

Nov
2020

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 : 45 अंक : 255 03 नवंबर 2020
Vol.: 45 Issue : 255 03 November 2020



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

CONTENTS

S. No.	TITLE	Page No.
	DRDO News	1-2
	DRDO Technology News	1-2
1.	India rushing to expand missile arsenal: The series of tests DRDO has carried out since Galwan Valley clash	1
	Defence News	3-10
	Defence Strategic National/International	3-10
2.	On table for next round of LAC talks: Thinning of troops	3
3.	More Rafale jets coming! French fighters to roar in the Indian skies this week	4
4.	India and three major democracies all set for naval drill in Indian Ocean	5
5.	Why India desperately needs the Russian 'Aquatic Tank Killer' – The Sprut against China?	6
6.	India may one day launch Hornets, ready to sting China	7
7.	China shops for graphene clothes for PLA soldiers at Ladakh border, flaunts it	9
8.	Indian Naval Ship Airavat arrives in Sudan with food aid as part of Mission Sagar-2	10
	Science & Technology News	11-16
9.	Team develops cost-efficient and high-resolution multi-spectral camera	11
10.	Artificial intelligence helps to identify correct atomic structures	12
11.	Researchers achieve fused silica with high damage threshold by combing chemical etching and laser polishing	13
	COVID-19 Research News	14-16
12.	Global study sees India having edge in Covid-19 vaccines	14
13.	Coronavirus developing genetic mutations, turning more contagious: Study	16

India rushing to expand missile arsenal: The series of tests DRDO has carried out since Galwan Valley clash

As mutual disengagement talks between India and China continue, the DRDO has fast-tracked its missile programmes over the last 2 months

KEY HIGHLIGHTS

- *The DRDO's Laser-Guided Anti Tank Missile was also test-fired in Maharashtra's Ahmednagar on September 22. A second test was conducted on October 1*
- *The DRDO tested its nuclear-capable Shaurya missile – the land-based equivalent of the Submarine Launched Ballistic Missile Sagarika (K-15) on October 3*
- *India's first indigenous anti-radiation missile, Rudram, was successfully flight-tested on a Sukhoi-30 MKI fighter on October 9*

In mid-October, the Defense Research and Development Organisation tested its Stand-Off Anti Tank Missile off the coast of Odisha in what became at least the 12th missile test conducted in roughly 45 days.

The latest series of missile tests comes against the backdrop of ongoing talks between India and China following a brutal clash between Indian Army forces and PLA soldiers at the Galwan Valley in Eastern Ladakh in mid-June.

With the two parties appearing deadlocked in negotiations, the DRDO has, reportedly, been told to expedite its missile programme amid concerns in New Delhi over China's commitment to disengage at the Line of Actual Control (LAC).

Hypersonic Technology Demonstrator Vehicle (HSTDV)

The DRDO tested the Hypersonic Technology Demonstrator Vehicle at the APJ Abdul Kalam Launch Complex on September 7. The HSTDV is an unmanned scramjet demo aircraft capable of achieving speeds over Mach 6.

Offering supersonic combustion, the scramjet engine is reported to be an upgrade over its ramjet counterpart that works inefficiently at hypersonic speeds. Although not a weapon itself, the HSTDV has multiple uses including acting as a carrier for long-range cruise missiles, and in launching satellites.

High-speed Expendable Aerial Target (HEAT)

The DRDO conducted a flight test of Abhyas, its High-speed Expendable Aerial Target (HEAT) at the Integrated Test Range (ITR) in Balasore, Odisha on September 22. The two demonstrator



India has conducted at least 12 missile tests over the last two months. | Photo Credit: ANI

vehicles launched were capable of reaching speeds of 0.5 Mach. As a drone (UAV), the vehicle is used as a target to test several missile systems and can fly fully autonomously.

Laser-Guided Anti Tank Guided Missile

The DRDO's Laser-Guided Anti Tank Missile was also test-fired in Maharashtra's Ahmednagar on September 22. A second test was conducted on October 1. The weapon, test-fired from an MBT Arjun Tank, is capable of being launched from multiple platforms, has a range between 1.5 to 5km, and uses laser designation to lock on to and track its target. It can be used against vehicles with specially designed armour plates.

Prithvi-II

On September 24, the nuclear-capable Prithvi-II missile took to the skies from the Integrated Testing Range near Odisha. The surface-to-surface, short-range ballistic missile is believed to have a range of 400km and has been developed by India's Strategic Forces Command. The missile has a warhead mounting capacity of 500kg and was first test-fired in January 1996.

BrahMos Missile

India's BrahMos surface-to-surface supersonic LACM was tested from the Integrated Testing Range on September 30. The LACM was inducted into the Indian Army in 2007 and features an autonomous launcher that can fire three missiles at three different targets or in several other combinations.

The Naval version of the BrahMos missile was test-fired from the INS Chennai on October 17 and hit its target in the Arabian Sea with pinpoint accuracy.

On October 30, the supersonic cruise missile was fired from one of India's Sukhoi fighter aircraft that took off from a frontline air base in Punjab. The IAF is, reportedly, integrating the missile into over 40 of its Sukhoi jets.

Shourya missile

The DRDO tested its nuclear-capable Shourya missile – the land-based equivalent of the Submarine Launched Ballistic Missile Sagarika (K-15) on October 3. The missile is, reportedly, able to achieve speeds of 7.5 Mach and has a range of roughly 800km.

Supersonic Missile Assisted Release of Torpedo (SMART) system

On October 5, the DRDO successfully flight-tested its indigenously developed SMART torpedo system from Wheeler Island off the coast of Odisha. The SMART system, used in Anti-Submarine Warfare, takes off from a warship or a truck-based coastal battery like a typical super-sonic missile, before releasing its torpedo into the water as it approaches a submerged enemy submarine. As such, it allows India's military to vastly extend the range of its torpedoes.

Rudram

India's first indigenous anti-radiation missile, Rudram, was successfully flight-tested on a Sukhoi-30 MKI fighter on October 9. The missile can be used to destroy enemy radars, communication sites and other targets that use radio-frequency waves, potentially disabling adversaries from launching surface-to-air missiles. In doing so, it exposes the enemy to attacks via relatively inexpensive short-range weapons.

Stand-Off Anti Tank Missile (SANT)

On October 19, India test-fired its Stand-Off Anti Missile (SANT) off the coast of Odisha. The latest iteration of the missile is integrated with both, Lock-on After Launch, and Lock-on Before Launch capabilities. It is an upgraded version of the Helicopter-launched Nag (HeliNa) missile and, reportedly, has a range of 12km.

<https://www.timesnownews.com/india/article/india-rushing-to-expand-missile-arsenal-the-series-of-tests-drdo-has-carried-out-since-galwan-valley-clash/676059>

 **The Indian EXPRESS**

Tue, 03 Nov 2020

On table for next round of LAC talks: Thinning of troops

Signal from Beijing on certain friction points as harsh Ladakh winter sets in

By Deeptioman Tiwary

New Delhi: Negotiations between India and China over the situation in eastern Ladakh have not yielded results so far on troops returning to their April locations — the status quo ante, before the start of the standoff in May — but the Indian establishment is hopeful of “partial disengagement” at certain friction points in the region.

Sources said this is largely supposed to translate into thinning of troops massed by the two sides on the north and south banks of Pangong Tso. Friction points also remain in Gogra and Hot Spring areas after some initial disengagement.

While seven rounds of talks at the level of the Corps Commander have taken place since June, movement of troops and artillery by either side has only increased in the region.

This move to effect some thinning of troops by either side comes at a time when

Prime Minister Narendra Modi and Chinese President Xi Jinping are likely to meet each other thrice this month — over video-conference — at the BRICS, SCO and G-20 summits.

“At the moment, China does not appear to have any intention to concede to India’s demand for restoration of status quo ante. They seem to be confident of sustaining the redrawing of the LAC that they have done unilaterally. However, there have been feelers from the other side that it is willing to thin down troops at certain friction points. The next Corps Commander level talks have not been scheduled yet. As and when it happens, this matter will be discussed,” said a source privy to negotiations between the sides.

India, the source said, will continue to push for restoration of status quo ante and will not agree to any “mutual equidistant withdrawal”. A “partial disengagement”, the source said, would be in the interest of both countries for now.

Following the June 15 Galwan Valley clash, in which 20 Indian soldiers were killed and the Chinese an unspecified number, Corps Commander level talks secured disengagement at the spot of the clash with forces of the two countries moving 2 km behind.

But ever since, no substantial disengagement has been achieved. As a countermeasure, Indian forces have occupied dominating heights on the south bank of Pangong Tso and the Chushul sub-sector.



Sources said this is largely supposed to translate into thinning of troops massed by the two sides on the north and south banks of Pangong Tso.

In early September, China increased troop presence on Finger 4 of the north bank with India mirroring the strength.

“The result is that there are 1500-2000 soldiers on each side at the top of the ridge between Finger 4 and Finger 3. The situation is no different on the south bank where China has tried to mirror the Indian strength. This is a recipe for a clash. Moreover, in the harsh winter, with temperatures diving several notches below freezing point, sustaining these positions is a difficult task for either side,” the source said.

<https://indianexpress.com/article/india/india-china-lac-troops-ladakh-6915599/>



Tue, 03 Nov 2020

More Rafale jets coming! French fighters to roar in the Indian skies this week

Indian Air Force Base in Jamnagar gets ready to welcome three Dassault Aviation's 'Rafale' fighters from France later this week

By Huma Siddiqui

Indian Air Force Base in Jamnagar gets ready to welcome three Dassault Aviation's 'Rafale' fighters from France later this week. These fighter jets, which will fly non-stop from that country are expected to reach Indian skies on November 4, 2020. According to sources, “It will be around eight-hour-long flight all the way from Istres in France to Jamnagar. These fighters aircraft will be accompanied by three mid-air refuelling aircraft of the French Air Force.”

The second batch of pilots and ground staff are already undergoing intense training at the Saint-Dizier airbase in France. As has been reported earlier, India received the first batch of five French fighters in July, out of the 36 that has been contracted for at a cost of Rs 59,000 crore. The aircraft are coming through the inter-governmental agreement with France and the deliveries are expected to be completed by 2023.

To oversee the progress being made in the project a team from the IAF has set up an office in Paris headed by a Group Captain. This office is not only overseeing the production timelines but is also monitoring the training of the crew, besides integration of India-specific enhancements and weapons systems.

On September 10, the first batch of fighter jets was formally inducted in the No.17 'Golden Arrows' Squadron at the Ambala Air Force station. These Rafales had taken off from the Merignac airbase at Bordeaux in France to the Al Dhafra airbase in the UAE. And then they took off from UAE to India, and they were all the way from France to UAE, and then to India were accompanied by the French Air Force mid-air refuellers, as well as IAF mid-air refuellers. From the time of induction these aircraft have been carrying out sorties in eastern Ladakh, where the tensions are mounting between India and China.

There were five fighter aircraft including three single-seat and two twin-seater trainers and were flown to Indian led by Commanding Officer of No. 17 squadron Group Captain Harkirat Singh. The first Squadron of the Rafale is based at Ambala Air Force Station, the second will be in West Bengal at Hasimara.



The first Squadron of the Rafale is based at Ambala Air Force Station, the second will be in West Bengal at Hasimara.

During the annual presser ahead of the IAF Day, Air Chief Marshal RKS Bhadauria had told the media persons, "Every two or three months the IAF will be receiving around 3-4 Rafale from France. And by the end of 2021, the first Squadron will be fully ready."

As per the IGA agreement between the governments, the 36 fighter jets in fly away condition with India Specific Enhancements (ISE) are expected to come by 2023.

<https://www.financialexpress.com/defence/more-rafale-jets-coming-french-fighters-to-roar-in-the-indian-skies-this-week/2119413/>



Tue, 03 Nov 2020

India and three major democracies all set for naval drill in Indian Ocean

New Delhi: The 'Quad' countries -- an informal security forum comprising India, the US, Japan and Australia -- are all set for annual naval drill Malabar Exercise in the Indian Ocean Region beginning Tuesday.

In a message to China on getting a wider footprint in the Indo-Pacific region, India had invited Australia to take part in the drill to which it has agreed.

"The 24th edition of the Malabar naval exercise is scheduled in two phases in November 2020," said Indian Navy spokesperson Commander Vivek Madhwal.

The officer said that Phase 1 of the exercise involving participation by the Indian Navy, United States Navy, Japan Maritime Self Defence Force, and Royal Australian Navy is set to be held off Visakhapatnam in the Bay of Bengal from November 3 to November 6.

Phase two of the drill is scheduled to be conducted in the Arabian Sea in mid-November 2020.

The Malabar series of maritime exercises commenced in 1992 as a bilateral between the Indian and US navies. Japan joined in 2015. The 2020 edition will now witness the participation of Australia in this joint maritime exercise.

Phase one will witness the participation of Indian Navy units with USS John S McCain (Guided-missile destroyer), Australian Ship Ballarat (long range frigate) with a MH-60 helicopter, and Japan Maritime Self Defence Ship Onami (Destroyer) with a SH-60 helicopter.

The Indian Navy participation in phase one will be led by Rear Admiral Sanjay Vatsayan, Flag Officer Commanding, Eastern Fleet.

Indian Navy units participating in the exercise include destroyer Ranvijay, frigate Shivalik, Off Shore Patrol Vessel Sukanya, Fleet Support Ship Shakti and submarine Sindhuraj.

In addition, Advanced Jet Trainer Hawk, long-range maritime patrol aircraft P-8I, Dornier maritime patrol aircraft, and helicopters will also be participating in the exercise.

The exercise, being conducted as a "non-contact, at sea only" exercise in view of the COVID-19 pandemic, will showcase the high-levels of synergy and coordination between the friendly navies, which is based on their shared values and commitment to an open, inclusive Indo-Pacific and a rules-based international order.

Phase one would witness complex and advanced naval exercises including surface, anti-submarine and anti-air warfare operations, cross deck flying, seamanship evolutions and weapon firing exercises.

<https://www.daijiworld.com/news/newsDisplay.aspx?newsID=767349>

Why India desperately needs the Russian ‘Aquatic Tank Killer’ – The Sprut against China?

With the increasing tensions at the India-China border at Ladakh, the deployment of VT-4 light tanks by the PLA has taken everyone’s attention, and eyes are now up to the Indian Army- that it might just be the time to have one of theirs.

While the DRDO has been given a green light to move forward with their own version of the light tank, the Indian Army would also look up for foreign vendors to fill this void – and one of the primary candidates is the Russian ‘Sprut-SD’ light tank.

Armed with a 125mm gun, this ‘light tank’ is capable of destroying enemy heavy armor, having the firepower commonality with the T-72, T-90, and the newest T-14 Armata tanks.



Sprut Tank – Wikimedia Commons

This also translates to be a logistical boon – as the same munitions would be used by these tanks. It is an amphibious tank-destroyer, much like its western counterpart Stryker Mobile Gun System, but having a bigger gun.

Sprut is currently in service with the Russian airborne units. It’s a legacy to the wide array of Soviet-era mechanized formations which include some of the most used ICVs like the BMP and BTR family. Its close relative, the BMP-3, has a 100mm cannon.

The vehicle weighs around 18 tonnes, which is about half as the Chinese counterpart, the VT-5, which sports a 105mm gun. Being lighter and carrying more firepower, the Sprut could enjoy a considerable advantage in the field, working in tandem with the Indian Army’s highly upgraded T-72 “Combat Improved Ajeya” tanks as well as the T-90s.

All of these three tanks sport the same munitions as mentioned above, and the higher protection cover provided just like the heavier main battle tanks.

This would be reminiscent of the tactics developed during the World War 2 when specific tank destroyer variants (and Anti-Tank Artillery) would move in formations along with the main armor, and provide a credible firepower addition that would render the enemy’s mechanized formations vulnerable.

Considering the VT-5’s lighter armor and its lesser firepower, Sprut might have an edge on the battlefield.

One of the major advantages of the Ruskie light tank is its amphibious capability, a feature that can be seen with most of the Russian infantry combat vehicles. This gives the combat engineers a sigh of relief, as these amphibious vehicles are unstoppable by water-obstructions like Rivers or other smaller water channels.

Working with the main armor, these vehicles could either continue the advance or secure a bridgehead, or the area at the opposite bank, while giving the engineers a safe and secure time to deal with bridge-laying operations.

The Sprut gun is also equipped with an autoloader, which ensures the high rate of fire of 6–8 rounds per minute with both conventional projectiles and rounds with guided missiles.

In addition, the fire control system features stabilization of the elevation and azimuth and also includes a laser rangefinder and a ballistic computer that provides ever-changing data about the target. The two-plane stabilization of the commander’s sight is aligned with the laser sight for aiming the 125 mm shells onto the laser rangefinder.

The tank could be a potent contender for the Indian Army's light tank requirements and provides adequate firepower and mobility along with the much-needed interoperability with its related armored vehicles like the T-90 and T-72 which form the backbone of the country's armored formations.

<https://eurasianimes.com/why-india-desperately-needs-the-russian-aquatic-tank-killer-the-sprut-against-china/>



Tue, 03 Nov 2020

India may one day launch Hornets, ready to sting China

US officials have offered to sell India an advanced version of Boeing-made aircraft along with the unmanned Sea Guardian

By Dave Makichuk

It is Beijing's worst nightmare.

The Indian Navy, brandishing brand new, state-of-the-art F/A-18 fighter jets, on their Himalayan doorstep.

You wanted a fight, China? Well, you got one.

A Hornet that can sting.

You might have some good fighter jets in the PLAAF, but you don't have F/A-18s.

According to respected military publication, The National Interest, and top notch writer Peter Suci — one of the best in the business — it is increasingly looking like the Indian Navy could soon be flying the F/A-18.

During the recent U.S.-India 2+2 Ministerial Dialogue, the United States signed a Basic Exchange and Agreement (BECA) for geo-spatial cooperation, and US officials have offered to sell India an advanced version of Boeing-made aircraft along with the unmanned Sea Guardian aircraft, National Interest reported.

Make no mistake — this is an unprecedented offer. One that could alter the balance in the Indo-China theater.

Given this looming threat from Xi Jinping's China, which is getting more unhinged with every passing day, it is likely India will reconsider the F/A-18 — despite previous concerns from New Delhi, that potential US sanctions could derail the entire thing.

Let's be honest, the entire US military and political system is a fool's game at present — a pathological liar as president, and a challenger with a vague foreign policy.

However, the Indian Navy clearly likes what it sees in the latest Block III version of the American fighter jet. Who wouldn't!

The F/A-18s would meet India's need to have a fighter that can operate from aircraft carriers, Naval-Technology reported.

The Indian Navy has been evaluating if the F/A-18 as well as the French-made Rafale naval fighters to determine if either will meet its current and future needs.



Will the Indian Navy have FA-18s flying off its carriers some day? Sources say, yes, it's possible, and if so, it will be a game changer with China. Credit: National Interest.

India has already announced its intentions to phase out its existing fleet of jet fighters, which include the Russian-built MiG-29K, National Interest reported.

This past summer Boeing utilized a ground-based ski jump at Naval Air Station Patuxent River in Maryland to demonstrate the capabilities of the Super Hornet on a short take-off but arrested recovery configured (STOBAR) aircraft carrier, such as the ones currently in service with the Indian Navy.

According to the Eurasian Times, Dan Gillian, VP of the Super Hornet program, said: “We’ve done a lot of simulation work with the Indian Navy to better understand their requirements and we feel comfortable that the Super Hornet can operate from all their carriers, both the ones fielded today and the ones in the future.

“We think we can move around the deck, be very mission capable with a relevant weapons load-out and fuel load-out to give the Navy what they need. The Super Hornet as built today can operate from Indian carriers.”

The Indian Navy operates one such carrier already, the *INS Vikramaditya*, a modified Kiev-class carrier that was originally built as the Baku and entered service with the Soviet Navy before being decommissioned and sold to India in 2004, National Interest reported.

The refurbished carrier entered service with the Indian Navy in 2013 and currently serves as its flagship. Additionally, India is constructing its first domestically-built carrier *INS Vikrant*, and it is expected to enter service in 2023.

McDonnell Douglas, which developed the original F/A-18 Hornet and was subsequently acquired by Boeing, had also previously conducted ski jump tests with that aircraft at the tail end of the Cold War, National Interest reported.

That testing showed that with as little as a nine-degree incline, the total required takeoff roll for the Hornet could be cut in half, though it’s unclear what the jet’s gross weight had to be to achieve this performance.

Ski jumps generally increase the takeoff performance of combat jets in the absence of catapults and also provide an added margin of safety, National Interest reported.

India has expressed interest in acquiring some 57 naval fighter aircraft from operations from the carriers, and earlier this month Boeing touted the capabilities of F/A-18 when responding to the Indian Navy’s Request for Information (RFI) for its Multi-role Carrier Borne Fighter program.

In its response, the American defense contractor noted that the jet has earned a reputation of being among the most lethal, advanced, combat-proven, multi-role frontline fighters in service today.

The company’s pitch, which was made by Boeing Defense India (BDI), also highlighted the fact that the Block III variant can perform in virtually every mission in the tactical spectrum including air superiority, day/night strike with precision guided-weapons, fighter escort, close air support, suppression of enemy air defense, maritime strike, reconnaissance, forward air control, and buddy refueling.

All factors, that will make Beijing wake up and take notice.

<https://asiatimes.com/2020/11/india-may-one-day-sport-hornets-ready-to-sting-china/>

China shops for graphene clothes for PLA soldiers at Ladakh border, flaunts it

The PLA's wish list includes "smart warm clothing made of graphene", a revolutionary form of carbon, the discovery of which led physicists Andra Geim and Konstantine Novoselov to the Nobel Prize in Physics in 2010

By Sutirtho Patranobis, Edited by Vinod Janardhanan

Beijing: China has shortlisted nearly two dozen private companies to supply advanced unmanned weaponry and graphene clothing to the People's Liberation Army (PLA) regiments deployed along the long high-altitude border areas with India, state media reports said.

The PLA's wish list includes "smart warm clothing made of graphene", a revolutionary form of carbon, the discovery of which led physicists Andra Geim and Konstantine Novoselov to the Nobel Prize in Physics in 2010.

The Chinese armed forces are also looking for advanced logistics support equipment like portable solar chargers, portable oxygenators and a multifunctional dining vehicle.

The rare, and surprisingly publicised, move is an indication that China is working towards fusing its military needs with technology available in the civilian sector - an effort to leverage civilian service and logistical capabilities for military purposes amid the months-long border standoff with India in eastern Ladakh.



Soldiers of the People's Liberation Army (PLA) march outside the Great Hall of the People in Beijing, China September 8.(Reuters)

The private companies, some of them based in south China and specialised in drone technology, are known to manufacture vertical takeoff and landing unmanned vehicles, which can operate at high altitudes.

It is rare for the PLA to disclose the names of private companies from which it plans to procure military equipment.

It's a sign that the world's largest military force is expanding procurement from traditional suppliers, China's state-owned enterprises, and buying specialised equipment from niche manufacturers.

The PLA's Tibet Command invited 22 private "arms companies" and held meetings to review their products to be potentially used during "plateau warfare and border defence", national broadcaster, China Central Television (CCTV) and the nationalistic tabloid, Global Times reported.

"Many types of rotor-wing and fixed-wing aerial drones, including the Blowfish A2 helicopter drone developed by Zhuhai-based Ziyan UAV and the CW-25 vertical take-off and landing fixed-wing drone made by Chengdu-based JOUAV, were inspected by the PLA," the CCTV report said.

They are specially designed for use in high elevation, low temperature regions, with the aim of conducting unmanned missions including material supply, border defense and management, "...surveillance and armed reconnaissance along the border of southwest China's Tibet Autonomous Region (TAR)," the CCTV report said.

The reports didn't specify which private Chinese company manufactures clothes made of graphene, which has been hailed as a "wonder material".

The website, Dailytechlife.com which tracks technology and invention, says as an item of cloth, graphene can be “thermal, waterproof, and fireproof” and have other advanced technical properties not normally associated with cloth.

Beijing’s decision to look at private companies matches with its goal to merge the military and civil sectors.

“PRC’s (People’s Republic of China) long-term goal is to create an entirely self-reliant defence-industrial sector—fused with a strong civilian industrial and technology sector—that can meet the PLA’s needs for modern military capabilities,” the USA’s Defence Department said in its annual report on China’s military in September.

Calling it the “Military-Civil Fusion (MCF) Development Strategy”, the report said China is pursuing its “...MCF Development Strategy to “fuse” its economic and social development strategies with its security strategies to build an integrated national strategic system and capabilities in support of China’s national rejuvenation goals.”

<https://www.hindustantimes.com/world-news/chinese-military-to-buy-graphene-clothing-chopper-drones-from-pvt-cos-for-india-border/story-Ddrzp2oFawwBxIwrMsFjoJ.html>



Tue, 03 Nov 2020

Indian Naval Ship Airavat arrives in Sudan with food aid as part of Mission Sagar-2

Indian Naval Ship Airavat arrived in Sudan on Monday with food aid as part of Mission Sagar-2

By Manjeet Singh Negi

New Delhi: As part of 'Mission Sagar-II', Indian Naval Ship Airavat carrying a consignment of 100 Tonnes of food aid arrived in Sudan today. Under the mission, the Indian government is providing assistance to friendly foreign countries to overcome natural calamities and the coronavirus pandemic.

What is Mission Sagar?

Mission Sagar-II follows the first 'Mission Sagar' undertaken in May-June 2020, wherein India reached out to Maldives, Mauritius, Seychelles, Madagascar and Comoros, and provided food aid and medicines. As part of Mission Sagar-II, Indian Naval Ship Airavat will deliver food aid to Sudan, South Sudan, Djibouti and Eritrea.

In a statement, the Navy said, "Mission Sagar-II is in line with the Prime Minister’s vision of Security and Growth for All in the Region ‘SAGAR’ and highlights the importance accorded by India to relations with her maritime neighbours and further strengthens the existing bond. The Indian Navy is progressing this mission in close coordination with the Ministries of Defence and External Affairs, and other agencies of the Government of India".

<https://www.indiatoday.in/india/story/indian-naval-ship-airavat-arrives-in-sudan-with-food-aid-as-part-of-mission-sagar-2-1737378-2020-11-02>

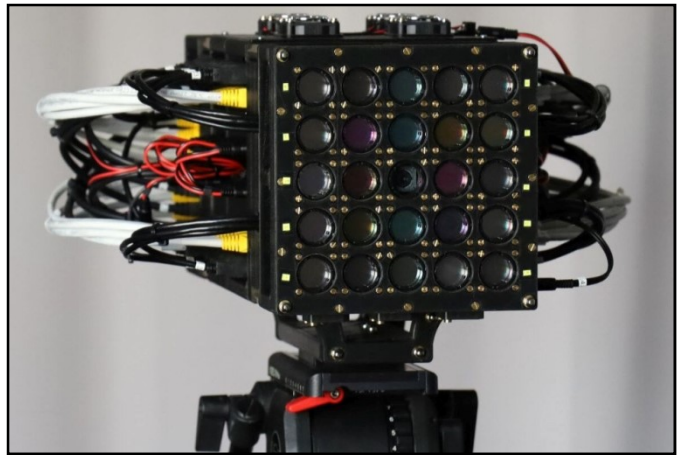


Indian Naval Ship Airavat entered Port Sudan today. (Photo; India Today)

Team develops cost-efficient and high-resolution multi-spectral camera

A team of researchers at the Chair of Multimedia Communications and Signal Processing at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) has developed an intelligent camera that achieves not only high spatial and temporal but also spectral resolution. The camera has a wide range of applications that can improve environmental protection and resource conservation measures as well as autonomous driving or modern agriculture. The findings of the research have been published as an open access publication.

"Research up to now has mainly focused on increasing spatial and temporal resolution, which means the number of megapixels or images per second," explains lecturer Dr. Jürgen Seiler. "Spectral resolution—the wavelength and thus the perception of colors—has largely been adjusted to match human sight during the development of cameras, which merely corresponds to measuring the colors red, green and blue. However, much more information is hidden in the light spectrum that can be used for a wide range of tasks. For example, we know that some animals use additional light spectra for hunting and searching for food."



The prototype of the high-resolution multi-spectral camera developed by a research team at the Chair of Multimedia Communications and Signal Processing at FAU: 5x5 cameras combine spatial, temporal and spectral resolution. Credit: FAU/Nils Genser

Three resolutions in one camera

Seiler, who is an electrical engineer, has developed a high-resolution multi-spectral camera that enhances human perception with his team at the Chair of Multimedia Communications and Signal Processing (LMS) led by Prof. Dr. Kaup at FAU. It combines all three resolutions—spatial, temporal and spectral—in a cost-efficient solution. "Up to now, there were only extremely expensive and complex methods for measuring the ultraviolet or infrared ranges of light or individual spectral bands for special industrial applications," says Seiler. "We looked for a cost-efficient model and we were able to develop a very cost-effective multi-spectral camera."

The researchers connected several inexpensive standard cameras with various spectral filters to form a multi-spectral camera array. "We then calculated an image in order to combine the various spectral information from each sensor," explains Nils Genser, research associate at LMS. "This new concept enables us to precisely determine the materials of each object captured using just one single image."

At the same time, the new camera is greatly superior to existing systems in terms of its spatial, temporal and spectral resolution. As the surroundings are recorded by several "eyes" as is the case with human sight, the system also provides a precise indication of depth. This means that the system not only precisely determines the color and certain material properties of objects it captures, but also the distance between them and the camera.

Ideal for autonomous driving and environmental technology

Autonomous driving is a potential application for these new intelligent cameras. "A whole range of solutions to various problems has now opened up thanks to our new technology," says Seiler. "In the infrared range, for example, we can differentiate between real people and signposts using the thermal signature. For night driving, we can detect animals crossing the road with sufficient warning."

The high-resolution, multi-spectral cameras could also be used for protecting the environment and conserving resources. "Several plastics differ significantly from each other in various ranges of the spectrum, which is something the new intelligent camera can reliably detect," Genser emphasizes. "Large amounts of plastics are simply burned instead of separated for recycling as they have a similar appearance. We can now separate them reliably."

More information: Nils Genser et al, Camera Array for Multi-Spectral Imaging, *IEEE Transactions on Image Processing* (2020). DOI: [10.1109/TIP.2020.3024738](https://doi.org/10.1109/TIP.2020.3024738)
<https://phys.org/news/2020-11-team-cost-efficient-high-resolution-multi-spectral-camera.html>



Tue, 03 Nov 2020

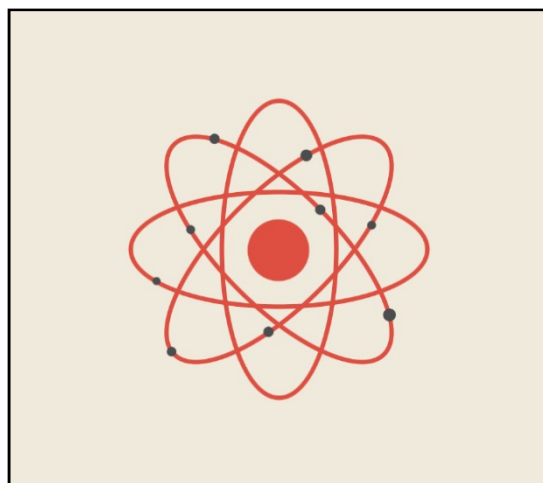
Artificial intelligence helps to identify correct atomic structures

By Jari Järvi

Functional materials are commonly employed in emerging technologies, such as green energy solutions and new electronic devices. These materials are typically blends of different organic and inorganic components and have many advantageous properties for novel applications. To achieve their full potential, we need precise knowledge on their atomic structure. State-of-the-art experimental tools, such as atomic force microscopy (AFM), can be used to investigate organic molecular adsorbates on metallic surfaces.

However, interpreting the actual structure from microscopy images is often difficult. Computational simulations can help to estimate the most probable structures, but with complex materials, accurate structure search is computationally intractable with conventional methods. Recently, the CEST group has developed new tools for automated structure prediction using machine-learning algorithms from computer science.

In this most recent work, researchers have demonstrated the accuracy and efficiency of the Bayesian Optimization Structure Search (BOSS) artificial intelligence method. BOSS identified the adsorbate configurations of a camphor molecule on a Cu(111) surface. This material has been previously studied with AFM, but inferring the structures from those images was inconclusive. Here, the researchers have shown that BOSS can successfully identify not only the most probable structure, but also eight stable adsorbate configurations that camphor can have on Cu(111).



Credit: CC0 Public Domain

They used these model structures to better interpret the AFM experiments and concluded that the images likely feature camphor chemically bound to the Cu surface via an oxygen atom. Analyzing single molecular adsorbates in this way is only the first step toward studying more

complex assemblies of several molecules on surfaces and subsequently the formation of monolayers. The acquired insight on interface structures could help to optimize the functional properties of these materials.

More information: Jari Järvi et al. Detecting stable adsorbates of (1S)-camphor on Cu(111) with Bayesian optimization, *Beilstein Journal of Nanotechnology* (2020). DOI: [10.3762/bjnano.11.140](https://doi.org/10.3762/bjnano.11.140)
<https://phys.org/news/2020-11-artificial-intelligence-atomic.html>

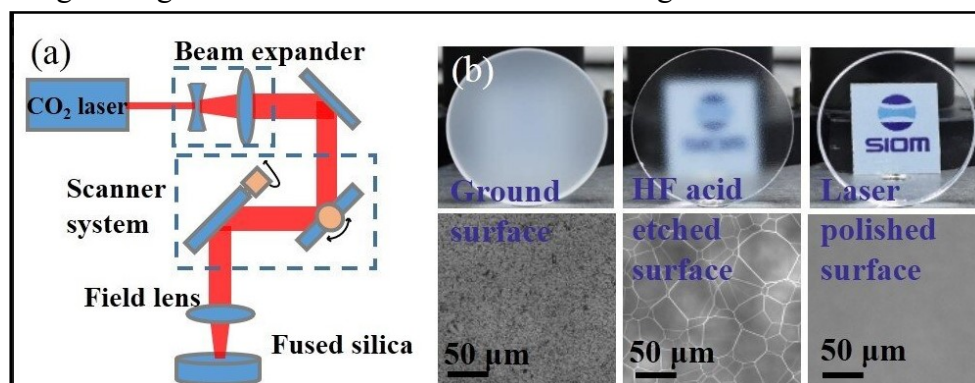


Tue, 03 Nov 2020

Researchers achieve fused silica with high damage threshold by combing chemical etching and laser polishing

By Zhang Nannan

Laser damage in fused silica, particularly ultraviolet laser damage, is still a key problem limiting the development of high-power laser systems. The traditional processing method of fused silica goes through the processes of grinding and chemical mechanical polishing (CMP). This method is time-consuming to achieve an ultra-smooth surface, and is easy to cause surface and sub-surface defects, resulting in a significant reduction in the surface damage threshold of the fused silica.



(a) Schematic of a laser polishing system. (b) Surface morphology evolution during the combined process. Credit: SIOM

Recently, a research team from the Shanghai Institute of Optics and Fine Mechanics of the Chinese Academy of Sciences combined chemical etching and CO₂ laser polishing to process the ground fused silica. Chemical etching was used to open the subsurface defects of the ground fused silica. Subsequently, CO₂ laser polishing was applied to reduce surface roughness.

This combined process not only can efficiently obtain a super-smooth surface with a low surface roughness, but also can improve the damage resistance of fused silica. This work was published in the *Optics Letters*.

Through damage morphology and a defect analysis, the combined process was shown to avoid the introduction of surface and subsurface defects, including destructive defects, chemical-structure defects, and photoactive mental impurity elements, and obtain fused silica with lower surface defect density, thereby obtaining better damage resistance.

More information: Zhen Cao et al. Ground fused silica processed by combined chemical etching and CO₂ laser polishing with super-smooth surface and high damage resistance, *Optics Letters* (2020). DOI: [10.1364/OL.409857](https://doi.org/10.1364/OL.409857)

Journal information: [Optics Letters](#)

<https://phys.org/news/2020-11-fused-silica-high-threshold-chemical.html>

Global study sees India having edge in Covid-19 vaccines

It will likely take three to four years to manufacture enough vaccines to cover the world's population, but high-income countries and a few middle-income countries with manufacturing capacity such as India, have already purchased nearly 3.8 bn doses

By Sanchita Sharma

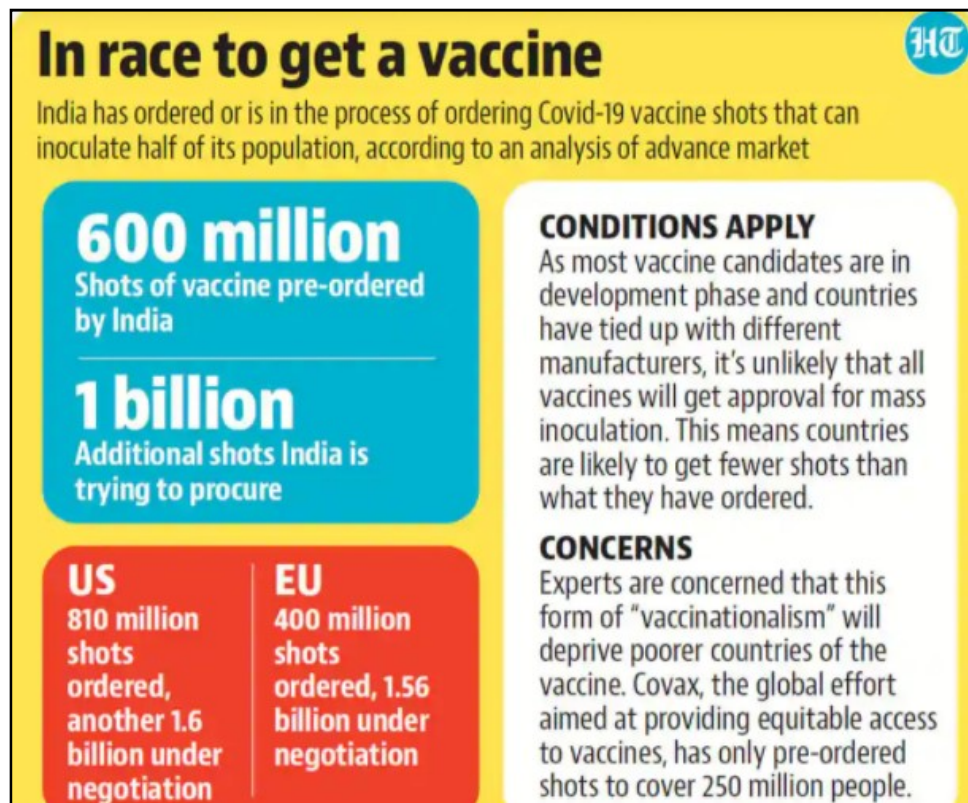
New Delhi: India has used its manufacturing capability to pre-order 600 million doses of the coronavirus disease (Covid-19) vaccine and is negotiating for another billion doses, enough to vaccinate at least half the population, according to a new global analysis of advance market commitments (AMCs) for experimental vaccines till October 8. Most experimental Covid-19 vaccines require two doses.

The figures are second only to the US, which has pre-ordered 810 million confirmed doses and has another 1.6 billion under negotiation.

It will likely take three to four years to manufacture enough vaccines to cover the world's population, but high-income countries and a few middle-income countries with manufacturing capacity such as India, have already purchased nearly 3.8 billion doses, with

options for another five billion, showed an analysis of purchasing agreements for Covid-19 vaccines by the US-based Duke Global Health Innovation Center.

“In terms of numbers of confirmed doses, the USA has pre-ordered the largest number (810 million confirmed, another 1.6 billion doses under negotiation), followed by India (600 million doses confirmed, with another 1 billion doses under negotiation), and the EU (400 million doses confirmed, another 1.565 billion doses under negotiation). But in terms of percent of population covered by confirmed purchases, Canada has pre-purchased enough vaccine to cover 527% of their population, followed by the UK at 277% of their population,” said Andrea D Taylor, assistant director of programmes at the Duke Global Health Innovation Center, who led the analysis. “Of



course, it is important to remember that most likely only some of the vaccine purchases will come through, depending on regulatory approval,” said Taylor.

“India is producing vaccines to protect the world against Covid-19, why shouldn’t it ensure its own citizens are protected as well? The government is committed to protecting the health of its citizens, so all measures have been taken to ensure we get adequate doses of the vaccines when they are available,” said a senior Union health ministry official, requesting anonymity.

Since none of the experimental vaccines yet have regulatory approval, countries are hedging bets by purchasing multiple candidates and some part of these doses may never materialise. The UK, for example, has made AMCs with five different vaccine candidates, using four different vaccine technologies.

Future agreements under discussion by the EU raise that number of vaccine doses to almost two billion, while the US, which has pre-ordered doses to cover 230% of its population, could eventually control 1.8 billion doses — about a quarter of the world’s near-term supply — according to the analysis.

This “vaccinationalism” will lead to some countries being able to vaccinate their entire populations — and some many times over — which is likely to deny low-resource regions, such as sub-Saharan Africa, access to Covid-19 protection until 2024.

Only enough doses to cover 250 million people have been confirmed as purchased thus far by Covax, a global effort involving both wealthy and poor countries that has promised equal access to Covid-19 vaccines globally. To meet its goal of vaccinating at least 20% of member countries, COVAX would need at least 1.14 billion doses of a single-dose vaccine and twice that amount for a two-dose regimen.

Covax signatories, which include the UK, the EU and Canada but not the US, are effectively undermining the pact by negotiating “side deals” for vaccines that will affect equitable access, said the study.

“An ambitious effort to create a global system of vaccine equity is being undermined as a handful of countries, including those who made a commitment to equality, secure as many doses as they possibly can,” said Elina Urli Hodges, MSPH, who leads the Launch and Scale Speedometer, an initiative that identifies impediments to delivering health innovations to low-income countries.

No low-income country has made a direct agreement to purchase, suggesting that they will be limited to the Covax pact to secure vaccines.

AMCs are being secured by countries through investment of large amounts of public funds into research and development of Covid-19 vaccines, national public and private vaccine development capacity, both public and private, and purchasing power and volume to make large-scale deals.

Other countries such as Brazil are also using their manufacturing capability to negotiate large AMCs with leading experimental vaccine candidates, while countries such as Peru are participating in phase 3 clinical trials to get leverage to negotiate AMCs, found the analysis, which used available evidence from public sources until October 8 combined with interviews with global and regional vaccine experts, as well as ministry of health officials in select countries.

“It is understandable that countries are acting in their national interest; they are incentivised to focus first on the safety of their populations. But globally, this will deepen existing inequities, and prolong the pandemic. Our research points to the need for countries and multilateral funders to unlock additional manufacturing capacity (particularly in the Global South) and invest in preparing countries for effective distribution of vaccines. High-income countries should also work with COVAX, as a global coordinator, to ensure that, once their populations are covered, excess doses are redeployed where they are needed most around the world,” said Taylor, in an email.

<https://www.hindustantimes.com/india-news/global-study-sees-india-having-edge-in-covid-19-vaccines/story-3Hh2hC3SGaadpX3LVG9hDL.html>

Coronavirus developing genetic mutations, turning more contagious: Study

The research, published in the journal mBIO, however, did not find that these mutations have made the virus deadlier

Houston: The novel coronavirus is accumulating genetic mutations, one of which may have made it more contagious, according to a study involving more than 5,000 COVID-19 patients in the US.

The research, published in the journal mBIO, however, did not find that these mutations have made the virus deadlier or changed clinical outcomes.

The researchers noted that the mutation, called D614G, is located in the spike protein that pries open our cells for viral entry.

"The virus is mutating due to a combination of neutral drift -- which just means random genetic changes that don't help or hurt the virus -- and pressure from our immune systems," said Ilya Finkelstein, associate professor at The University of Texas at Austin, US.

The researchers noted that during the initial wave of the pandemic, 71 per cent of the novel coronaviruses identified in patients in Houston had this mutation.

When the second wave of the outbreak hit Houston during the summer, this variant had leaped to 99.9 per cent prevalence, they said.

This mirrors a trend observed around the world, according to the researchers.

The reason why strains containing this mutation outcompete those that didn't have it may be that natural selection would favour strains of the virus that transmit more easily, the researchers said.

However, some scientists have suggested another explanation, called "founder's effects."

In that scenario, the D614G mutation might have been more common in the first viruses to arrive in Europe and North America, essentially giving them a head start on other strains, according to the researchers.

The spike protein is also continuing to accumulate additional mutations of unknown significance, they said.

The team also showed in lab experiments that at least one such mutation allows spike to evade a neutralising antibody that humans naturally produce to fight SARS-CoV-2 infections.

The researchers said this may allow that variant of the virus to more easily slip past our immune systems.

Although it is not clear yet whether that translates into it also being more easily transmitted between individuals, they said.

The scientists noted a total of 285 mutations across thousands of infections, although most don't appear to have a significant effect on how severe the disease is.

<https://www.deccanchronicle.com/science/science/021120/coronavirus-developing-genetic-mutations-turning-more-contagious-stu.html>



A student washes her hands at Chamata Girls School after schools re-opened following a gap of more than seven months due to coronavirus pandemic, at Chamata in Nalbari district, Monday, Nov. 2, 2020. (PTI Photo)

