (NAG missile) तैयार की है जो दुनिया की सबसे खतरनाक एंटी-टैंक गाइडेड मिसाइलों (Anti-tank guided missiles) में गिनी जाती है।

भारत के मिसाइल प्रोग्राम में 'नाग' मिसाइल (NAG missile) की बेहद खास जगह है। 'मिसाइल मैन डॉ ए.पी.जे. अब्दुल कलाम की अगुवाई में इस पर काम शुरू हुआ था। यह उन मिसाइल्स में है जिन्हें एक बार दाग दिया तो काम तमाम, दुश्मन के सामने होना जरूरी नहीं। इस खूबी को 'फायर एंड फॉरगेट' कहते हैं। नाग मिसाइल लॉन्च होने के बाद अपने टारगेट का पता लगाती है और उसे खत्म कर देती है। 'नाग' मिसाइल को राजस्थान के रेतीले इलाके में बड़े पैमाने पर टेस्ट किया गया है, पाकिस्तान को ध्यान में रखकर। यहां से गुजरने वाली अंतरराष्ट्रीय सीमा ने इतिहास की कुछ सबसे विध्वंसक टैंक लड़ाइयां देखी हैं। वैज्ञानिकों ने इसके पांच अलग-अलग वैरियंट्स तैयार किए हैं जिनकी रेंज 500 मीटर से 20 किलोमीटर तक है। दिन हो या रात, कैसा भी मौसम हो, 'नाग' मिसाइल अपने दुश्मनों का डसने को हमेशा तैयार रहती है।

पांच अलग-अलग रूप में आती है ये मिसाइल

'नाग' मिसाइल डिफेंस रिसर्च एंड डिवेलपमेंट ऑर्गनाइजेशन (DRDO) के वैज्ञानिकों की एक शानदार उपलब्धि है। इस मिसाइल के लैंड वर्जन के लिए खासतौर पर 'नाग मिसाइल कैरियर' (NAMICA) बनाया गया है। दिन हो या रात, दुश्मन के टैंकों को यह मिसाइल पहचान कर तबाह कर सकती है। इसका दूसरा वर्जन मास्ट माउंटेड सिस्टम के लिए है। बाकी तीन की अपनी अलग-अलग खूबियां हैं।

1. 'टॉप अटैंक' कर सकती है MPATGM

- मैन पोर्टेबल एंटी-टैंक गाइडेड मिसाइल यानी MPATGM थर्ड जेनरेशन की मिसाइल है।
- देखने में यह बेसिक 'नाग मिसाइल' जैसी ही है वजन में कम (लगभग 14 किलो) है।
- सवा मीटर से थोड़ी लंबी इस मिसाइल के बीच में चार पर (fins) लगे होते हैं।
- मिसाइल के साथ हाई एक्सप्लोजिव एंटी-टैंक यानी HEAT वारहेड फिट होता है।



हर मौसम में टैंक के परखच्चे उड़ा सकती है 'नाग' मिसाइल,
चीन-पाकिस्तान के लिए इसमें खास इंतजाम

- MPATGM की रेंज करीब ढाई किलोमीटर है। मिसाइल टैंकों के ऊपर आग बरसा सकती है जिसे 'टॉप अटैक' कहते हैं।
- 2005 में डिवेलपमेंट शुरू हुआ। पहला ट्रायल 2018 में। पहले दो टेस्ट मार्च 2019 में। ट्राइपॉड लॉन्चर से तीसरा टेस्ट सितंबर 2019 में हुआ और मिसाइल ने टॉप अटैक मोड में एक डमी टैंक को उड़ाकर दिखाया था।

2. हेलिकॉप्टर से छोटी 'नाग' मिसाइल तो बन गई HELINA

- NAG के एयर-लॉन्चड वर्जन को HELINA (हेलिकॉप्टर लॉन्चड NAG) कहते हैं। अब इसका नाम 'ध्रुवासूत्र' कर दिया गया है।
- आमतौर पर इसे HAL रूद्र या HAL LCH से लॉन्च करते हैं।
- टेस्ट में यह मिसाइल 7-8 किलोमीटर तक टारगेट हिट कर चुकी है।
- यह मिसाइल 'टॉप अटैक' और 'डायरेक्ट अटैक', दोनों कर सकती है।

3. दुनिया की 'सबसे खतरनाक' एंटी-टैंक मिसाइल है SANT

- स्टैंडऑफ एंटी-टैंक गाइडेड मिसाइल (SANT) असल में HELINA का अपग्रेडेड वैरियंट है।
- इसे DRDO और IAF ने मिलकर डिवेलप किया है।
- इसकी रेंज 15-20 किलोमीटर तक है और इसमें एक ऐक्टिव रडार सीकर लगा है ताकि मिसाइल लॉन्च प्लेटफॉर्म से दूर रहे।
- SANT इन्फ्रारेड इमेजिंग सीकर (IIR) से अपना टारगेट ढूंढती है। यह दुनिया की सबसे ऐडवांस्ड एंटी-टैंक मिसाइल्स में से एक है।



<https://navbharattimes.indiatimes.com/india/nag-anti-tank-guided-missile-program-in-hindi/articleshow/79404367.cms?story=6>

Hyderabad offers perfect ecosystem for defence: Industry

Highlighting the strengths of Hyderabad ecosystem, Rudra Jadeja, CEO, Kalyani Rafael Advanced Systems, said, DRDO has been the backbone for Hyderabad

Hyderabad: Several global original equipment manufacturers (OEMs) and national defence companies have chosen Hyderabad for setting up their aerospace and defence facilities. The State government's policies such as TS-iPASS, established defence ecosystem, city's infrastructure and availability of talent pool have made the city the preferred investment destination, say industry leaders.

Speaking on the uniqueness, Ganesh Raghavan, VP & head (Business Development), Tata Aerospace & Defence said, "We have received faster approvals through State government's single-window system. Electricity which is key to the sector has been supplied uninterrupted and we are also able to leverage IT effectively in this city. Hyderabad's infrastructure is another key advantage. All this has enabled us three global joint ventures so far."

"We are able to produce parts, components and composites at our facility. We have also created centres of excellence (CoE) for engines and structures," he added.

Highlighting the strengths of Hyderabad ecosystem, Rudra Jadeja, CEO, Kalyani Rafael Advanced Systems, said, DRDO has been the backbone for Hyderabad. Human resource availability is a major plus for the city. A lot of proliferation has happened in the defence sector here that has attracted every large national player to the city.

Colonel K V Kuber, Indian Army veteran, director – Aerospace & Defence, Ernst and Young LLP said that defence manufacturing has become matured in Hyderabad however there is a need for more testing facilities in the State. These testing facilities need to be considered as national assets.

Krishna Bodanapu, chairman, CII Telangana & MD, Cyient said that the new DRDO procurement manual 2020 released recently will facilitate the indigenous defence industry by simplifying the processes and ensure their participation in design and development activities.

The CII is of the firm belief that public entities, including research and development establishments, and the private sector, should complement each other to meet the requirements of the Indian Armed Forces, Raminder Singh Soin, convenor, CII Telangana Defence & Aerospace Panel said.

Praveen PA, Director, Aerospace & Defence, Government of Telangana, said, in order to meet the growing demand for space to set up manufacturing units, the government is in the processing of adding new aerospace and defence parks in Telangana.

CII Telangana has organised 'Defence Conclave' with the theme 'Revisiting strategies for self-reliance by integrating India's defence value chain' through a virtual platform.

<https://telanganatoday.com/hyderabad-offers-perfect-ecosystem-for-defence-industry>



Thu, 26 Nov 2020

Meet IAF's New 'Made In India' World's Lightest Multi-Role Attack LCH Helicopter

By Anuj Tiwari

In a major boost to India's air power capability, the Indian Air Force (IAF) Chief of Air Staff Air Chief Marshal Rakesh Kumar Singh Bhadauria takes a sortie of HAL's home-grown Light Combat Helicopter ahead of its induction into the armed forces. IAF Chief RKS Bhadauria took a sortie in the indigenous Light Combat Helicopter (LCH) in Bengaluru today. The sortie lasted for 45 minutes.

IAF Chief In The LCH

Indian Air Force (IAF) Chief of Air Staff Air Chief Marshal Rakesh Kumar Singh Bhadauria flew the home-grown Light Combat Helicopter (LCH) over this aerospace city, an official said on November 20.

Designed By HAL

Designed and developed by the city-based state-run defence behemoth (HAL)

Good Look At Sensors

The Air Chief was airborne for an hour during his maiden flight sortie as a co-pilot, dressed in an olive green suit. "It was a very good sortie. I was able to look at the important flying characteristics and status of sensors installed," said Bhadauria in a statement later.

Flying With The Best

"Bhadauria flew the twin-seater LCH for the first time, taking off at 11:45 am from our airport in the city's eastern suburb, with our deputy chief test pilot Wing Commander (Retd) S.P. John," a Hindustan Aeronautics Ltd (HAL) official told *IANS*.

Also Flew LCA Tejas

IAF Chief RKS Bhadauria, who took over as the Indian Air Force (IAF) in September 2019, also flew the HAL-made Light Combat Aircraft (LCA) Tejas on May 27, 2020 when it was inducted into the IAF's 18 Squadron (Flying Bullets) at the Sulur air base near Coimbatore.

World's Lightest Multi-Role Attack Helicopter

LCH is the world's lightest multi-role attack helicopter, with the highest flight ceiling.

Proposal For The Initial Batch Of 15 LCHs

The Defence Acquisition Council (DAC) had approved the proposal for the initial batch of 15 LCHs.

LCH's 1st Prototype Test Flown On March 2010

Drawing from the company's multi-role Advanced Light Helicopter (ALH) Dhruv and its weaponised version Rudra, LCH's first prototype was test flown on March 2010.



Induction Soon

Noting that the LCH was a potent platform due to excellent design and development efforts and well-supported flight test team, the Air Chief said the IAF was looking forward to its induction soon. "I am sure HAL will give required focus on its production at a fast pace," Bhadauria said.

<https://www.indiatimes.com/news/india/indian-air-force-light-combat-helicopter-photo-gallery-528299.html?picid=2042009>



Thu, 26 Nov 2020

Thales TALIOS : Next Generation Targeting Pod For Rafale

In November 2018, a new TALIOS targeting pod manufactured by the Thales Group was adopted into service by the French Air and Space Forces. Currently, the supply of serial products is underway, and the military units are mastering them. At the end of October, the VKS reported new successes in this direction.

The first targeting Pod have been brought to the stage of initial operational readiness and are now fully operational. The French defence ministry has revealed that an Indian Air Force pilot was given a demonstration of a new target acquisition system meant for the Rafale fighter.

The French defence ministry informed on its website earlier this week that an Indian Air Force pilot flew on a Rafale F3R fighter on September 22 that was equipped with the TALIOS target acquisition pod.



Development

Development of the future TALIOS (Targeting Long-range Identification Optronic System) began in late 2013 on the order of vks France. Originally, the project was called PDL-NG (Pod de D'ignation Laser de Nouvelle G'n'ration – "Next Generation Laser Targeting Container").

PDL-NG was seen as a more advanced and modern replacement for the existing Damocles container, compatible with multi-type fighter jets. The French VKS had to use such containers on Rafale fighter jets, and compatibility with Mirage 2000 aircraft should have been envisaged to enhance export capabilities.

In 2016-18, Thales and VKS conducted all the necessary tests of the new container, which resulted in its adoption. In November 2018, the order appeared, and soon the first serial products were delivered to the troops. The containers are still being delivered and will continue in the coming years.

On 29 October, the French Ministry of Defence announced new successes.

In an unnamed squadron manned by the Rafals, TALIOS containers reached the stage of initial operational readiness. This allows the use of such equipment in full-fledged combat operations. In the foreseeable future, new types of containers will be operated in alongside Damocles products but will be replaced in the future. Current plans provide for the gradual retooling of all fighter-bombing units with new containers.

Technical features

The Thales TALIOS sighting container was designed with the experience of the previous Damocles product. The latter was criticized for the lack of a "day" optical channel and other

shortcomings. In the new project, all these wishes are taken into account, so talIOS is more powerful and has increased tactical and technical characteristics.

<https://www.defenceaviationpost.com/2020/11/thales-talios-next-generation-targeting-pod-for-rafale/>

ThePrint

Thu, 26 Nov 2020

Indian Navy inducts two American drones on lease, could add more later

The two drones, flying with Indian Navy logo, are under the full operational control of the force and it will have exclusive access to all the information that the drone will capture

By Snehash Alex Philip

New Delhi: In a first, India has inducted two American drones — Sea Guardian, unarmed version of the deadly Predator series — into the Navy on lease under the emergency procurement in the backdrop of the tensions with China in Ladakh, ThePrint has learnt.

Even though the drones, MQ-9 Guardian/Predator-B, have been leased from an American firm, General Atomics, for a year for surveillance in the Indian Ocean Region, it could also be used in Ladakh, top defence sources said.

Sources told ThePrint the two drones, flying with Indian Navy logo, are under the full operational control of the force and it will have exclusive access to all the information that the drone will capture.

They added the only role of the American firm is to ensure availability of the two drones based on the contract signed.

This means that the Sea Guardians will be flown by Indian Navy personnel and all data acquired by the Unmanned Aerial Vehicle (UAV) will be the sole property of India.

The team from the US firm, which is currently in India as part of the deal, will only be doing the maintenance work for the two machines.

“The two drones are the unarmed versions and have been inducted into flying operations on 21 November at Indian Navy base at INS Rajali. The drones arrived in India earlier this month,” a senior officer in the know said.

This is the first defence system that has been taken on lease under the new Defence Acquisition Procedure 2020 introduced this year.

The only other defence equipment on lease is the Chakra nuclear submarine from Russia.

Drones have endurance of flying for over 30 hours

Asked if more drones could be brought on lease, a source said: “It all depends on the experience of these two drones. We are right now going to operate these two.”

Sources said the two UAVs, which have an endurance of flying for over 30 hours, have already been operationally deployed in the Indian Ocean. They also said the two drones will be flown extensively.

“The long endurance of the drones gives us a huge jump in our ability to track various things. We have been flying the P8I aircraft. These drones will now supplement the work done by the American aircraft and much more too,” a second source said.

Drone purchase from US

The Indian defence establishment is currently divided on the drone purchase from the US.

While earlier India was eyeing both Sea Guardians for the Navy and the armed Predator B for attack options, there is a growing feeling that both surveillance and attack can be done by the same drone only.

This is because of the prohibitive price involving the American drones. Earlier, 22 Sea Guardians were being priced at over \$2 billion. The number for Sea Guardians was eventually brought down to just 12.

The US had in 2018 agreed to supply India the Sea Guardians, but the high cost meant that the process had slowed down.

<https://theprint.in/defence/indian-navy-inducts-two-american-drones-on-lease-could-add-more-later/551931/>



Thu, 26 Nov 2020

India discussing more trilateral naval exercises

Two new such exercises are in the works

New Delhi: In continuation of the trend of growing trilateral and multilateral exercises, two new trilateral naval exercises are in the works: one among India, Australia and Indonesia; and in the other, France is keen on joining India-Australia bilateral naval exercise AUSINDEX, according to two official sources.

“France is keen to join AUSINDEX and discussions are under way on how to take it forward,” one of the sources said. “Also a naval exercise between India, Australia and Indonesia is under discussion. The modalities are being worked out,” the source stated.

There are several other proposals for such exercises but a decision on them would be taken based on operational commitments and other factors. “There is increasing focus on minilaterals in the region and many countries are keen to exercise with India,” the source stated. With India’s capacity growing up in the Indian Ocean Region and the focus on Indo-Pacific, there was interest from many countries, a second source said.



The 24th edition of the Malabar naval exercise among India, Australia, Japan and the U.S. just concluded, with Canberra joining the exercise for the first time since 2017. | Photo Credit: AFP

In the last few years, India has significantly expanded its military to military engagement with both Australia and France on bilateral level.

Last year, India, Thailand and Singapore began an annual exercise, which completed the second edition last week. The 24th edition of the Malabar naval exercise among India, Australia, Japan and the U.S. just concluded, with Canberra joining the exercise for the first time since 2017.

Australian envoy’s call

In April, Australian High Commissioner Barry O’Farrell made a pitch for greater trilateral cooperation between India, Australia and Indonesia and called for building on last year’s successful trilateral maritime security workshop with Indonesia to identify new ways that the three countries can collaborate to be the “best possible custodians of the Indian Ocean.”

In February, India carried out its first joint patrol with France from Reunion Island in the Indian Ocean. During this, an Indian Navy P-8I maritime patrol aircraft was deployed with French Navy personnel embarked onboard.

France was also the first country to deploy a Liaison Officer at the Navy’s Information Fusion Centre for Indian Ocean Region (IFC-IOR), followed by the U.S., which is meant to improve Maritime Domain Awareness in the Indian Ocean Region.

<https://www.thehindu.com/news/national/india-discussing-more-trilateral-naval-exercises/article33177983.ece>

China adopting US’ “Disruptive Strategy” against India as Ladakh border tensions remain unresolved

By Smriti Chaudhary

India is one of the worst-hit countries by the Covid-19 pandemic, with its economy entering a ‘technical recession’ phase. The country is also facing a prolonged border conflict with its neighbor, China.

About five months ago, Indian and Chinese troops got into a brutal clash in the eastern Ladakh that killed 20 Indian soldiers and injured several others. Chinese soldiers also suffered casualties although, the official number wasn’t released.

Following the clash in June, tensions have been flaring up with frequent skirmishes between soldiers of both the nuclear-armed nations. This led to a fierce military standoff resulting in the deployment of a large number of troops and heavy artillery being moved towards the Line of Actual Control (LAC).

According to Bhim Bhurtel, a visiting faculty for a master’s in international relations and diplomacy, Tribhuvan University in Kathmandu, New Delhi is doing exactly what China wanted with its India strategy since April.

“Whatever China wants India to do, India does,” he noted. He explained that while Beijing doesn’t consider India as a current rival “because it is economic and military capabilities lag far behind China’s” but it sees it as a possible future rival.

“Beijing wants to gain the upper hand over India strategically while resolving the border dispute,” he stated. “If that cannot be done quickly, China will prolong the border standoff in Ladakh. However, if India perceives this strategy as a weakness and attacks China, Beijing will retaliate strongly,” Bhurtel wrote in a piece for Asia Times.



Another expert talking to the EurAsian Times who wanted to remain anonymous said that China is adopting the same strategy that the US adopted against the USSR during the cold war. China is making India go for expensive weapons and military spending when its economy is very fragile.

Although India and China have engaged in several rounds of military commander talks, full disengagement on the border is still far-fetched. New Delhi has already approved the purchase of emergency military equipment from key allies, including Israel, France, Russia, and the US.

India has also increased military cooperation with countries that sustain a rivalry with China. The Quad nations — India, the US, Japan, and Australia — have conducted the Malabar Naval exercise in the Indian Ocean, which has irked Beijing.

With BECA (Basic Exchange and Cooperation Agreement), India received a massive boost to access American capabilities, including geospatial intelligence for targeting enemy positions with pinpoint accuracy and better surveillance of adversaries.

The Chinese state media has called New Delhi a “pawn of the US just because of India-China border issues”. Bhurtel believed that China expected this, and New Delhi is going in the direction that they wanted. “China wants to divert India’s national energies and effort.

The country’s politicians, administrative leadership, army, media, intellectuals, and the general public all seem to be preoccupied with border disputes with China,” he noted.

Bhurtel argued that Beijing is fuelling an arms race with India, leading the latter to divert its resources from more pressing issues such as poverty alleviation and economic spending.

On the other hand, Beijing has driven its military technology to develop indigenous aircraft carriers and fighter jets while India has to still rely on technology from other countries to compete with China.

“For the modernization of the Indian Air Force, Navy, and Infantry, New Delhi will waste enormous financial resources on military and logistic supplies,” wrote Bhurtel.

“Because of India’s territorial nationalism, a political situation will be developed whereby the government spends scarce financial resources on irrational projects such as constructing a road or airport in the high Himalaya or buying aircraft carriers.”

<https://eurasianimes.com/china-adopting-us-disruptive-strategy-against-india-as-ladakh-border-tensions-remain-unresolved/>

TIMESNOWNEWS.COM

Thu, 26 Nov 2020

Pakistan looking to buy more drones, begins discussions with Turkish firms

The Pakistan armed forces conducted trials for the S-250 mini UAV trials at Mangla at the 506 UAV base workshop

By Srinjoy Chowdhury

Whether it is for snooping on Indian army positions or for dropping weapons to terrorists in Jammu and Kashmir, Pakistan is looking for drones.

In the wake of the security forces shooting down a drone in the Kathua area of Jammu and Kashmir two days ago, there are reports of Pakistan's efforts to buy more drones.

The Pakistan armed forces conducted trials for the S-250 mini UAV trials at Mangla at the 506 UAV base workshop. This was for a week beginning on September 3. Right after that, another series of trials were held in the 12 Infantry Division area between 8-18 September.



Representational Image

These mini UAVs are primarily for surveillance and can be in the air for about three hours. They have a range of 150 km. Pakistan is also looking for the S-350 UAV and there have been trials at Gwadar, Muzaffarabad, and Turbat, in Balochistan. It can be in the air for over four hours and has a range of 280 km.

Pakistan has also begun discussions with Bogazici Savunma, a Turkish firm, for the ILTER drone detection and neutralization systems. These systems can detect drones from a distance and jam their surveillance devices.

<https://www.timesnownews.com/india/article/pakistan-looking-to-buy-more-drones-begins-discussions-with-turkish-firms/686581>

China says India's latest app ban order violates WTO rules

Chinese embassy spokesperson Ji Rong said the Chinese government has always required that overseas Chinese companies "abide by international rules, operate in compliance with laws and regulations and conform to public order and good morals"

By Rezaul H Laskar

New Delhi: China on Wednesday opposed India's decision to ban 43 more Chinese-origin mobile phone applications on security grounds and contended that the move violated the rules of the World Trade Organization (WTO).

On Tuesday, India imposed a fresh ban on Chinese-origin apps, the fourth time it has done so since the border standoff in Ladakh sector of the Line of Actual Control (LAC) emerged in the open in May. With this, the total number of Chinese-origin apps banned by India has gone up to 267.

"We firmly oppose the Indian side's repeated use of 'national security' as an excuse to prohibit some mobile apps with Chinese background," said Chinese embassy spokesperson Ji Rong.

Ji called on India to withdraw the ban on the ground that it went against the WTO's rules.

"We hope the Indian side provides a fair, impartial and non-discriminatory business environment for all market players from various countries, including China, and rectify the discriminatory practices violating WTO rules," she said.

The Chinese government, Ji said, has always required that overseas Chinese companies "abide by international rules, operate in compliance with laws and regulations and conform to public order and good morals".

China and India represent "opportunities of development to each other rather than threats", Ji said, reiterating a line taken by Beijing since the border standoff began.

"Both sides should bring bilateral economic and trade relations back to the right path for mutual benefit and win-win results on the basis of dialogue and negotiation," she added.

The border standoff involving tens of thousands of troops from both sides is currently in its seventh month, and several rounds of diplomatic and military talks have failed to lead to a breakthrough in disengagement and de-escalation at key friction points such as Pangong Lake, Hot Spring and Depsang.

Troops from both sides have now dug in for the harsh winter, and India has been rushing equipment such as winter clothing and shelters to soldiers in forward areas.

Since the standoff emerged in the open, India has tightened rules related to Chinese investments in the country and cracked down on Chinese-origin apps under provisions of the Information Technology Act, saying they "engaging in activities which are prejudicial to sovereignty and integrity of India, defence of India, security of state and public order".

India initially banned 59 Chinese-origin apps on June 29, before banning 47 more on July 28, 118 more on September 2 and 43 more on November 24. Among the apps banned on Tuesday was the one of Chinese e-commerce giant Alibaba's AliExpress app.

<https://www.hindustantimes.com/india-news/china-says-india-s-latest-app-ban-order-violates-wto-rules/story-xgktTlRi1Jyg06C3rmC6xJ.html>

Thu, 26 Nov 2020

Sweden getting on board ISRO'S Venus mission with payload to explore planet

Ambassador Klas Molin said Swedish Institute of Space Physics' satellite instrument will study how the charged particles from the Sun interact with the atmosphere and exosphere of Venus

Bengaluru: Sweden is getting on board India's Venus orbiter mission 'Shukrayaan' with a scientific instrument to explore the planet. Ambassador of Sweden to India, Klas Molin said Swedish Institute of Space Physics (IRF) is engaged in the venture, its second collaborative project with the Indian Space Research Organisation (ISRO).

"IRF's satellite instrument Venusian Neutrals Analyzer (VNA) will study how the charged particles from the Sun interact with the atmosphere and exosphere of the planet", he told PTI.

"The new Venus mission means that the collaboration between IRF and ISRO continues".

The VNA would be the ninth generation of IRF's series of miniaturized ion and ENA (Energetic Neutral Atoms) instruments, according to Swedish officials. The first generation was named SARA (Sub-keV Atom Reflecting Analyzer) and was launched on board the Indian spacecraft Chandrayaan-1 that explored the Moon in 2008-2009. SARA consisted of two sensors.

One was a detector for energetic neutral atoms and the other was an instrument to measure the flow of ions in the solar wind. The instrument studied how the plasma around the Moon interacts with the moon where the surface is not protected by an atmosphere or a magnetic field, they said.

"For the first time ever, SARA could investigate energetic atoms that are knocked from the lunar surface when they are hit by the solar wind", Swedish officials said. The SARA experiment was the first collaborative project between IRF and the ISRO.

On collaboration in general with India in the field of space, Molin said Sweden has quite a lot to provide, both from its institutions and from space tech companies. He said India has a clear ambition to explore the universe, other planets and to send humans to space.

"This segment includes to a large extent R&D effort, both regarding space technologies and services." "The unique Space Tech Testbed capability at Esrange can also carry out even more advanced tests of equipment and technologies that should be used in exploration campaigns", Molin said.

On future prospects in the space field between the two countries, the Ambassador noted that India has recently created National Space Promotion and Authorization Centre (IN-SPACe) to provide a level playing field for private companies to use Indian space infrastructure. This is part of reforms aimed at giving a boost to private sector participation in the entire range of space activities, he said.

"The future is exciting as India is opening the space market for commercial player participation and easing import-export restrictions, including 100 per cent FDI allowed in satellite development



ISRO was eyeing June, 2023 for the country's first mission to Venus. (Photo:Reuters)

and deployment. It is important to underline that ISRO will remain as the main Indian customer in the coming years, but the market growth could be exponential", Molin said.

According to ISRO officials, the Indian space agency has short-listed 20 space-based experiment proposals, including from France, for its proposed Venus mission to study the planet for more than four years. They include "collaborative contributions" from Russia, France, Sweden and Germany.

ISRO was eyeing June, 2023 for the country's first mission to Venus. "But we are currently reviewing this mission timeline due to delays arising from the pandemic situation", an ISRO official said. "Future launch opportunity is either in 2024 or 2026".

It was noted that optimal launch window (when Venus is closest to the Earth) comes about every 19 months. Of the Indian and international payload proposals it received in response to an announcement of opportunity for novel space-based experiments to study Venus, ISRO has shortlisted 20 and they are currently under review.

The one already selected, according to French space agency CNES, is France's VIRAL instrument (Venus Infrared Atmospheric Gas Linker) co-developed with the Russian space agency Roscosmos, and the LATMOS atmospheres, environments and space observations laboratory attached to the French national scientific research centre CNRS.

Scientific objectives of ISRO's Venus mission are investigation of the surface processes and shallow subsurface stratigraphy; and solar wind interaction with Venusian Ionosphere, and studying the structure, composition and dynamics of the atmosphere, according to ISRO.

The payload capability of the proposed 2500-kg satellite, planned to be launched on GSLV Mk II rocket, is likely to be 175 kg with 500W of power. The proposed orbit is expected to be around 500 x 60,000 km around Venus. This orbit is likely to be reduced gradually, over several months to a lower apoapsis (farthest point).

<https://www.indiatoday.in/science/story/sweden-isro-venus-mission-explore-planet-1743910-2020-11-25>



Wed, 25 Nov 2020

New platform for creating and characterizing material blends could significantly accelerate development

Blending is a powerful strategy for improving the performance of electronics, coatings, separation membranes, and other functional materials. For example, high-efficiency solar cells and light-emitting diodes have been produced by optimizing mixtures of organic and inorganic components.

However, finding the optimal blend composition to produce desired properties has traditionally been a time-consuming and inconsistent process. Scientists synthesize and characterize a large number of individual samples with different compositions one at a time, eventually compiling enough data to create a compositional "library." An alternative approach is to synthesize a single sample with a compositional gradient so that all possible compositions can be explored at once. Existing combinatorial methods for rapidly exploring compositions have been limited in terms of the types of compatible materials, the size of compositional increments, or number of blendable components (often only two).

To overcome these limitations, a team from the U.S. Department of Energy's (DOE) Brookhaven National Laboratory, Yale University, and University of Pennsylvania recently built a first-of-its-kind automated tool for depositing films with finely controlled blend compositions made of up to three components onto single samples. Solutions of each component are loaded into

syringe pumps, mixed according to a programmable "recipe," and sprayed as tiny electrically charged droplets onto the surface of a heated base material called a substrate. By programming the flow rates of the pumps as a stage underneath the substrate changes position, users can obtain continuous gradients in composition.

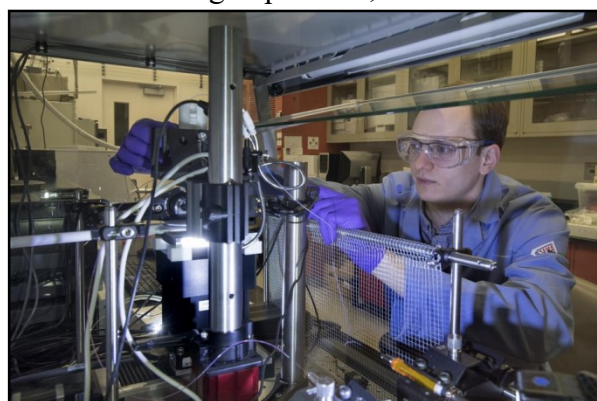
Now, the team has combined this electro spray deposition tool with the structural characterization technique of X-ray scattering. Together, these capabilities form a platform to probe how material structure changes across an entire composition space. The scientists demonstrated this platform for a thin-film blend of three polymers—chains made of molecular building blocks linked together by chemical bonds—designed to spontaneously arrange, or "self-assemble," into nanometer-scale (billionths of a meter) patterns. Their platform and demonstration are described in a paper published today in RSC Advances, a journal of the Royal Society of Chemistry (RSC).

"Our platform reduces the time to explore complex compositional dependencies of blended material systems from months or weeks to a few days," said corresponding author Gregory Doerk, a staff scientist in the Electronic Nanomaterials Group at Brookhaven Lab's Center for Functional Nanomaterials (CFN).

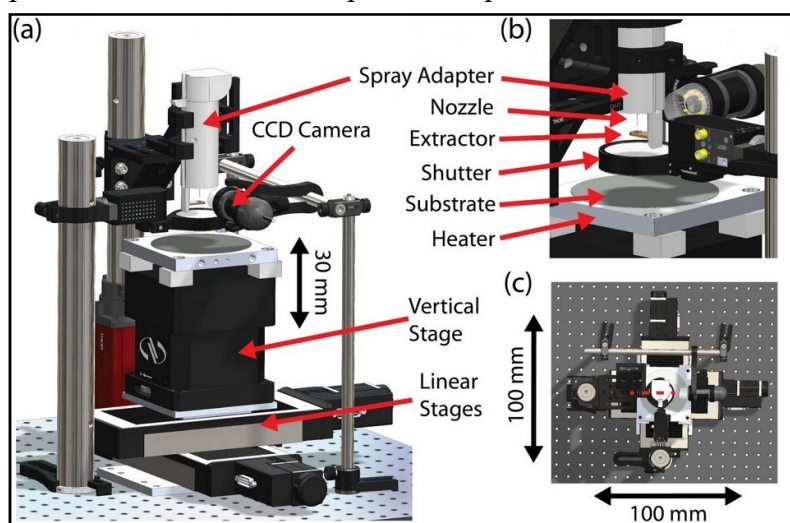
"We constructed a morphology diagram with more than 200 measurements on a single sample, which is like making 200 samples the conventional way," said first author Kristof Toth, a Ph.D. student in the Department of Chemical and Environmental Engineering at Yale University. "Our approach not only reduces sample preparation time but also sample-to-sample error."

This diagram mapped how the morphologies, or shapes, of the blended polymer system changed along a compositional gradient of 0 to 100 percent. In this case, the system contained a widely studied self-assembling polymer made of two distinct blocks (PS-*b*-PMMA) and this block copolymer's individual block constituents, or homopolymers (PS and PMMA). The scientists programmed the electro spray deposition tool to consecutively create one-dimensional gradient "strips" with all block copolymer at one end and all homopolymer blend at the other end.

To characterize the structure, the team performed grazing-incidence small-angle X-ray scattering experiments at the Complex Materials Scattering (CMS) beamline, which is operated at Brookhaven's National Synchrotron Light Source II (NSLS-II) in partnership with the CFN. In this technique, a high-intensity X-ray beam is directed toward the surface of a sample at a very low angle. The beam reflects off the sample in a characteristic pattern, providing snapshots of nanoscale structures at different compositions along each five-millimeter-long strip. From these images, the shape, size, and ordering of these structures can be determined.



Yale University PhD student Kristof Toth (pictured above) with the electro spray deposition tool he designed, built, and validated in collaboration with staff scientist Gregory Doerk of Brookhaven Lab's Center for Functional Nanomaterials (CFN). This CFN tool allows users to blend multiple components—such as polymers, nanoparticles, and small molecules—over a range of compositions in a single sample. Next door to the CFN, at the National Synchrotron Light Source II, users can probe how the structure of the blended material changes across this entire composition space. Credit: Brookhaven National Laboratory



A schematic of the electro spray deposition tool (a), with zoomed-in (b) and aerial (c) views. Credit: Brookhaven National Laboratory

"The synchrotron's high intensity X-rays allow us to take snapshots at each composition in a matter of seconds, reducing the overall time to map the morphology diagram," said co-author Kevin Yager, leader of the CFN Electronic Nanomaterials Group.

The X-ray scattering data revealed the emergence of highly ordered morphologies of different kinds as the blend composition changed. Normally, the block copolymers self-assemble into cylinders. However, blending in very short homopolymers resulted in well-ordered spheres (increasing amount of PS) and vertical sheets (more PMMA). The addition of these homopolymers also tripled or quadrupled the speed of the self-assembly process, depending on the ratio of PS to PMMA homopolymer. To further support their results, the scientists performed imaging studies with a scanning electron microscope at the CFN Materials Synthesis and Characterization Facility.

Though the team focused on a self-assembling polymer system for their demonstration, the platform can be used to explore blends of a variety of materials such as polymers, nanoparticles, and small molecules. Users can also study the effects of different substrate materials, film thicknesses, X-ray beam focal spot sizes, and other processing and characterization conditions.

"This capability to survey a broad range of compositional and processing parameters will inform the creation of complex nanostructured systems with enhanced or entirely new properties and functionalities," said co-author Chinedum Osuji, the Eduardo D. Glandt Presidential Professor of Chemical and Biomolecular Engineering at the University of Pennsylvania.

In the future, the scientists hope to create a second generation of the instrument that can create samples with mixtures of more than three components and which is compatible with a range of characterization methods—including in situ methods to capture morphology changes during the electro spray deposition process.

"Our platform represents a huge advance in the amount of information you can get across a composition space," said Doerk. "In a few days, users can work with me at the CFN and the beamline staff next door at NSLS-II to create and characterize their blended systems."

"In many ways, this platform complements autonomous methods developed by CFN and NSLS-II scientists to identify trends in experimental data," added Yager. "Pairing them together has the potential to dramatically accelerate soft matter research."

More information: Kristof Toth et al, High-throughput morphology mapping of self-assembling ternary polymer blends, *RSC Advances* (2020). DOI: [10.1039/d0ra08491c](https://doi.org/10.1039/d0ra08491c)
<https://phys.org/news/2020-11-platform-characterizing-material-blends-significantly.html>



Wed, 25 Nov 2020

Fluorescent molecule betrays the breakdown of polymer materials

Nylon, rubber, silicone, Teflon, PVC—these are all examples of man-made polymers—long chains of repeated molecular units that we call monomers. While polymers also exist in nature (think wool, silk, or even hair), the invention of synthetic polymers, the most famous of which is plastic, revolutionized the industry. Light, stretchy, flexible, yet strong and resistant, synthetic polymers are one of the most versatile materials on the planet, used in everything from clothing to building, packaging and energy production. Since the very beginning of this new era in material engineering, understanding the influence of external forces on polymers' strength and stability has been crucial to evaluate their performance.

When subjected to mechanical stress, the weak bonds that keep some polymer chains together are overcome, and one inevitably breaks. When this happens, a free radical (a molecule with an unpaired electron, which is naturally unstable and very reactive, called a "mechanoradical" in this case) is generated. By estimating the amount of free mechanoradicals produced, we can infer the

resistance of a material to the amount of stress. While this phenomenon is well documented, scientists struggled to observe it under ambient temperature in bulk state, because mechanoradicals produced for polymers in bulk are not stable due to their high reactivity toward oxygen and other agents.

Taking a Shine to Polymers: Fluorescent Molecule Reveals the Breakdown of Polymer Materials

Polymers can produce free mechanoradicals when subjected to mechanical stress

Highly reactive M^+

Mechanoradical R^{\bullet}

Mechanoradical formation in solutions is well-documented...

...but how do they form in bulk polymers?

New method to detect radicals produced under a given stimuli

Diarylacetonitrile molecule (H-DAAN) 'scavenges' the free radical

Mechanoradical R^{\bullet}

Force

Polymer chain

Production of fluorescent DAAN $^{\bullet}$

Fluorescence shows a linear correlation to the breakdown rate of the polymer chain

Can be used to estimate the amount of DAAN $^{\bullet}$ produced

H-DAAN can be used to...

- Visualize and quantify how polymers react to mechanical stress
- Predict and improve material performance in fields like engineering and medicine

Diarylacetonitrile as a Molecular Probe for the Detection of Polymeric Mechanoradicals in the Bulk State via a Radical Chain-transfer Mechanism
Yamamoto et al. (2020) | 10.1002/anie.202013180

東京工業大学
Tokyo Institute of Technology

H-DAAN could work as a radical scavenger for polymeric mechanoradicals in the bulk and generate DAAN $^{\bullet}$, which could potentially be evaluated by EPR spectroscopy and fluorescence measurements owing to their high stability toward oxygen. Credit: Tokyo Tech

Researchers from Tokyo Institute of Technology led by Professor Hideyuki Otsuka decided to take up the challenge. In their study published in *Angewandte Chemie International Edition*, they used a small molecule called diarylacetonitrile (H-DAAN) to capture the rogue free radicals. "Our theory was that H-DAAN would emit a distinctive fluorescent light when it reacts with the free radicals, which we could then measure to estimate the extent of polymer breakdown," explains Prof Otsuka. "The theory is simple; the higher the force exerted on the polymer, the more mechanoradicals are produced, and the more they react with H-DAAN. This higher reaction rate results in more intense fluorescent light, changes in which can easily be measured."

The researchers now wanted to see how this would work in practice. When polystyrene (in the presence of H-DAAN) was subjected to mechanical stress via grinding, the H-DAAN acted as a radical scavenger for polymeric mechanoradicals, and bound with them to produce "DAAN $^{\bullet}$," which has fluorescent properties. This caused a visible yellow fluorescence to appear.

"More important, probably, is the clear correlation that we found between fluorescence intensity and the amount of DAAN radicals generated by the ground-up polystyrene, as we had predicted," reports Prof Otsuka. "This means that it is possible to estimate the amount of DAAN radicals generated in the bulk system just by measuring the fluorescence intensity."

The implications of their findings are wide-ranging: by being able to visually quantify how materials respond to different external stimuli, they can test how suitable polymers are for various uses, depending on the mechanical stress they will be expected to undergo. This method could prove to be an invaluable tool for scientists and engineers as they strive to improve material performance and specificity.

This exciting research shines light on the responses of polymers to mechanical stress and illuminates the way forward in the research of polymer mechanoradicals!

More information: Hideyuki Otsuka et al, Diarylacetonitrile as a Molecular Probe for the Detection of Polymeric Mechanoradicals in the Bulk State via a Radical Chain-transfer Mechanism, *Angewandte Chemie International Edition* (2020). DOI: [10.1002/anie.202013180](https://doi.org/10.1002/anie.202013180)

Journal information: *Angewandte Chemie International Edition*
<https://phys.org/news/2020-11-fluorescent-molecule-betrays-breakdown-polymer.html>



Thu, 26 Nov 2020

Research creates hydrogen-producing living droplets, paving way for alternative future energy source

Scientists have built tiny droplet-based microbial factories that produce hydrogen, instead of oxygen, when exposed to daylight in air.

The findings of the international research team based at the University of Bristol and Harbin Institute of Technology in China, are published today in *Nature Communications*.

Normally, algal cells fix carbon dioxide and produce oxygen by photosynthesis. The study used sugary droplets packed with living algal cells to generate hydrogen, rather than oxygen, by photosynthesis.

Hydrogen is potentially a climate-neutral fuel, offering many possible uses as a future energy source. A major drawback is that making hydrogen involves using a lot of energy, so green alternatives are being sought and this discovery could provide an important step forward.

The team, comprising Professor Stephen Mann and Dr. Mei Li from Bristol's School of Chemistry together with Professor Xin Huang and colleagues at Harbin Institute of Technology in China, trapped ten thousand or so algal cells in each droplet, which were then crammed together by osmotic compression. By burying the cells deep inside the droplets, oxygen levels fell to a level that switched on special enzymes called hydrogenases that hijacked the normal photosynthetic pathway to produce hydrogen. In this way, around a quarter of a million microbial factories, typically only one-tenth of a millimeter in size, could be prepared in one milliliter of water.

To increase the level of hydrogen evolution, the team coated the living micro-reactors with a thin shell of bacteria, which were able to scavenge for oxygen and therefore increase the number of algal cells geared up for hydrogenase activity.

Although still at an early stage, the work provides a step towards photobiological green energy development under natural aerobic conditions.

Professor Stephen Mann, Co-Director of the Max Planck Bristol Centre for Minimal Biology at Bristol, said: "Using simple droplets as vectors for controlling algal cell organization and photosynthesis in synthetic micro-spaces offers a potentially environmentally benign approach to hydrogen production that we hope to develop in future work."

Professor Xin Huang at Harbin Institute of Technology added: "Our methodology is facile and should be capable of scale-up without impairing the viability of the living cells. It also seems flexible; for example, we recently captured large numbers of yeast cells in the droplets and used the microbial reactors for ethanol production."



Electron microscopy image of a densely packed droplet of hydrogen-producing algal cells. Scale bar, 10 micrometres. Credit: Prof Xin Huang, Harbin Institute of Technology

More information: "Photosynthetic hydrogen production by droplet-based microbial micro-reactors under aerobic conditions" *Nature Communications* (2020). DOI: [10.1038/s41467-020-19823-5](https://doi.org/10.1038/s41467-020-19823-5)

Journal information: *Nature Communications*
<https://phys.org/news/2020-11-hydrogen-producing-droplets-paving-alternative-future.html>

COVID-19 Research News

THEWEEK

Thu, 26 Nov 2020

Diabetic eye disease associated with five-fold risk of severe COVID-19: Study

The study identified the risk associated with diabetic retinopathy and COVID-19

People with diabetic eye disease have a five-fold increased risk of requiring intubation when hospitalised with COVID-19, according to a new study which calls for better clinical monitoring of patients with this complication.

The study, published in the journal *Diabetes Research and Clinical Practice* on Tuesday, identified for the first time the risk associated with diabetic retinopathy and COVID-19. This eye disease is a common complication of diabetes and is caused by damage to the small blood vessels in the eye, the researchers, including those from King's College London in the UK, explained.



In the study, the scientists investigated 187 people with diabetes hospitalised with COVID-19 between March and April 2020.

They found that 67 patients had diabetic retinopathy, a majority with background eye damage.

Of the 187 patients hospitalised with severe COVID-19, the scientists said 26 per cent were intubated, and 45 per cent of these patients had retinopathy.

According to the study, retinopathy was associated with a five-fold increased risk for intubation with no association observed between this condition and mortality.

"This is the first time that retinopathy has been linked to severe COVID-19 in people with diabetes," said study co-author Antonella Corcillo from King's College London.

"Retinopathy is a marker of damage to the blood vessels, and our results suggest that such pre-existing damage to blood vessels may result in a more severe COVID-19 infection requiring intensive care treatment," Corcillo added.

According to the researchers, people with diabetes are at high risk of vascular complications affecting the large and small blood vessels.

"We hypothesise that the presence of diabetes related vascular disease such as retinopathy may result in greater vulnerability and susceptibility to respiratory failure in severe COVID-19," Corcillo said.

The scientists believe looking for presence or history of retinopathy or other vascular complications of diabetes may help health care professionals identify patients at high risk of severe COVID-19.

Citing the limitations of the study, the researchers said it included a relatively small sample size and was unable to identify a causal relationship between retinopathy and severe COVID-19 outcomes.

"Further studies are required to investigate the possible mechanisms that explain the links between markers and manifestations of diabetic vascular disease such as retinopathy and severe COVID-19," Corcillo added.

<https://www.theweek.in/news/health/2020/11/25/Diabetic-eye-disease-associated-with-five-fold-risk-of-severe-COVID-19-Study.html>



Thu, 26 Nov 2020

Will COVID-19 vaccine protect you from novel coronavirus? Know likely side-effects

Vaccines work by training and preparing the body's natural defences, the immune system, to recognize and fight off the viruses and bacteria they target

By Pushkar Tiwari

Highlights

- 1. According to reports, no unexpected adverse events were identified as part of the COVID-19 vaccine research to date.**
- 2. Although, some of those vaccinated across the world had short-term minor adverse events.**
- 3. The felt pain at the injection point and witnessed flu-like symptoms including fever, weakness, fatigue, and headache.**

New Delhi: The coronavirus outbreak that was first reported in December 2019 in China, has brought the whole world to a standstill. Over 7 billion people around the world have been waiting for the COVID-19 vaccine now, which has currently more than 100 candidates under development, with a number of these in the human trial phase.

As per the World Health Organization (WHO), immunization currently prevents 2-3 million deaths every year from diseases like diphtheria, tetanus, pertussis, influenza and measles and there are now vaccines to prevent more than 20 life-threatening diseases

Vaccines work by training and preparing the body's natural defences, the immune system, to recognize and fight off the viruses and bacteria they target. If the body is exposed to those disease-causing germs later, the body is immediately ready to destroy them, preventing illness.



Reuters photo

According to reports, no unexpected adverse events were identified as part of the coronavirus vaccine research to date.

Although, some of those COVID-19 vaccinated across the world had short-term minor adverse events such as pain at the injection point and flu-like symptoms including fever, weakness, fatigue, and headache.

This mainly happens because the body's immune system recognizes the virus and starts fighting it, and then the immunity is prepared against the virus. Subsequently, the second dose of vaccine would be given to people, but its side effects will be less than before.

Currently, Russia's has said that its Sputnik V COVID-19 vaccine efficacy is above 95 per cent, 42 days after the first dose, whereas, Moderna's vaccine is said to be 94.5% effective in preventing coronavirus.

Pfizer has also claimed an efficacy rate of 95 % for its coronavirus vaccine and Oxford-AstraZeneca COVID-19 vaccine is likely to be 90% effective.

This is to be noted that most vaccines have been in use for decades and each vaccine under development first undergoes screenings and evaluations to determine which antigen should be used to invoke an immune response. This preclinical phase is done without testing on humans and an experimental vaccine is first tested in animals to evaluate its safety and potential to prevent disease.

If the vaccine triggers an immune response, it is then tested in human clinical trials in three phases.

According to WHO, during Phase 1, the vaccine is given to a small number of volunteers to assess its safety, confirm it generates an immune response, and determine the right dosage. Generally in this phase vaccines are tested in young, healthy adult volunteers.

In Phase 2, the vaccine is then given to several hundred volunteers to further assess its safety and ability to generate an immune response. Participants in this phase have the same characteristics (such as age, sex) as the people for whom the vaccine is intended. There are usually multiple trials in this phase to evaluate various age groups and different formulations of the vaccine. A group that did not get the vaccine is usually included in phase as a comparator group to determine whether the changes in the vaccinated group are attributed to the vaccine, or have happened by chance.

In Phase 3, the vaccine is next given to thousands of volunteers – and compared to a similar group of people who didn't get the vaccine, but received a comparator product – to determine if the vaccine is effective against the disease it is designed to protect against and to study its safety in a much larger group of people. Most of the time phase three trials are conducted across multiple countries and multiple sites within a country to assure the findings of the vaccine performance apply to many different populations.

During phase two and phase three trials, the volunteers and the scientists conducting the study are shielded from knowing which volunteers had received the vaccine being tested or the comparator product. This is called “blinding” and is necessary to assure that neither the volunteers nor the scientists are influenced in their assessment of safety or effectiveness by knowing who got which product. After the trial is over and all the results are finalized, the volunteers and the trial scientists are informed who received the vaccine and who received the comparator.

When the results of all these clinical trials are available, a series of steps are required, including reviews of efficacy and safety for regulatory and public health policy approvals.

<https://zeenews.india.com/health/will-covid-19-vaccine-protect-you-from-novel-coronavirus-know-likely-side-effects-2326608>

