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Thu, 24 June 2021

India's Tejas Jets back in limelight as Malaysia 'Urgently' looks to acquire new warplanes after Chinese incursions

By Jayanta Kalita

After the recent incursions by Chinese jets, Malaysia has accelerated efforts to acquire a new light combat aircraft and released a tender. India's HAL Tejas is in the race for the contract, along with several other foreign platforms.

Kuala Lumpur's renewed interest in procuring the LCA comes in the wake of a major Chinese aerial incursion into the Malaysian maritime territory in the South China Sea.

Malaysia's Defence Ministry has issued tenders for 18 Fighters Lead-In Trainer-Light Combat Aircraft (FLIT-LCA) to replace its older fleet of aircraft, reported Defence News. At present, the Southeast Asian country operates 18 BAE Hawk-108 and 208 light combat aircraft and seven Aermacchi MB-339CM trainers.



The HAL Tejas

According to the Capability 55 plan of the Royal Malaysian Air Force (RMAF), "the service is to have three squadrons of FLIT-LCAs". For the RMAF, a squadron typically comprises 18 aircraft. The deadline for the tender issued is September 22.

In December 2018, Malaysia had issued a request for information for its FLIT-LCA program, receiving responses from eight foreign platforms — Boeing T-7 Red Hawk, KAI FA-50 of South Korea, Leonardo M-346 Master of Italy, HAL Tejas of India, the China-Pakistan PAC JF-17 Thunder, Hongdu L-15 of China, Yakolev Yak-130 of Russia and Vodochody L-39 NG of the Czech Aero.

Last year, Malaysian Air Force Chief, Gen. Tan Sri Datuk Seri Ackbal Abdul Samad, said that the country would not upgrade RMAF's aging Fleet of Hawks, which entered the service in the mid-1990s. However, Malaysian attempts at modernizing its military arsenal have hit financial hurdles.

According to the report, the RMAF has been unable to replace its MiG-29 Fulcrum interceptors and has expressed its interest in acquiring some Hornets from Kuwait.

India's LCA Tejas

In April, The EurAsian Times reported that the LCA Tejas, manufactured by India's state-owned Hindustan Aeronautics Limited (HAL), has been shortlisted as a contender for the contract of 36 new Light Combat Aircraft along with KAI FA-50 and JF-17.

This is being viewed by experts as the first potential sale of made-in India aircraft, the report mentioned.

A Malaysian team is expected to visit Bengaluru for a tour of the LCA production facilities. The team may be given access to the test infrastructure and a demonstration of the fighter's combat capabilities, according to reports.

The LCA Tejas is equipped with advanced avionics and weapon systems. The MK 1A version of the Tejas is outfitted with modern AESA radar and new avionics. It can be customized to integrate various weaponry.

The Indian Air Force has also signed a contract for the acquisition of 83 Tejas Mark 1-A fighters, in addition to an earlier order of 40 LCAs in two batches.

Earlier, at the 2019 Langkawi International Maritime and Aerospace Exhibition (LIMA-2019), the Tejas had generated a great deal of interest, The EurAsian Times had also reported.

Tejas Spreading Its Wings

Last year, Indian news magazine The Week reported that India had offered the Lead-in Fighter Trainer (LIFT) variant of the HAL Tejas in response to the US Navy's Request for Information (RFI) for a jet trainer. The US reportedly is looking for a replacement for its Boeing T-45 Goshawk.

It was reported that the LIFT variant of the LCA Tejas is expected to be based on the MK-1A variant already ordered by the Indian Air Force.

"We have done all the work in-house," HAL chairperson R. Madhavan was quoted in the report. "The same platform can be used to mimic any other platform. All that needs to be done is put in the flying characteristics and things will change to the selected aircraft. For example, if they have Rafale characteristics, to the pilot it will seem like he is flying Rafale, which will help in the advanced training process."

In 2016, the Indian Navy conducted carrier trials of the naval variant of the Tejas but rejected the aircraft as being too heavy. The Navy reportedly wanted an aircraft that may be used as a twin-engine deck-based fighter (TEDBF) in the future. The service is keen to procure around 57 jets at a cost of \$9.6 billion, though the number of jets was later reduced to 36.

This year, HAL was given a contract to manufacture 83 LCA Tejas fighters for the Indian Air Force. HAL Chairperson said, "As per the contract, we are to start delivery of LCA by 36 months from today. The first delivery will be by March 2024; there will be a delivery of two aircraft which will be ramped up to 16. Total supply time, post first delivery is 6 years."

The Print reported that India is looking at the export potential of the LCA Tejas, at an estimated cost of Rs 309 crore per aircraft given countries from Southeast Asia and the Middle East have shown interest in procuring the India-made aircraft.

HAL is also reportedly looking to set up logistics bases in Sri Lanka, Indonesia, Vietnam, and Malaysia to boost the chances of the countries buying India's indigenous aircraft.

Malaysia's Conflict with China

Malaysia's renewed interest in procuring a fighter jet follows the Chinese aerial incursion into the areas near the disputed shoals in the South China Sea, which are administered by Malaysia.

According to the Malaysian Air Force, a formation of 16 Chinese PLAAF aircraft including Y-20 and Ilyushin I1-76 airlifters were sighted within 60 nautical miles (69 miles) off Malaysia's coast on May 31.

The Chinese aircraft reportedly approached in a "tactical formation" and was first detected by air defense radar in the eastern Malaysian state of Sarawak.

It released a map showing the PLAAF jets flying past the Luconia Shoals and then turning back to the areas near James Shoal, both of these maritime features are inside the exclusive economic zone of Malaysia.

However, on its part, China also claims ownership of the Shoals, as they are located "within China's so-called nine-dash line".

The RMAF described the presence of PLAAF aircraft near disputed shoals as “a serious matter that threatens national security and aviation safety”, with the Malaysian Foreign Minister stating that the country will issue a diplomatic protest against the overflight.

In its statement to Singapore’s Channel News Asia, the Chinese embassy in Malaysia said the aircraft were conducting overflights in accordance with international law, stressing that they did not enter Malaysia’s territorial airspace.

<https://eurasianimes.com/indias-tejas-jets-back-in-limelight-as-malaysia-urgently-looks-to-acquire-new-warplanes-after-chinese-incursions/>



Thu, 24 June 2021

DRDO’s SWiFT UAV starts ground trials

SWiFT, 1-ton All Up Weight (AUW) Technological Demonstrator for India’s upcoming Unmanned Stealth Bomber has begun its ground level trials on the first assembled Prototype, that will be involved in series of low, medium, and high-speed taxi testing to ascertain aircraft’s performance and instrumentation from a ground control station to verify the functionality while the vehicle reached accelerated speeds.



If ground test data collected are in the required parameters based on the final test verifications then preparation for the flight testing might be carried out in the next few weeks as per information

provided to idrw.org. SWiFT will be powered by a Russian NPO Saturn 36MT turbofan engine, that will be later replaced by GTRE’s Small Turbo Fan Engine (STFE).

India’s Defence Research and Development Organisation (DRDO) had delivered retractable landing gear (RLG) systems for the SWiFT program developed by Combat Vehicles Research and Development Establishment (CVRDE) earlier this year. SWiFT will be used to collect data on the controllability of flying wing configuration and autonomous take-off and landing technology, retractable landing gear system, flying-wing design, and low radar signature data of the aircraft that will be used for further improvements.

India’s Ghatak stealth flying wing combat drone powered by a Dry Kaveri engine generating 46kN of thrust will be ready for flight trials by 2024-25, once most of the technologies are validated on the Scale down SWiFT variant. SWiFT might also go into production as part of the unmanned wingman bomber program separately as per the latest speculations.

<https://www.eletimes.com/drdo-swift-uav-starts-ground-trials>

Indian Air Force and Navy conduct passage exercise with the U.S. Navy in the Indian Ocean

By Ravi Sharma

Frontline nuclear-powered warships, maritime surveillance aircraft and all-weather land- and carrier-based multirole fighter aircraft have all been in action as the two-day “passage exercise” involving the United States’ Navy, the Indian Air Force (IAF) and the Indian Navy got underway on June 23 on India’s western seaboard south of Thiruvananthapuram.

Indian Naval warships and IAF fighter jets are engaging in separate drills with frontline assets of the U.S. Navy, including the nuclear-powered supercarrier USS Ronald W. Reagan. The Nimitz class aircraft carrier, the flagship of the U.S. Navy’s Carrier Strike Group 5 (CSG 5) which is assigned to the U.S. Pacific Fleet and is permanently forward deployed to the U.S’ 7th Fleet, is currently passing through the Indian Ocean Region (IOR). For India, the joint drills are a strategic outreach exercise with the defence forces of friendly foreign countries operating in the IOR.



Participating in the joint multi-domain operation with the Indian Naval Ship (INS) Kochi, a Kolkata-class stealth guided-missile destroyer built at the Mazagon Dock, INS Tej, the Russian-built Talwar-class frigate, P-8I maritime patrol aircraft, and MiG-27K carrier-based multirole fighter aircraft are the USS Ronald Reagan, USS Halsey, an Arleigh Burke class guided missile destroyer, and USS Shiloh, a Ticonderoga class guided-missile cruiser.

A spokesperson for the Indian Navy said the two-day exercise aims to strengthen bilateral relationship and cooperation between the two countries “by demonstrating the ability to integrate and coordinate comprehensively in maritime operations”. The high tempo operations during the joint exercises include advanced air defence exercises, cross deck helicopter operations and anti-submarine exercises. The participating forces will endeavour to hone their war-fighting skills and enhance their interoperability as an integrated force to promote peace, security, and stability in the maritime domain. Added the spokesperson: “Indian Navy and U.S. Navy regularly undertake a host of bilateral and multilateral exercises which underscore the shared values as partner navies, in ensuring commitment to an open, inclusive and a rule-based international order.”

Officials taking part in the exercise disclosed that the IAF’s operational engagements with the USS Ronald Reagan-led U.S. Navy involves the IAF’s assets from bases under four operational commands and includes Jaguar and Su-30 MKI combat fighter aircraft, the Defence Research and Development Organisation’s (DRDO’s) Centre for Airborne System’s indigenously designed and developed NETRA Airborne Early Warning and Control System and Il-78 mid-air refuellers. Taking part in the drills are the U.S. Navy’s air assets which include F-18 jets and E-2C Hawkeye AEW&C aircraft.

Said IAF spokesperson Wing Commander Ashish Moghe: “The IAF has extensive experience in maritime operations in the IOR. This has been consolidated over the years by conduct of exercises from the country’s island territories, including participation in international exercises. The multi-spectral capability of the IAF in the IOR also includes Humanitarian Assistance and Disaster Relief missions and logistics support undertaken in support of friendly nations in the region. This engagement with the US CSG offers one more opportunity to undertake joint operations in the maritime domain with a friendly foreign power.”

<https://frontline.thehindu.com/dispatches/indian-air-force-and-navy-conduct-passage-exercise-with-the-us-navy-in-the-indian-ocean/article34931551.ece>

COVID 19: DRDO's Contribution



Press Information Bureau
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Ministry of Defence

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Defence Secretary calls for active collaborations to fight Covid-19 at 9th Moscow Conference on International Security

Highlights India as a large eco-system for the pandemic support industry

“Active collaborations, research partnerships and leveraging each other’s strengths are the ways ahead to fight pandemics like COVID-19,” said Defence Secretary Dr Ajay Kumar in his address at the plenary session of the 9th Moscow Conference on International Security on the topic ‘Role of Military Agencies in fighting against COVID-19’, in Moscow, Russia on June 23, 2021. Defence Ministers of Kazakhstan, Mongolia, Zimbabwe, Sudan and UN Under Secretary General for Peacekeeping among others participated in the session.

Noting that global challenges like COVID-19 make no distinction among nations, the Defence Secretary stressed on bolstering infrastructure and capabilities for global response to prevent eruption of such diseases in future. He urged the international community to focus on proactive vaccinations and keep ahead of the curve to deal with COVID-19 pandemic. “Emerging technologies must be leveraged. For example, Artificial Intelligence can be put to use for infection prediction, data analysis and COVID diagnostics with greater accuracy,” he suggested.

On the India-Russia defence relations, Dr Ajay Kumar termed the ties as an integral pillar of the Special & Privileged Strategic Partnership between the two countries. He welcomed Russia’s willingness to actively engage in India’s ‘Make in India’ program for co-development and production of high technology defence items. He looked forward to the visit of Russian Defence Minister General Sergei Shoigu to India later this year for the next meeting of the India-Russia Inter-Governmental Commission on Military & Military-Technical Cooperation.

Highlighting India’s assistance to other countries in fighting the pandemic, the Defence Secretary said “India not only fought its own battle, India also helped and continues to help friendly foreign nations to withstand COVID-19.” Even at a time of great medical and economic stress, India supported others unhesitatingly, inspired by its ancient belief of *Vasudhaiva Kutumbakam* – ‘the world is one family’, he added.

Right when the first wave of the pandemic had struck, Prime Minister Shri Narendra Modi called upon the leaders of the South Asian Association for Regional Cooperation (SAARC) to combat COVID-19 together in the region.

The Defence Secretary highlighted India’s support to friendly nations by deploying Rapid Response Medical Teams to provide medical assistance to those in need. Medical supplies of



various kinds were sent to 150 countries. Through the spring and summer of 2020, India was the main supplier of basic medicine of that time - paracetamol and hydroxychloroquine, to over 120 countries, he said. On the 'Vande Bharat' Mission, he said it was the largest logistical exercise of its kind ever undertaken that enabled movement by air and sea of seven million people, including evacuating over 120,000 foreigners from 120 nations stranded in India, when most of the world's airlines were closed.

Dr Ajay Kumar said today India is one of the largest eco-systems for the pandemic support industry, including the second largest producer of PPE kits. He said the pandemic triggered innovations across the domain of medical demands and the industry developed a variety of COVID related medicines, vaccines, ventilators, equipment, diagnostic kits and other supplies which have been supplied to nearly 150 countries.

The Defence Secretary reiterated the Government's resolve to make vaccines and drugs effective and affordable for all, terming vaccination as the mainstay of the country's response to the pandemic. He also stated that as on date, India's contribution of 66 million doses of vaccine to other countries is the largest from any country. Dr Ajay Kumar described Russia as a front ranking fighter against COVID-19 and hoped that the Russian vaccine, Sputnik V will play a significant role in mitigating the pandemic in India. "Mass production of the vaccine in India is expected to commence soon. A total of about 900 million doses of Sputnik V are expected to be produced in India, accounting for 70% of its global production," he said.

Elaborating on the efforts made by Ministry of Defence & the Armed Forces in augmenting medical facilities and providing aid to civil authorities in India & abroad in fight against COVID-19, the Defence Secretary lauded the contribution of Defence Research and Development Organisation (DRDO) and the three Services as well as Directorate General Armed Forces Medical Services (DG AFMS). He said DRDO figured out the most promising use of 2-deoxy-D-glucose (2-DG) which is effective against COVID-19. He added that DRDO established COVID Care facilities in a matter of days and embarked to set up 500 medical oxygen plants using the Medical Oxygen Plant technology developed for on-board oxygen generation on Light Combat Aircraft (LCA) Tejas.

Commending the Armed Forces for providing assistance to the civil authorities, Dr Ajay Kumar stated that within days of the first wave, Army set up a number of isolation facilities and ran special military trains to transport medical supplies. On the efforts during the second wave, he said Indian Navy sent huge number of medical supplies and teams to Indian Ocean Region, while 11 Naval ships ferried in over 1,500 metric tonnes of emergency Liquid Medical Oxygen. Indian Air Force carried out approximately 1,800 sorties and lifted 15,000 metric tonnes of essential medical supplies from within the country and abroad, he added. The Defence Secretary complimented AFMS for deploying additional doctors, including retired doctors and paramedics, and manning the hospitals 24x7 for Service personnel as well as civilians.

The Ministry of Defence of the Russian Federation is holding the 9th Moscow Conference on International Security between June 22-24, 2021. The conference, held annually since 2012, is an important security dialogue.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1729856>

L-G Mathur lauds DRDO's contribution to various sectors of Ladakh

Leh: Ladakh Lt Governor (L-G) R K Mathur on Wednesday appreciated the Defence Research and Development Organisation (DRDO) for its contribution to various sectors in the union territory, and requested for continued support for development of the region.

Mathur interacted with G Satheesh Reddy, Secretary, Department of Defence R&D, and Chairman, DRDO, and O P Chaurasia, Director, Defence Institute of High Altitude Research (DIHAR), Leh-Ladakh, at the Raj Niwas here, an official spokesperson said.

Conveying his gratitude for the aid provided to the UT during the pandemic, the L-G said Ladakh was able to timely receive essential items like masks, sanitisers, ventilators and Viral Transport Mediums (VTMs).

With the setting up of an RT-PCR laboratory at DIHAR, DRDO Leh, in July last year, Ladakh has been able to enhance the rate of testing to identify COVID-19 cases in the union territory, the official said.

Mathur appreciated the DRDO for the anti-COVID oral drug, 2-deoxy-D-glucose (2-DG), developed at its Institute of Nuclear Medicine and Allied Sciences, and said this invention was yet another example of the scientific prowess of the agency.

The Lt Governor spoke of the various advanced methodologies introduced by DIHAR in the agricultural sector which has proved to enhance overall output, the official said.

“DIHAR has played a vital role in the implementation of the Mission Organic Development Initiative (MODI) scheme in Ladakh which is to become the major contributor in taking Ladakh forward towards carbon neutrality,” Mathur said.

He said the polycarbonate greenhouse developed by them is an apt solution to redress the shortage of fresh vegetables during winters in Ladakh.

DIHAR has brought about notable advancements in other sectors in Ladakh like the introduction of the hydroponic system of agriculture, addressing the issue of the codling moth in apricot trees and improvement in dairy processing sectors.

Setting up of a fruit processing plant at Khaltsey for Ladakhi apples will also be carried out under the aegis of the DRDO by DIHAR, the spokesperson said, adding that the plant is expected to be functional by the month of September.

*Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds.
Source: PTI*

<https://www.outlookindia.com/newscroll/lg-mathur-lauds-drdo-contribution-to-various-sectors-of-ladakh/2107614>

उपराज्यपाल आर रके माथुर ने कहा- लद्दाख के विकास में अहम योगदान दे रहा डीआरडीओ

लेह में ऑर्गेनिक विकास मिशन को बढ़ावा देने के साथ भी कृषि सेक्टर को फायदा देने की डीआरडीओ की भूमि भी सराहनीय है। इसी बीच बैठक में उपराज्यपाल को बताया गया कि जल्द डीआरडीओ लेह के खलत से इलाके में फ्रूट प्रोसेसिंग प्लांट भी स्थापित करने जा रहा है।

By Rahul Sharma

जम्मू: केंद्र शासित प्रदेश लद्दाख के उपराज्यपाल आरके माथुर ने डिफेंस रिसर्च एंड डेवलपमेंट आर्गेनाइजेशन (डीआरडीओ) की ओर से लद्दाख के विकास में सहयोग देने की सराहना की है। उपराज्यपाल बुधवार को लेह में उनसे मिलने के लिए पहुंचे रक्षा मंत्रालय के सचिव व डीआरडीओ के चेयरमैन जी सथीश रेड्डी व डिफेंस इंस्टीट्यूट आफ हाई अल्टीच्यूड रिसर्च (दिहार) के निदेशक ओपी चोरसिया से बातचीत कर रहे थे।



लेह के राजनिवास में हुई इस बैठक में उपराज्यपाल ने कहा कि डीआरडीओ की ओर से कोरोना की रोकथाम के लिए समय पर मदद दी गई। बेहतर इलाज के लिए मास्क, सैनिटाइजर, वेंटिलेटर वायरल ट्रांसपोर्ट मीडियम उपलब्ध करवाकर सराहनीय कार्य किया गया।

उपराज्यपाल ने कहा कि डीआरडीओ के संस्थान दिहार में आरटी पीसीआर लेब बनाने से कोविड-19 की रोकथाम में मदद मिली। उन्होंने कोविड की रोकथाम के लिए डीआरडीओ द्वारा 2 डिआक्सी डी गुलुकाेस, (2D ग्लूकोस) विकसित करने पर भी बधाई दी। उपराज्यपाल ने कहा यह हमारे देश के रक्षा संस्थान की मजबूती का संकेत है कि काेरोना की रोकथाम के लिए इतनी प्रभावी दवाई बनाई गई है।

वहीं कृषि को बढ़ावा देने के लिए लद्दाख में दिहार के प्रयासों की सराहना करते हुए उपराज्यपाल ने कहा कि पालीकार्बोनेट ग्रीन हाउस बनाने से सर्दियों में ताजी सब्जियों की कमी दूर हो गई है। लेह में ऑर्गेनिक विकास मिशन को बढ़ावा देने के साथ भी कृषि सेक्टर को फायदा देने की डीआरडीओ की भूमि भी सराहनीय है। इसी बीच बैठक में उपराज्यपाल को बताया गया कि जल्द डीआरडीओ लेह के खलत से इलाके में फ्रूट प्रोसेसिंग प्लांट भी स्थापित करने जा रहा है। यह प्लांट सितंबर महीने से काम भी करने लगेगा।

<https://www.jagran.com/jammu-and-kashmir/jammu-ladakh-lg-rk-mathur-said-drdo-is-contributing-significantly-in-the-development-of-ladakh-21767435.html>

बरेली में 300 बेड कोविड अस्पताल पहुंची आक्सीजन जेनरेशन मशीन

संक्रमण की दूसरी लहर में संक्रमितों के लिए आक्सीजन की किल्लत सामने आई तो शासन ने कई जिलों में आक्सीजन प्लांट लगाने का फैसला लिया। मंडल में कुल 21 में से जिले में छह जगह आक्सीजन प्लांट लगने स्वीकृत हुए।

बरेली: संक्रमण की दूसरी लहर में संक्रमितों के लिए आक्सीजन की किल्लत सामने आई तो शासन ने कई जिलों में आक्सीजन प्लांट लगाने का फैसला लिया। मंडल में कुल 21 में से जिले में छह जगह आक्सीजन प्लांट लगने स्वीकृत हुए।

इसी कड़ी में मंडलीय 300 बेड कोविड अस्पताल में भी प्लांट लगाने की कवायद शुरू हुई। बुधवार को गुजरात के सूरत जिले से 960 लीटर प्रति मिनट की क्षमता वाली आक्सीजन जेनरेशन मशीन 300 बेड कोविड अस्पताल पहुंच गई। यह मशीन रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने भिजवाई है। यहां करीब 1,000 लीटर प्रति मिनट आक्सीजन सप्लाई की क्षमता का प्लांट भी है।



इतनी क्षमता के प्लांट से 300 बेड कोविड अस्पताल में एक साथ 165 बेड पर आक्सीजन सप्लाई शुरू हो सकेगी। गुरुवार को आक्सीजन प्लांट पूरी तरह स्थापित हो जाएगा। इसके लगने से स्वास्थ्य सेवाएं बेहतर होंगी और यह तीसरी लहर में कोरोना से बचाव में कारगर साबित होगी।

जेनरेटर से भी दिया जाएगा कनेक्शन

300 बेड कोविड अस्पताल में आक्सीजन प्लांट चलाने के लिए अलग से ट्रांसफार्मर कनेक्शन दिया गया है। वहीं बिल्डिंग की दूसरी ओर जनरेटर सेट लगे हैं। बिजली जाने पर आक्सीजन निर्माण व आपूर्ति बाधित न हो, इसलिए इनसे भी बिजली आपूर्ति दी जा रही है। वहीं शासन ने संक्रमण के दौरान प्रयोग होने वाले उपकरणों को संक्रमण रहित करने के लिए तीन स्टेलाइजेशन मशीन भी अस्पताल भेजी हैं। डीआरडीओ से आक्सीजन जनरेशन मशीन 300 बेड कोविड अस्पताल पहुंच गई हैं। इन्हें स्थापित कराकर प्लांट आपूर्ति सुनिश्चित की जाएगी। डा. एसके गर्ग, मुख्य चिकित्सा अधिकारी, बरेली

<https://www.jagran.com/uttar-pradesh/bareilly-city-oxygen-generation-machine-reach-at-300-bed-covid-hospital-in-bareilly-21767015.html>

‘Patient care, infra build-up will give cushion against subsequent waves’

Surgeon Vice Admiral Rajat Datta adds that while there has been a ramping up of medical infrastructure, it is important that citizens do not to let their guard down

By Man Aman Singh Chhina

The Director General of Armed Forces Medical Services (DGAFMS), Surgeon Vice Admiral Rajat Datta tells Man Aman Singh Chhina that the armed forces medical services are well geared up for any probable third wave of Covid infections. He adds that while there has been a ramping up of medical infrastructure, it is important that citizens do not to let their guard down.

What were the preparations of the AFMS leading upto the second wave of Covid?

The first wave provided us with valuable insights into infrastructural and manpower requirements needed for handling a surge in Covid cases. This experience proved valuable for the AFMS to mount an accelerated response to tackle the second wave of the pandemic.

In the lull period between the two waves, the AFMS had already augmented its infrastructural capabilities and had earmarked manpower ready for deployment at short notice in aid to civil authorities should the need arise. Hence, although the second wave caught the entire nation by surprise, the Armed Forces were in a considerable position of advantage due to investments made in enhancing patient care and treatment facilities in AFMS hospitals.



Surgeon Vice Admiral Rajat Datta

A well-planned manpower and logistics chain ensured a fast and effective response when AFMS was called upon to manage the DRDO hospitals at Ahmedabad, Delhi, Varanasi, Lucknow and Patna. These hospitals were manned by our medical and paramedical staff within a short period of time and rendered yeoman service to the civil population at the peak of pandemic.

Given the importance of preserving the health of the troops across the country in the midst of the pandemic, what were the challenges that arose to keep the rank and file healthy given the scale of the infections outside military stations?

At the first hint of the probability of a second wave, guidelines and advisories related to hospital admissions, discharge, home isolation, testing and quarantine of serving personnel were revised during January and February, 2021. These were further refined in March to included stricter quarantine norms and restriction of avoidable movement.

These enhanced measures along with a vaccination programme which progressed with alacrity have yielded rich benefits for the armed forces.

Hospital admissions of serving personnel were minimal, making beds available for the veterans, dependents and civilians who were more vulnerable to develop severe illness. While ramped up testing facilities using both molecular and rapid tests detected asymptomatic and mildly symptomatic armed forces personnel, Covid Care Centres outside the premises of hospitals served as admission and monitoring centres for these cases. This provided the twin benefit of asymptomatic cases not transmitting the infection to other personnel and keeping hospital beds available for cases of severe illness.

How has vaccination progressed in the armed forces? Has there been a shortage of vaccines as experienced by many state governments?

Based on the projection made by the armed forces to the Ministry of Health and Family Welfare in the month of December, 2020, more than adequate stocks of vaccine were made available by the Health Ministry to the AFMS for vaccinating Healthcare and Frontline Workers. The vaccination programme evolved in phases in line with the government policy.

Despite the constraints posed by operational deployment of armed forces personnel, the vaccination programme has progressed at a brisk pace wherein more than 90 per cent of Healthcare and Frontline Workers have been vaccinated with two doses of the vaccine.

The AFMS is also vaccinating dependent family members, veterans, their families and defence civilians and their families above the age of 45 years. There has been no shortage of vaccines and we are thankful to the MoHFW for this feat. I would also like to assure that there has been no wastage of any doses in the armed forces since the entire project was coordinated in a disciplined manner.

Many field hospitals have been set up by AFMS across the country to help states fight Covid. How long can military medical authorities sustain them?

The Covid hospitals set up by the DRDO at Delhi Cantt, Ahmedabad, Patna, Varanasi and Lucknow are manned by the AFMS doctors and paramedical staff. Over 4,000 patients have been treated at these hospitals and the AFMS has deployed more than 500 medical and 800 paramedical staff at these hospitals.

With the waning of the second wave, a de-escalation programme has been planned. However, we will be ready to deploy at short notice in future if the need arises. The question of sustainability of these does not arise since this is a national emergency and we are duty bound to aid the civil authority to the best of our capability. The AFMS will leave no stone unturned in this regard.

There has been literally no word on the fatalities due to Covid in the military.

While the exact data could be sensitive and have security implications, but can you give a general idea on the numbers?

That there has been literally no word on the fatalities due to Covid in the armed forces speaks of the insignificant numbers in this context. The case fatality rate is much lower than the national average and most deaths have been in persons with significant co-morbidities.

During the second wave, when hospitals across the country were reeling under oxygen shortage, there was an unseemly controversy over the transfer of the Commandant of Base Hospital Delhi Cantonment. Could that have been avoided given that the move has led to circulation of all sorts of rumours about the real reasons behind him being posted out?

The transfer of Maj Gen Vasu Vardhan, VSM, from Commandant Base Hospital, Delhi Cantt to Army Hospital (R&R), New Delhi was a routine turnover posting in the rank of Maj Gen (& equivalent) in executive cadre as approved by government on 08 May 2021 in organisational interest.

<https://indianexpress.com/article/cities/chandigarh/patient-care-infra-build-up-will-give-cushion-against-subsequent-waves-7373195/>

1000 LPM Oxygen Generator might be put in at TRIHMS quickly by DRDO: Pema Khandu

By *Martin Eggen*

Arunachal Pradesh Chief Minister Pema Khandu mentioned that 1000 LPM Oxygen Generator might be put in at Tomo Riba Institute of Well being and Medical Sciences (TRIHMS) quickly by DRDO.

Khandu inaugurated two oxygen vegetation – one with 600 LPM capability at TRIHMS and one other with 500 LPM capability on the Devoted Covid Hospital (DCH) Chimpu.

Talking at TRIHMS, Khandu on behalf of the folks of the state expressed gratitude to UNDP for donating the vegetation. The third plant of 300 LPM capability, additionally donated by UNDP, he mentioned, is beneath set up on the Bakin Pertin Normal Hospital Pasighat and might be useful quickly.

Khandu knowledgeable that one other 1000 LPM Oxygen Generator might be put in at TRIHMS quickly by DRDO.

“To fulfill any measure of demand, Oxygen assist has been supplied to all district hospitals, devoted covid hospitals and devoted covid well being centres. That is additionally being prolonged to CHCs and choose PHCs and as standby to some Covid Care Centres (CCCs) to realize our goal of constructing out there 1000 oxygen-beds by July finish. From 164 oxygen-beds as on Could 2, we right this moment have 815 beds,” he mentioned.

As on date, 9 PSA oxygen technology vegetation are operational – one every of 100 LPM capability at Aalo, Seppa, Tezu, Tawang, Yingkiong and Ziro. Additional 5 UNICEF supported PSA vegetation are in superior levels of being commissioned and are anticipated to be operational earlier than 15 July 2021

Khandu mentioned that the state authorities’s focus to develop well being infrastructure to take care of the pandemic resulted in institution of 63 Covid Care Centres; 35 Devoted Covid Well being Centres; 2 Devoted Covid Hospitals at Chimpu and Pasighat with 33 ICU beds to medically handle and supply remedy for all classes of sufferers.

“From no Labs able to testing for SARS-CoV-2, we now have 2 Rt-PCR Labs, one every at BPGH, Pasighat and TRIHMS and True-Nat Labs in all Districts. And for delicate residence isolation instances we’re offering medical kits and frequently being monitored by 73 Fast Response Groups constituted for the aim,” he knowledgeable.

Lauding the healthcare employees, Khandu credited them for the state’s each day COVID check common stands at 3,286 per million of inhabitants, as towards the WHO beneficial each day check per million inhabitants of 140. He mentioned, a mean of 5,700 each day assessments are being performed at present.

“Within the final two weeks from tenth June 2021 onwards, we have now witnessed a 13 % lower in total weekly new COVID-19 instances and within the previous one week, round 300 COVID-19 instances have recovered each day from the illness, at a mean, bringing our restoration charge to 91.6%,” he knowledgeable.

Within the wake of a third-wave risk, he knowledgeable that the state authorities has constituted a “Core Group of Consultants on COVID-19 Surveillance & Containment” for evaluation, preparedness and administration measures associated to potential subsequent surges of COVID-19. He mentioned paediatricians might be extensively consulted and included within the course of as it’s speculated that the third-wave might infect folks beneath 18 years. He additional knowledgeable that 60 CHCs in every meeting constituency, recognized in session with native

MLAs, might be outfitted with Indian Public Well being Requirements fundamental medical tools of various varieties.

Interacting with healthcare employees and medical doctors at DCH Chimpu, the Chief Minister revealed that he plans to transform the complete MLA Residences advanced right into a everlasting specialist hospital for welfare of the folks. He mentioned he'll pursue the proposal with the Speaker, Deputy Speaker and all his legislator colleagues.

“Regardless of many distinctive constraints and improvement challenges associated to terrain, local weather, distant and troublesome to entry habitations, frequent disruptions in air, highway, energy, tele-communications hyperlinks; unknown to remainder of the nation, save few different areas, if in any respect; our state has fared properly to this point. Our compliments to the Well being Division, PRI and municipal members, Well being-care employees in any respect ranges, police, district administrations, youth associations, community-based organizations, NGOs, social and non secular leaders, and above all, folks of Arunachal Pradesh,” Khandu added.

<https://www.kaiserin-magazine.com/business/1000-lpm-oxygen-generator-will-be-installed-at-trihms-soon-by-drdo-pema-khandu/>



Thu, 24 June 2021

Explained: From fighting as one to one fighting force, how theatre command system can help Indian military embrace future, match up to China

Why the Centre wants to implement the theatre command structure and what it will mean for the fighting readiness of the Indian armed forces?

We have all grown up knowing that there are three basic components that make up a country's armed forces: the army, navy and air force, each with its unique fighting profile and headed by a separate boss. When discussing military might, we ask how strong a country is in each of these departments. But while they may be separate in their sphere of operations and how they are composed, the demands of modern warfare have seen many countries, including the US and China, effect tight integration of these three branches in line with a system of 'theatre command'. India, too, has taken steps to reorganise its army, navy and air force under seamless command centres to meet the challenges of the future.



Representational photo

What is Theatre Command?

It is not a new idea. The appointment of Gen. Bipin Rawat as the Chief of Defence Staff in January 2020 and, before that, the setting up of the Integrated Defence Staff in 2001 can all be seen as steps in the direction of achieving greater synergy and fusion between the three branches of the armed forces. The CDS appointment was also accompanied by the creation of the Department of Military Affairs (DMA) within the Ministry of Defence with the view to promote 'jointness' among the three branches of the armed forces. The idea behind these moves is to create capacities for the armed forces to adapt to the requirements of hybrid warfare and ensure increased coordination to boost the overall fighting capabilities of the Indian armed forces.

At present, the Indian Army, Navy and Air Force each has multiple commands that are vertically split in terms of their command structure. The Army and Air Force have seven commands each while the Navy has three commands.

But these commands do not coincide geographically and are scattered across the country. While the details of how exactly the theatre command system will shape up are not immediately clear, reports say that the proposal currently is for four theatre commands: air defence, maritime, integrated eastern and integrated western theatre commands.

How Will Theatre Command System Help?

The theatre command system is intended to bring better synergy between the three branches of the armed forces. Instead of separate commands for the army, navy, air force, a unified command will be set up to be led by a single commander. Which means that the military assets that are

now split under separate centres of command will be fused into one single command under one operational head who will be responsible for directing and controlling their activities in a given situation.

But apart from operational synergies, experts point out that a theatre command system will also contribute to more streamlined costs and a leaner fighting force. A big chunk of the annual defence budget goes into paying salaries and pensions while outlays do not always grow in line with the actual needs of the armed forces.

Supporters say that the theatre command system will help remove redundancies and bring greater focus in the allocation of resources.

Does India Have Any Such Command?

There are, in fact, two such joint services commands in India at present: the Andaman and Nicobar Command (ANC) and the Strategic Forces Command (SFC). The ANC is based on the theatre command principle and is at present considered to be the only one of its kind in India that combines the Army, Navy and Air Force since the SFC controls the nuclear assets of the country and is not related to any specific theatre of war.

The ANC was set up in 2001 to cover India's strategic interests in Southeast Asia and the Strait of Malacca. It is based in Port Blair and is headed through rotation by officers of the three services.

What Are The Other Countries That Have A Theatre Command System?

More than 32 countries in the world already have some form of theatre or joint command in place for better integration among the branches of the military. Notable among such countries are the US and China. According to a report, the US was the first to come up with a theatre command system and "presently possesses six geographical and four functional commands". Russia is said to have commenced with the restructuring of its armed forces in 2008 and "has now created four theatre commands".

China's theatre command system is said to be based on the US model and has "five peacetime geographical commands". It is the Chinese Western Theatre Command that covers India.

What Are The Challenges Towards The Creation Of Theatre Commands In India?

According to experts, the key hurdle in integrating the three services under the theatre command system is that of the structure itself, that is who reports to whom and how does the chain of command flow. These involve issues of operational command and control over assets. Further, budgetary allocations and the distribution of funds have also been pointed out as factors that need to be clearly worked out to enable the setting up of a seamless theatre command system.

Another issue may be the existing mismatch between the assets of the Army, Navy and Air Force. According to reports, with fewer perceived resources, the Indian Air Force has concerns about its assets getting spread out thinly over the different theatre commands while it has also been suggested that more clarity is sought on questions of operational control. A piece published by the Observer Research Foundation says that the air force "has only 31 operational squadrons against a modest sanctioned strength of 42 (and that) would make it difficult for IAF to permanently station assets in a particular command with territorial boundaries".

<https://www.news18.com/news/india/explained-from-fighting-as-one-to-one-fighting-force-how-theatre-command-system-can-help-indian-military-embrace-future-match-up-to-china-3882758.html>

Army now wants 1,750 new futuristic infantry combat vehicles

By Rajat Pandit

New Delhi: The Army now wants to acquire 1,750 futuristic infantry combat vehicles (FICVs), with state of the art weapons and capable of swiftly transporting soldiers, through a new 'Make in India' project in the years ahead.

The Army has issued a RFI (request for information) to "identify probable Indian vendors", who are capable of commencing supply of the tracked FICVs within two years of the contract being inked, with at least 75-100 "fully-formed vehicles" per year.

This is the second such RFI to be issued in recent days. The Army had earlier this month sought the response of foreign armament companies for another proposed mega 'Make in India' project for induction of 1,770 advanced main-battle tanks or "future ready combat vehicles (FRCVs)" in a phased manner, as was reported by TOI.

An earlier project for 2,300 FICVs has remained stuck in bureaucratic bottlenecks, corporate rivalry and controversies despite first being accorded "acceptance of necessity" by the defence ministry way back in October 2009.

The new RFI says the tracked FICVs will be employed for cross-country operations, including amphibious ones, in plains and deserts along the Pakistan front as well as mountainous terrain and high-altitude areas (up to 5,000-metre) on the China one.

The FICVs should have weapon systems capable of destroying enemy tanks, armoured personnel carriers, low-flying helicopters and other ground-based weapon platforms and positions.

The tracked vehicles should provide "protected mobility" to its crew and troops in the different terrains, including CBRN (chemical, biological, radiological and nuclear) environment, says the RFI.

The FICVs should have an operational life of at least 32 years with maximum one overhaul or repair intervention, and be capable of being transported by existing in-service tank transporter vehicles of the Army, IAF transport aircraft and broad-gauge railway military bogies.

<https://timesofindia.indiatimes.com/india/army-now-wants-1750-new-futuristic-infantry-combat-vehicles/articleshow/83787387.cms>



Representative image

Military Transformation on Back Foot

By Lt. Gen Prakash Katoch

After months of media blitz of new tri-Service Commands being round the corner, news has emerged that the proposal has hit a roadblock. An Air Defence Command (ADC) headed by the IAF and a Maritime Theatre Command (MTC) headed by the Navy was to be set up this year. Subsequently, three Theatre Commands were to be set up under the Army; one for the western border with Pakistan, and northern and eastern ones with China. Incidentally, China's Western Theatre Command (WTC) covers the entire expanse of China's border with Myanmar in the east to Afghanistan in the west including its borders with India, Bhutan and Nepal.

According to media reports above proposal was recently presented at the Ministry of Defence (MoD) evoked major inter-Service differences, also mentioned as "turf wars". One instant quoted is IAF opposition to divide its "limited air assets" in different theatre commands. Obviously the presentation was organized by the Directorate of Military Affairs (DMA) headed by the Chief of Defence Staff (CDS) but was Defence Minister and Defence Secretary present and representatives from the Ministry of Home Affairs (MHA) and Ministry of Finance (MoF)?



Military Transformation on Back Foot

A committee has reportedly been constituted that includes Vice Chiefs of Army, Navy and Air Force, Chief of Integrated Defence Staff and representatives of other ministries and departments to resolve internal differences of Armed Forces, consult external stake holders like the MHA and MoF and look into the structure, composition, nomenclature and reporting channels of the proposed tri-Service commands. The Committee is to resolve various issues and recommend the way forward.

Military jointness has been emphasized by Prime Minister Narendra Modi though this is not something new. In 2004, then Prime Minister Manmohan Singh stated, "Reforms within the Armed Forces also involve recognition of the fact that our Navy, Air Force and Army can no longer function in compartments with exclusive chains of command and single Service operational plans." General VP Malik, Chief of Army Staff had said, "It is not my case that the Service Chiefs do not cooperate in war. Were they not to do so, it would be churlish. But in war, cooperative synergies are simply not good enough." Similarly, General S Padmabhan, Chief of Army Staff had said, "There is no escaping the military logic of creating suitably constituted Integrated Theatre Commands and functional commands for the Armed Forces as a whole."

The catalyst to Indian military's theatreisation in recent years is reorganization of China's PLA though this did not happen overnight. PLA's transformation was ushered by President Jiang Zemin (1993-2003) with its implementation overseen by the Central Military Commission and Chief of General Staff of the PLA. In Germany the transformation process was initiated by the Berlin Decree to integrate German Armed Forces ensuring full benefits of ongoing technological advancements. In the US, catalyst for the transformation process commenced with Secretary of Defence, Donald H Rumsfeld; the US Department of Defence created US Joint Forces Command as the transformation laboratory. The Goldwater Nichols Act finally brought about the transformational changes in US Armed Forces but this act too was debated for four years.

While establishment of CDS in India was under consideration, there was hot news that the Defence Secretary will be elevated to Principal Secretary before the CDS is appointed – because bureaucracy wanted to retain its 'prime position' in governance. But the bureaucrats scored even

better with the CDS as Secretary DMA and all the power and finances controlled by the Defence Secretary heading Department of Defence (DoD). Stature of a four-star General was reduced to secretary level, which has been followed up by appointing three-star and two-star equivalent officers as additional and joint secretaries in DMA.

General Bipin Rawat was appointed first CDS and tasked with creating integrated military commands during his five year tenure. In the instant case it appears Army, Navy and Air Forces were not taken on board by DMA while working on the proposals, leave aside concurrent liaison with MHA and MoF. Had this been done, matters would not have come to a head. Inhibitions of IAF about limited air assets distributed among theatre commands needs resolution. Air assets of one theatre can be employed elsewhere as has been exercised in the past in previous wars and in IPKF operations with even naval air assets supporting ground operations. If that were not the case even China will be ill prepared to fight on multiple fronts. However, air assets of IAF are at premium and IAF has to cater for a two-front war.

The proposal includes Central Armed Police Forces (CAPF) deployed on the borders placed under operational control of the Army Theatre Commands. This was also recommended by the 1999 Kargil Review Committee and Group of Ministers (GoP) reports but never followed. Even the ITBP deployed in Eastern Ladakh in sensitive areas has not been put under operational control of Army. Defence Minister Rajnath Singh who was earlier Home Minister should understand the nuances but he never even raised the issue during the Chinese aggression last year. This needs to be resolved at 'minister level' least it becomes an issue at the CCS.

It is being said that theatreisation will result in financial savings in the 'long run' but have the financial implications of adopting it been worked out? Not only is this required, provisional approval for this must be obtained before the proposal goes to the CCS. If this is not done we may end up with theatreisation in suspended animation midway, as it happened with the Mountain Strake Corps for lack of funds. As Army Chief, Rawat's focus was on reducing defence expenditure. He never even raised the issue of civilian defence employees being five times more expensive than their uniformed counterparts. As CDS, the bureaucracy is more than happy to use him in the same manner – cutting defence expenditure. India's forex reserves have reached US\$605 billion but we are loathe to spend on defence.

The command and control in theatreisation too needs to be fixed. For example IAF heads the ADC, is responsible for a two-front war but would have air assets distributed in various Theatre Commands. Besides, who will the Theatre Commanders report to with CDS having no operational role? Will they report to the Prime Minister, Defence Minister or will Defence Secretary claim the slot on plea that he is charged with the defence of India?

Many strategists and military thinkers in India have opined that only an Act of Parliament (like the Goldwater-Nichols Act of the US) can bring about required transformation in for Armed Forces. Will the CCS have the inclination to undertake such an exercise through a committee in time-bound manner? Can the National Security Council (NSC) or the DMA be tasked to work out a Draft Act of Parliament for Military Transformation? Will this not be better for transformation to be implemented smoothly rather than hurrying up in the present manner? Establishment of integrated theatre commands must be done in deliberate fashion over a period of time taking into account that the transformation period does not put us at disadvantage if war is thrust upon us during the changeover.

<https://www.thenorthlines.com/military-transformation-on-back-foot/>

Thu, 24 June 2021

China is testing carrier killer missiles for an assault after sundown

The DF-26, a weapon that is regularly shot off by China, can reportedly travel distances as far as 2000 nautical miles to destroy maneuvering targets at sea

By Kris Osborn

The Chinese military fired off one of its much-hyped “carrier-killer” missiles at night. This was part of an effort to refine guidance systems and targeting technologies for more challenging combat circumstances such as tracking targets without daylight.

China’s People’s Liberation Army Rocket Force shot a DF-26 anti-ship missile at midnight during multi-wave mock fire strikes and the transfer and loading of missiles, the Chinese *Global Times* newspaper said.

“After launching a first wave of missile strikes, the troops received orders to relocate, reload and start a second wave of strikes. The drills also simulated a hostile attack on a launch position, and the troops had to maneuver to a backup launch location,” the Chinese report said.



The Chinese forces also, as cited in the report, practiced maneuver operations under hostile fire to preserve an ability to attack while under hostile fire. These circumstances are one of several reasons the Chinese military places such value upon operating mobile launchers as they can maneuver to avoid being tracked or subject to air attack.

Night maneuvers, the Chinese report said, introduce additional tactical variables such as the need to carefully manage any signal or signature which might compromise a launch position.

“Night launches are more challenging than in the day due to lower visibility, and artificial light must be controlled to a low level in order not to expose the launch position,” the Chinese paper rights.

Defending against an incoming anti-ship missile, however, might not be as challenging as firing one and achieving the needed guidance to strike a target at night. Not only is there likely to be some kind of light signature emerging from a launch which could potentially be tracked by drones, surface ships, or even satellites depending upon its size and duration. But anti-ship missiles such as the DF-26 present a significant heat signature that is detectable at night with long-range infrared sensors coming from drones, helicopters, or surface ships in position to transmit tracking data for ship defenders.

Along with heat and light indicators, an approaching DF-26 would also present some kind of radio frequency or electronic signature potentially detectable by passive electronic warfare sensors or other kinds of detection technologies. Electromagnetic signals of course operate independently of visible light but still travel at the speed of light, something which could speed up detection and tracking of arriving DF-26 missiles approaching a carrier. The DF-26, a weapon that is regularly shot off by China, can reportedly travel distances as far as 2000 nautical miles to destroy maneuvering targets at sea.

<https://nationalinterest.org/blog/buzz/china-testing-carrier-killer-missiles-assault-after-sundown-188410>



Thu, 24 June 2021

Machine learning for solar energy is a supercomputer killer

Supercomputers could find themselves out of a job thanks to a suite of new machine learning models that produce rapid, accurate results using a normal laptop.

Researchers at the ARC Centre of Excellence in Exciton Science, based at RMIT University, have written a program that predicts the band gap of materials, including for solar energy applications, via freely available and easy-to-use software. Band gap is a crucial indication of how efficient a material will be when designing new solar cells.

Band gap predictions involve quantum and atomic-scale chemical calculations and are often made using density functional theory. Until now, this process has required hundreds of hours of costly supercomputer processing time, as well as complicated and expensive software.

To address this issue, the researchers trained a machine learning model using data generated from 250,000 previous supercomputer calculations. The results have been published in *Journal of Cheminformatics*.

Significantly, while the program is capable of including multiple variables, it was found that just one factor, stoichiometry, contains—in almost all cases—enough information to accurately predict band gap. Stoichiometry is the numerical relationships between chemical reactants and products, like the volume of ingredients in a recipe to bake a cake.

More work is needed to fully understand why stoichiometry alone proved to be so useful. But it raises the exciting prospect of lengthy supercomputer calculations no longer being required for some applications. The artificial neural network that powers the machine learning programs could one day be succeeded by a software program that performs a similar function to density functional theory, albeit with far more simplicity.

Lead author Carl Belle says that "if you want to do simulations but you need to have millions of dollars of supercomputing infrastructure behind you, you can't do it. If we can dig into why the stoichiometric configuration is so powerful, then it could mean that supercomputers are not needed to screen candidate materials, nor for accurate simulations. It could really open things up to a whole new group of scientists to use."

The machine learning program isn't limited to band gap. It can be used to predict the properties of many other materials for other contexts, and has been developed by a professional programmer, making it useful not only for scientists and academics but also for businesses and corporate applications. "It's built to industry standard and it's designed to be collaborative," Belle said.

"The website has a fully relational database. It's got millions of records. It's all there and freely available to use. We're ready to go."

More information: Carl E. Belle et al, A machine learning platform for the discovery of materials, *Journal of Cheminformatics* (2021). DOI: [10.1186/s13321-021-00518-y](https://doi.org/10.1186/s13321-021-00518-y)
<https://phys.org/news/2021-06-machine-solar-energy-supercomputer-killer.html>



Credit: CC0 Public Domain

Development of ultra-high-resolution printed electronics using dual surface architectonics

NIMS has developed a dual surface architectonic process which enables to print submicrometer-scale circuit patterns by increasing the chemical polarity of predetermined areas on surface, thereby promoting selective adhesion of metallic nanoparticles to these areas. In this process, the patterned polarity is achieved by simple treatments in ambient air which increase the surface's adhesiveness to ink in the treated areas. As a result, very fine circuit lines (0.6 μm in width) can be printed.

Printed electronics—electronic circuits printed using metallic and semiconducting inks—have been developed for a wide range of applications. However, the circuit traces printable using existing printing technologies, such as inkjet and screen printing, are too wide for certain applications. New technologies capable of printing finer circuit traces therefore had to be developed.

This research team recently developed a dual surface architectonic process which can be used to print submicrometer-scale wiring patterns by increasing the chemical polarity of predetermined microscopic areas of a substrate surface, thereby promoting selective adhesion of metallic nanoparticles to these areas. Simple photo and chemical treatments are applied to the substrate during this process. First, preselected surface areas are activated by ultraviolet irradiation. A chemical treatment is then applied to these areas which increases chemical polarity and surface energy only in the UV-activated surface areas. Consequently, the surface's adhesiveness to metallic ink increases precisely in the treated areas. Because both treatments are simple and quick and can be performed in ambient air, use of the dual surface architectonic process is expected to significantly expedite and reduce the cost of printable electronic manufacturing processes compared to photolithography and other conventional printing methods.

Priways Co., Ltd. and C-INK Co., Ltd. have developed a metallic nanoparticle self-assembly system which can be used to print metallic nanoparticle inks at ultra-high resolution. The system will soon be put on sale along with primers specifically designed for use with it to enhance adhesion of metallic inks to different types of substrates. This research team will promote widespread use of this ultra-high-resolution printing technology for the production of printed electronics.

This research was published in the online version of *Small*, a German scientific journal, on May 14, 2021.

More information: Lingying Li et al, Dual Surface Architectonics for Directed Self-Assembly of Ultrahigh-Resolution Electronics, *Small* (2021). [DOI: 10.1002/sml.202101754](https://doi.org/10.1002/sml.202101754)

Journal information: [Small](https://doi.org/10.1002/sml.202101754)

<https://phys.org/news/2021-06-ultra-high-resolution-electronics-dual-surface-architectonics.html>

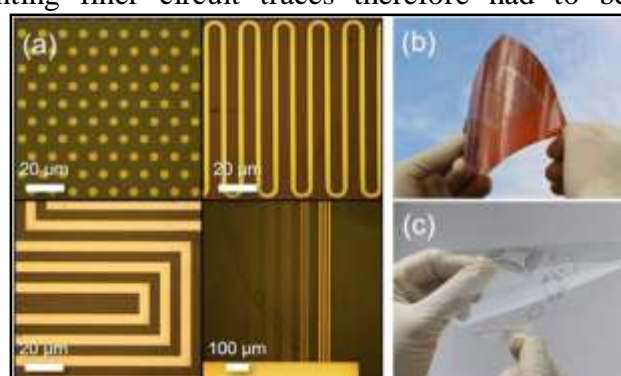


Figure. (a) Microcircuit patterns printed using a dual surface architectonic process. Circuits printed on polyimide (b) and transparent (c) films. Credit: National Institute for Materials Science

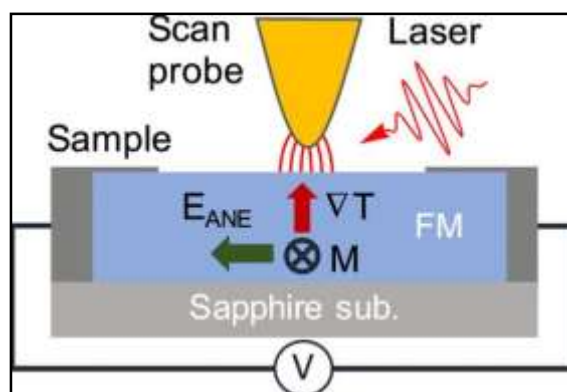
Magneto-thermal imaging brings synchrotron capabilities to the lab

By David Nutt

Coming soon to a lab tabletop near you: a method of magneto-thermal imaging that offers nanoscale and picosecond resolution previously available only in synchrotron facilities.

This innovation in spatial and temporal resolution will give researchers extraordinary views into the magnetic properties of a range of materials, from metals to insulators, all from the comfort of their labs, potentially boosting the development of magnetic storage devices.

"Magnetic X-ray microscopy is a relatively rare bird," said Greg Fuchs, associate professor of applied and engineering physics, who led the project. "The magnetic microscopies that can do this sort of spatial and temporal resolution are very few and far between. Normally, you have to pick either spatial or temporal. You can't get them both. There's only about four or five places in the world that have that capability. So having the ability to do it on a tabletop is really enabling spin dynamics at nanoscale for research."



Credit: ACS

His team's paper, "Nanoscale Magnetization and Current Imaging Using Time-Resolved Scanning-Probe Magnetothermal Microscopy," published June 8 in the American Chemical Society's journal *Nano Letters*. The lead author is postdoctoral researcher Chi Zhang.

The paper is the culmination of a nearly 10-year effort by the Fuchs group to explore magnetic imaging with magneto-thermal microscopy. Instead of blasting a material with light, electrons or X-rays, the researchers use a laser focused onto the scanning probe to apply heat to a microscopic swath of a sample and measure the resulting electrical voltage for local magnetic information.

Fuchs and his team pioneered this approach and over the years have developed an understanding of how temperature gradients evolve in time and space.

"You think about heat as being a very slow, diffusive process," Fuchs said. "But in fact, diffusion on nanometer length scales has picosecond times. And that's a key insight. That is what gives us the time resolution. Light is a wave and diffracts. It doesn't want to live down at these very small length scales. But the heat can."

The group has previously used the technique to image and manipulate antiferromagnetic materials—which are difficult to study because they don't produce a magnetic field—as well as magnetic metals and insulators.

While it is easy enough to focus a laser, the major hurdle has been confining that light and generating enough heat on a nanometer scale to get the process to work. And because some phenomena at that scale occur so quickly, the imaging needs to be equally speedy.

"There's a lot of situations in magnetism where stuff is wiggling, and it's small. And this is basically what you need," Fuchs said.

Now that they have refined the process and successfully achieved a spatial resolution of 100 nanometers and a temporal resolution below 100 picoseconds, the team can explore the real minutiae of magnetism, such as skyrmions, quasi-particles in which the magnetic order is twisted.

Understanding these kinds of "spin textures" could lead to new high-speed, high-density magnetic storage and logic technologies.

In addition to magnetism, the technique's dependence on electrical voltage means it can be used to measure current density when the voltage interacts with a material. This is a novel approach, since other imaging techniques measure current by gaging the magnetic field the current produces, not the current itself.

Magneto-thermal microscopy does have limitations. Because samples need to be configured with electrical contacts, the material has to be patterned into a device. As a result, the technique can't be applied to bulk samples. Also, the device and the scanning probe must be scaled together. So if you want to measure a phenomenon at the nanoscale, the sample has to be small.

But those limitations are minor compared with the benefits of a relatively low-cost form of magneto-thermal microscopy in your own lab.

"Right now, people have to go to a public facility, like a synchrotron facility, for doing these types of measurements," Zhang said. "You write a proposal, you get a beam time, and you have maybe a few weeks to work, at best. If you didn't get the result you want, then it's maybe another couple of months. So this will be progress for the field."

More information: Chi Zhang et al, Nanoscale Magnetization and Current Imaging Using Time-Resolved Scanning-Probe Magnetothermal Microscopy, *Nano Letters* (2021). [DOI: 10.1021/acs.nanolett.1c00704](https://doi.org/10.1021/acs.nanolett.1c00704)

Journal information: [Nano Letters](https://phys.org/news/2021-06-magneto-thermal-imaging-synchrotron-capabilities-lab.html)
<https://phys.org/news/2021-06-magneto-thermal-imaging-synchrotron-capabilities-lab.html>

COVID-19 Research News

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Gene profile in blood predicts death for patients with Covid-19, risk of poor outcomes: Study

A recent study found that a blood gene profile associated with a high risk of dying from severe lung disease can also predict poor outcomes in patients with COVID-19

Washington: A multicenter retrospective study led by the University of South Florida Health (USF Health) recently demonstrated that a blood gene profile associated with a high risk of dying from severe lung disease can also predict poor outcomes in patients with COVID-19. The risk profile based on 50 genes could help customize how COVID-19 is treated, improve the allocation of limited health care resources such as intensive care beds and ventilators, and potentially save lives. The study was published in the journal EBioMedicine. Idiopathic pulmonary fibrosis (IPF), a disease of unknown cause, affects the lung interstitium of the space between the lung sacs and the bloodstream, leading to severe lung scarring. Severe COVID-19 can also damage the lung interstitium leading to severe lung scarring.

"Our study identified at the molecular level, a gene risk profile that predicts worse COVID-19 outcomes before the patient becomes severely ill," said principal investigator Jose Herazo-Maya, MD, an associate professor and associate chief of pulmonary, critical care and sleep medicine at the USF Health Morsani College of Medicine.

He added, "That means every patient with COVID-19 could potentially get a blood test that could tell us if they are at high or low risk of dying... And if we know in advance who will likely

end up in the ICU and who will likely do well recovering at home with appropriate monitoring, we can tailor our interventions to individual patients based on their level of risk."

The USF Health study appeared online on June 20 in EBioMedicine, a publication of THE LANCET. It builds upon previous genomic research by Dr Herazo-Maya and colleagues at Yale School of Medicine. In 2017, they led an international team that studied and validated a gene expression signature in the blood that reliably forecasts the likelihood of IPF mortality. (Certain patients with lung scarring can live well for years, while others develop worsening disease and die quickly from IPF.)

As the COVID-19 pandemic unfolded, "the basic question we had was 'Can we repurpose the gene signature known to predict mortality in a fibrotic lung disease to predict mortality in those infected with a new coronavirus that can cause lung fibrosis as well?'" said the EBioMedicine paper lead author Brenda Juan-Guardela, MD, assistant professor of medicine at the USF Health Morsani College of Medicine and medical director of Respiratory Care Services at Tampa General Hospital (TGH). "To the best of our knowledge, this study is the first to compare overlapping immune gene profiles in COVID-19 and IPF, which were remarkably similar."

The USF Health-led team analyzed gene expression patterns of 50 genes known to predict IPF mortality in three COVID-19 cohorts and two IPF cohorts. The researchers used a molecular scoring system to distinguish between high versus low-risk gene profiles in all five cohorts.

Among their findings:

- In the COVID-19 validation cohorts, a 50-gene high-risk profile was linked to a greater risk of ICU admission, mechanical ventilation, and in-hospital death.
- The researchers also performed single-cell, gene expression analyses and identified specific immune cells -- monocytes, neutrophils, and dendritic cells as the primary source of gene expression changes in the high-risk, COVID-19 gene profile. This finding suggests COVID-19 and IPF may share common innate and adaptive immune responses that trigger lung scarring.
- The 50-gene risk profile in COVID-19 can also predict mortality in IPF at the same threshold.

At TGH, Dr Herazo-Maya treats previously hospitalized COVID-19 patients who come to the Center for Advanced Lung Disease with severe lung fibrosis; some are being evaluated for lung transplantation. "Even though coronavirus cases are dropping, that doesn't mean all the patients will recover without complications," he said. "We're starting to see the damaging, long-term effects in the lungs of some COVID-19 survivors."

While more studies are needed, researchers and clinicians may soon be able to apply the gene risk profiles to help advance the care of both COVID-19 and IPF patients, Dr Herazo-Maya said. His laboratory is currently developing a blood test, based on these genes, that can be easily applied in clinical practice to predict poor disease outcomes. Besides outcome prediction, the identification of 50-gene risk profiles may also have significant therapeutic potentials. For example, a 10-day regimen of the steroid dexamethasone, a drug that suppresses the immune system, has been shown to increase the survival of patients hospitalized with COVID-19.

Immunosuppressant drugs have been essentially discontinued for IPF treatment because they increase mortality when given at high doses and in combination over long periods, Dr Herazo-Maya said. "But perhaps we could investigate the use of dexamethasone or a similar steroid treatment for a short period of time in a subgroup of IPF patients with a 50-gene high-risk profile, using the principle of precision or personalized medicine."

The 50-gene high-risk profile may also support the rationale to investigate the use of targeted IPF antifibrotic medications, which slow the rate of lung scarring, to prevent short and long-term sequelae of COVID-19, he added.

<https://www.timesnownews.com/health/article/gene-profile-in-blood-predicts-death-for-patients-with-covid-19-risk-of-poor-outcomes-study/774746>

