

Apr
2021

समाचार पत्रों से चयित अंश Newspapers Clippings

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

खंड : 46 अंक : 78 21-22 अप्रैल 2021

Vol.: 46 Issue : 78 21-22 April 2021



रक्षा विज्ञान पुस्तकालय
Defence Science Library
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Indian LCA Tejas or Pakistani JF-17: Who is winning the Malaysian Fighter Jet contract?

By Younis Dar

India's multi-role Tejas fighter has captured the imagination of the Malaysian air force for quite some time now. The 4.5 generation Light Combat Aircraft (LCA) later enthralled the audience when it performed at the 2019 Malaysian Air Show at Langkawi International Maritime and Aerospace Exhibition (LIMA-2019).

The combat jet impressed the crowd with its artful maneuvers, engaging in loops, slow speed passes, minimum radius turn, maximum rate turn, negative G turn, along with point rolls.

It was the first international performance of the indigenous Indian fighter produced by India's state-based company Hindustan Aeronautics Limited (HAL).

Malaysia's air force is in dire need of new and modern combat aircraft and its ageing fighter fleets need up-gradation. The Malaysian Air Force chief Gen. Affendi Buang had said that 40% of the country's combat fleet – which includes British, American and Russian fighters – needs urgent up-gradation.

Consequently, the country floated a global tender to procure a variety of different aircraft, ranging from fighter trainers to medium-range combat aircraft (MRCA). The Royal Malaysian Air Force (RMAF) intends to fill the operational and combat requirement gaps by ordering a certain number of combat jets in a two-stage process.

Along with India's multi-role LCA Tejas, which has reportedly emerged as the top contender in the race, other aircraft in the fray include the Swedish Gripen, Pakistan's Chinese origin JF-17 jet, the South Korean T-50, among others.

Who is leading the Race?

During its 2019 air show presence in Malaysia, Tejas attracted the curiosity of the then Malaysian PM Mahathir Mohammad, who experienced the cockpit of the aircraft first-hand and was reportedly impressed with the systems and design.

India and Malaysia have similar operational needs and weapon types with both countries using considerable Russian and NATO systems.

The two countries even match in their military strategy and the use of defense technologies. That will offer an advantage for Malaysia if it chooses Tejas which can accommodate both Russian



Former Malaysian PM Mahathir Mohamad inspecting Tejas at Malaysia air show (file photo)

and Western weapon systems, with both countries operating an amalgam of the fighter aircraft from both blocs.

With India said to be offering the latest version Mk1A, which features modern AESA radar, new avionics and the capability to integrate a variety of weaponry, it will be hard for the Malaysian Air Force to ignore Tejas.

The fighter also boasts of enhanced maneuverability, aerodynamics, maintainability and pilot survivability, self-protection jammer, radar warning receiver and external ECM pod.

To sweeten the deal, India has offered to establish a Maintenance, Repair and Overhaul (MRO) facility in Malaysia to ensure high-rate availability of the aircraft.

At approximately \$42 million per unit, Tejas is an economical choice for RMAF, considering it brings a wide range of modern capabilities to a multi-role fighter and has an operational edge over Pakistan's JF-17 in many respects, the experts say.

Moreover, the Indian Air Force's recent order for 83 Tejas aircraft has helped scale down the prices significantly. Malaysia is likely to place an initial order for 12 jets, and go for 24 more at a later stage.

With a team from the country visiting India for assessing the suitability of the aircraft within months, there is great competition expected between LCA Tejas, JF-17, and Korean FA-50

JF-17 vs LCA Tejas

Compared to JF-17, Tejas has a combat edge with its more potent engine, radar system, and electronic warfare suite, and not to forget the Beyond Visual Range (BVR) missile capability according to IAF experts talking to the EurAsian Times.

JF-17 also comes with a Russian engine, about which Malaysia's experience has not been good when it comes to serviceability. The country also operates the Russian MiG-29s with similar engines, which are said to require significant after-sales support and maintenance.

However, Tejas is powered by a General Electric F404 engine, also used in Malaysia's F/A-18s, which has delivered satisfying performance.

With Kuala Lumpur engaged in maritime border disputes with Beijing, there's a chance that the country could prefer the Indian or even Korean fighters over that of Pakistan.

Malaysia and China have been locked in a tense standoff in the South China sea over exploration rights, with Chinese naval vessels repeatedly harassing the former's exploration and drilling ships and other sea assets.

Experts say that Kuala Lumpur takes the Chinese threat very seriously, and this could be a major factor in deciding the top contender for its combat aircraft procurement deal.

This could explain why Malaysia has been keen on spending more time studying India's Tejas, with a team heading again for India in the coming few months.

Nitin J Ticku a political analyst with the EurAsian Times says that buying a fighter jet is not a simple process as all these decisions are politically motivated. A country's air force aspires to have potent fighter jets that also suits the political interest of the ruling government.

The purchase of the JF-17s would bind Malaysia with the Chinese weapons while the FA-50 or LCA Tejas would give them access to 'trusted' Western technology, despite being of Korean and Indian origin.

<https://eurasianimes.com/indian-lca-tejas-or-pakistani-jf-17-who-is-winning-the-malaysian-fighter-jet-contract/>



Thu, 22 April 2021

US's AI Playbook: How India can shore up its defence through private participation

We view Artificial Intelligence just like Thomas Edison viewed electricity

- Robert Work, Former Deputy Secretary of Defense, US

Technology is the central pillar of modern warfare. Paul Maxwell, Lt. Col. (Retd.) of the US army said the use of AI would improve capability and resilience, and the military cannot afford to ignore this: "Certainly our opponents will and we must be able to attack and defeat their AIs," he said. In the light of the ever-changing geopolitical scenario, Joint Artificial Intelligence Center (JAIC) – AI Centre of Excellence under Department of Defense (DoD), US has come out with an action plan to facilitate the integration of AI across departments, especially the Department of Defence (DoD) by 2025.



Pentagon's AI artillery

The Pentagon is counting on AI as a major driver of defence modernisation. The US government has allocated the Pentagon around \$841 million for building AI capabilities for 2021, of which more than one-third will go to the JAIC. The DoD has launched a program, called Tradewind, incorporating tech players, academia, and other stakeholders to develop new AI capabilities for the defence forces. Additionally, the Pentagon has started a \$10 billion program to centralise data across departments over the cloud.

"Tradewind will provide a user-friendly framework for our private sector partners to work more efficiently with the DoD to scale and implement AI for the warfighter and consumers across the military. We want to learn from this initiative to improve the way DoD works with all types of private sector and academic partners, and inject the much-needed speed and agility necessary to scale artificial intelligence and transform the Department," said William Roberts, JAIC Chief of Acquisition.

The Tradewind portal will be available via AI.mil, the Department of Defense's main artificial intelligence website. The first step of the project will be to develop online capabilities that communicate with small and non-traditional businesses, create rapid contract actions, and assist DoD offices with end-user integration through agile delivery. The Data Readiness for Artificial Intelligence Development (DRAID) will allow defence organisations to issue orders for data preparation work, which may include anything from data collection to data sorting and storage to modelling how workers can use AI to gain deeper insights.

What's India upto

While speaking at the e-symposium event organised by SAMDeS along with the FICCI, RKS Bhaduria, IAF Chief Marshal, expressed IAF's interest towards integration of the AI concepts for future combat operations. In a recent news article, the Ministry of Defence (MoD) mentioned the utilisation of low latency communication provided by the 5G technology to power up AI and build UAV for the armed forces. The MoD has established iDEX – an ecosystem to promote defence and aerospace innovation and technology growth by bringing together innovators and entrepreneurs to

provide technologically innovative solutions for the modernisation of the Indian military. Take a look at the recent winner for remote real-time in-flight health monitoring of aircrew:

08-03-2021 NEW DELHI				
DEFENCE INDIA STARTUP CHALLENGE 4				
List of Winners for DISC 4 Airforce challenge				
#	Service	Challenge Name	Startup /MSME	Winner Name
1	Indian Airforce	Remote Real Time In Flight Health Monitoring of Aircrew	Astromeda Space Pvt Ltd	Mr. Rajaguru Nathan
			Individual Innovator	Mr. Dhruv Baijal

Moreover, it has set up a Technology Development Fund (TDF) under the ‘Make in India’ program. The program is executed by DRDO to encourage industries participation in cutting edge technologies for defence applications. Feasibility studies are under way for various defence projects. DRDO is trying to develop SSPA (Solid State Power Amplifier) – a component of transmitter system, for AMDR 2D/3D radar for the Indian Navy. For Indian Air Force, DRDO is in the process of building a wireless aircraft flight data recorder and automatic weather station.

Wrapping up

India’s IITs, IISc, NITs, and IISERs are home to remarkable academics in computer science and engineering. To integrate AI capabilities in defence, a convergence between academia, industry, and policy is critical.

AI is a game of collaboration. Good datasets are crucial to building good AI models. But building models for the military is even trickier. The nature of data getting collected, the risk of mass surveillance in the name of counter insurgency, and an absence of a strong data protection bill make data collection problematic. So it’s important to have an airtight policy in place on the use of public data for building military AI capabilities.

That said, the military could enlist private players and co-opt their AI/ML models to build defence capabilities. AI works best in collaboration, not in siloes. But when we use AI, we should have the guardrails – like anonymised and unbiased data –to ensure fairness.

<https://analyticshindiamag.com/uss-ai-playbook-how-india-can-shore-up-its-defence-through-private-participation/>

COVID 19: DRDO's Contribution



Press Information Bureau
Government of India

Ministry of Defence

Tue, 20 April 2021 4:35PM

Raksha Mantri Shri Rajnath Singh reviews preparedness of Ministry of Defence & Armed Forces amid spike in COVID-19 cases

Asks them to aid civilian administration to tide over the current situation; gives go ahead for emergency procurement of critical medical supplies

Raksha Mantri Shri Rajnath Singh held a virtual meeting to review the preparedness of Ministry of Defence and Armed Forces to deal with the recent spike in COVID-19 cases across the country, in New Delhi on April 20, 2021. Defence Secretary Dr Ajay Kumar, Chief of Defence Staff General Bipin Rawat, Chief of Naval Staff Admiral Karambir Singh, Chief of Army Staff General M M Naravane, Director General Armed Forces Medical Services (AFMS) Surg Vice Admiral Rajat Datta, Secretary (Defence Production) Shri Raj Kumar, Secretary Department of Defence R&D and Chairman Defence Research and Development Organisation Dr G Satheesh Reddy, Financial Adviser (Defence Services) Shri Sanjiv Mittal and other senior civil & military officers attended the meeting via video conferencing.

Shri Rajnath Singh was briefed about the measures taken by AFMS, DRDO, Defence Public Sector Undertakings (DPSUs), Ordnance Factory Board (OFB) and other organisations of Ministry of Defence such as National Cadet Corps (NCC) in providing aid to the civil administration in this hour of crisis. Raksha Mantri was informed that a COVID care centre established by Hindustan Aeronautics Limited (HAL) is active in Bengaluru assisting the civil administration. He was informed that arrangements are being made by the DPSUs to buy oxygen plants that will help them in production of oxygen cylinders at a faster pace. Raksha Mantri asked the DPSUs, OFB and DRDO to work on war footing to provide oxygen cylinders and extra beds to civil administration/state governments at the earliest.



Shri Rajnath Singh called upon the Armed Forces to be in close contact with the state governments and be ready to provide any required assistance. In a significant decision, Raksha Mantri directed the Armed Forces and other stakeholders to go ahead with procurement of critical medical requirements under emergency powers of procurement.

DRDO Chairman briefed that a COVID-19 facility, developed by DRDO, has again been made functional in New Delhi and efforts are being made to soon increase the number of beds from 250 to 500. Dr Sathish Reddy informed the meeting that the ESIC Hospital, which was converted to COVID hospital in Patna, has started functioning with 500 beds and a COVID hospital will soon be made functional at Muzaffarpur in Bihar. He also informed that work is on war footing to set up a 450-bed hospital in Lucknow, 750-bed hospital in Varanasi, Uttar Pradesh and 900-bed hospital in Ahmedabad, Gujarat.

Shri Rajnath Singh was also informed that based on the On-Board Oxygen Generation Technology developed for LCA Tejas, a 1000 litre/minute capacity oxygen generation plants

technology has been given to the industry and the Uttar Pradesh government has placed order of five such plants with the industry. Dr Reddy informed the Raksha Mantri that more plants can be supplied by the industry to cater to the hospital requirements. He further said SpO2 (Blood Oxygen Saturation) based supplemental oxygen delivery system developed for soldiers posted at extreme high-altitude areas can be used for COVID patients as their conditions become similar. The product will be available soon in the market from the industry as per technology provided by DRDO.

Raksha Mantri was informed that the AFMS has mobilised its man power and other resources in various military hospitals dealing with COVID patients. To augment the manpower if required, Raksha Mantri suggested to utilise the services of vaccinated retired Armed Forces personnel to assist the civil administration/state governments to deal with the current situation.

During the meeting, Shri Rajnath Singh also discussed ways to contain the spread of COVID-19 among the Armed Forces personnel and the officers/staff working in Ministry of Defence. He focused on COVID appropriate behavior at the work place, stressing on the need to strictly follow all the COVID protocols such as wearing of masks at all times and maintaining physical distancing.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1712894>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 20 April 2021 4:35PM

रक्षा मंत्री श्री राजनाथ सिंह ने कोविड-19 मामलों में आई तेजी से निपटने के लिए मंत्रालय और सशस्त्र बलों की तैयारियों की समीक्षा की

रक्षा मंत्री श्री राजनाथ सिंह ने 20 अप्रैल, 2021 को नई दिल्ली में देश भर में कोविड-19 मामलों में हाल ही में हुई बढ़ोतरी से निपटने के लिए रक्षा मंत्रालय और सशस्त्र बलों की तैयारियों की समीक्षा के लिए एक वर्चुअल बैठक की। बैठक में रक्षा मंत्रालय सचिव डॉ. अजय कुमार, चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत, नौसेना प्रमुख एडमिरल करमबीर सिंह, थल सेनाध्यक्ष जनरल एमएम नरवणे, महानिदेशक सशस्त्र बल चिकित्सा सेवा (एएफएमएस) सर्ज वाइस एडमिरल रजत दत्ता, सचिव (रक्षा उत्पादन) श्री राज कुमार, रक्षा अनुसंधान एवं विकास विभाग सचिव और अध्यक्ष रक्षा अनुसंधान और विकास संगठन डॉ.जी सतीश रेड्डी और अन्य वरिष्ठ नागरिक और सैन्य अधिकारियों ने वीडियो कॉन्फ्रेंसिंग के माध्यम से भाग लिया।

श्री राजनाथ सिंह को इस बात की जानकारी दी गई कि कैसे सशस्त्र बल चिकित्सा सेवा, डीआरडीओ, रक्षा सार्वजनिक क्षेत्र के उपक्रमों (डीपीएसयू), ओएफबी और रक्षा मंत्रालय के अन्य संगठनों जैसे राष्ट्रीय कैडेट कोर (एनसीसी) द्वारा कोविड 19 महामारी के इस मुश्किल दौर में देश की जनता की मदद की जा रही है। उन्होंने डीपीएसयू, ओएफबी और डीआरडीओ से आग्रह किया कि वे जल्द से जल्द नागरिक प्रशासन / राज्य सरकारों को ऑक्सीजन सिलेंडर और अतिरिक्त बेड उपलब्ध कराने के लिए युद्धस्तर पर काम करें। उन्होंने सशस्त्र बलों को राज्य सरकारों के साथ निकट संपर्क में रहने और किसी भी आवश्यक

सहायता प्रदान करने के लिए तैयार रहने का आह्वान किया। रक्षा मंत्री ने इन संस्थाओं को जरूरी सामान की खरीद की आपातकालीन शक्तियां भी सौंप दीं ताकि महत्वपूर्ण जरूरतों की खरीद की जा सके।

रक्षा मंत्री को डीआरडीओ अध्यक्ष ने डीआरडीओ द्वारा विकसित की गई कोविड-19 सुविधाओं के बारे में सूचित करते हुए कहा कि नई दिल्ली में ये सेंटर फिर से कार्यशील हो गया है। साथ ही यहां बेड की संख्या को भी 250 से बढ़ाकर 500 करने ओर प्रयास किए जा रहे हैं। डॉ. रेड्डी ने बैठक में बताया कि ईएसआईसी अस्पताल, जिसे पटना के कोविड-19 अस्पताल में परिवर्तित किया गया है, उसने 500 बिस्तरों के साथ काम करना शुरू कर दिया है। उन्होंने बताया कि लखनऊ में 450 बेड का अस्पताल, वाराणसी में 750 बेड का अस्पताल और अहमदाबाद में 900 बेड का अस्पताल स्थापित करने के लिए युद्ध स्तर पर काम चल रहा है।

श्री राजनाथ सिंह को यह भी बताया गया कि एलसीए तेजस के लिए विकसित ऑन-बोर्ड ऑक्सीजन जेनरेशन तकनीक पर आधारित, एक 1000 लीटर/ मिनट की क्षमता वाली ऑक्सीजन जेनरेशन प्लांट तकनीक उद्योग को दी गई है और उत्तर प्रदेश सरकार ने इस तरह के पांच प्लांट्स का ऑर्डर इंडस्ट्री को दिया है। डॉ. रेड्डी ने रक्षा मंत्री को सूचित किया कि अस्पताल की आवश्यकताओं को पूरा करने के लिए उद्योग द्वारा अधिक प्लांट्स की आपूर्ति की जा सकती है। उन्होंने आगे कहा कि अत्यधिक ऊंचाई वाले क्षेत्रों में तैनात सैनिकों के लिए विकसित SpO2 (ब्लड ऑक्सीजन सेचुरेशन) आधारित पूरक ऑक्सीजन वितरण प्रणाली का उपयोग कोविड-19 रोगियों के लिए किया जा सकता है क्योंकि उनकी स्थिति भी समान हो जाती है। डीआरडीओ द्वारा प्रदत्त तकनीक के अनुसार उद्योग से बाजार में जल्द ही उत्पाद उपलब्ध हो जाएगा।

रक्षा मंत्री ने यह भी सुझाव दिया कि वर्तमान स्थिति से निपटने के लिए उन रिटायर्ड सशस्त्र बल के कर्मियों की सेवाएं ली जा सकती हैं जिन्हें टीका लग चुका है। ये सेवानिवृत्त कर्मी सिविल प्रशासन/ राज्य सरकारों की सहायता कर सकते हैं।

बैठक के दौरान, श्री राजनाथ सिंह ने सशस्त्र बलों के जवानों और रक्षा मंत्रालय में कार्यरत अधिकारियों / कर्मचारियों के बीच कोविड-19 के प्रसार के तरीकों पर भी चर्चा की। उन्होंने कार्य स्थल पर कोविड के उचित व्यवहार के पालन पर जोर डाला, हर समय मास्क पहनने और शारीरिक दूरी कायम रखने की आवश्यकता पर भी बल दिया।

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713029>

Wed, 21 April 2021

Defence Forces, OFB and DRDO join fight against COVID-19, says Rajnath Singh; Indian Army sets up special facilities

By Huma Siddiqui

In view of the growing numbers of COVID positive cases, the Armed Forces, DPSUs, Ordnance Factory Board (OFB) as well as Defence Research and Development Organisation (DRDO) have been called in to provide assistance to the state governments. On Tuesday afternoon (April 20, 2021), Defence Minister Rajnath Singh urged them all to work on war footing and to provide oxygen cylinders and extra beds to both civil administration/state governments at the earliest.

To meet any critical needs, defence Minister Rajnath Singh during the virtual meeting delegated emergency powers of procurement too.

Facilities providing aid to civil administration

DRDO has rebuilt a facility near Terminal 1, New Delhi with 250 beds and more beds will be added by Thursday taking the total number to 500.

ESIC Hospital, which was converted to COVID hospital in Patna, there are 500 functioning beds. And work goes on war footing for setting up a 450-bed hospital in Lucknow, 750-bed hospital in Varanasi and 900-bed hospital in Ahmedabad.

The On-Board Oxygen Generation Technology which has been developed for the Light Combat Aircraft Tejas, a 1000 litre/minute capacity oxygen generation plants technology has been given to the industry. And, the government of Uttar Pradesh has placed order of 5 such plants with the industry.



Photos Credit: Ministry of Defence

And to cater to the hospital requirements, more plants can be supplied by the industry.

SpO₂ (Blood Oxygen Saturation) based supplemental oxygen delivery system developed for soldiers posted at extreme high-altitude areas, could be used for COVID patients as their conditions become similar. This will be available in the market soon as the DRDO is expected to transfer the technology to the private industry.

What did the defence minister say?

To deal with the current situation, according to the Ministry of Defence statement, issued on April 20, 2021, the defence minister suggested that the services of vaccinated retired Armed Forces personnel should be utilized to help the civil administration/state governments

The minister also discussed ways of containing the spread of COVID 19 among the Armed Forces personnel and the officers/staff working in the Ministry of Defence.

On Monday, (April 19, 2021) the defence minister in his meeting with the Indian Army Chief Gen MM Naravane and Defence Secretary Ajay Kumar and other stakeholders talked about the initiatives that could be taken to help the civil administration. There was discussion on using the designated military hospitals to be used with additional beds for the civilian population in this critical time.

According to reports, in coordination with the civil authorities, all the hospitals run by the 63 Cantonment Boards in the country have been asked to accommodate Cantonment residents and those who reach out for treatment.

Who was present at the meeting?

Chief of Naval Staff Admiral Karambir Singh, Chief of Army Staff General M M Naravane, Director General Armed Forces Medical Services (AFMS) Surg Vice Admiral Rajat Datta.

Defence Secretary Dr Ajay Kumar, Chief of Defence Staff General Bipin Rawat, Secretary (Defence Production) Raj Kumar, Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy and other senior civil & military officers also attended the meeting via video conferencing.

The minister in today's meeting was briefed on the measures taken by AFMS, DRDO, DPSUs, Ordnance Factory Board (OFB) and other departments of the Ministry of Defence like National Cadet Corps (NCC) which is helping in providing aid to the civil administration.

And, in the meantime ...

The Indian Army on Tuesday has launched SeHAT OPD", which is an online Triservice Teleconsultation Service, This according to the ADG PI tweet is functional for all serving personnel of the Indian Armed Forces, the Veterans and their dependents to provide healthcare. For consultations for their ailments, prescriptions for continuation of medications, etc., a web page has been set up to log in.

And to ensure better care facilities are provided to its veterans and the Indian Armed Forces personnel, the ADG PI office has also tweeted that the Base Hospital Delhi Cantt (BHDC) is being converted into an exclusive COVID Facility. This will become operational as the COVID Facility from April 22, 2021 onwards.

What does it mean?

It means that all OPDs will shift and function at Army Hospital Research and Referral (AHRR) from Thursday.

<https://www.financialexpress.com/defence/defence-forces-ofb-and-drdo-join-fight-against-covid-19-says-rajnath-singh-indian-army-sets-up-special-facilities/2236872/>

संकट के समय रक्षा मंत्री ने सेना और DRDO के चीफ से की बात, कहा- नागरिकों को उपलब्ध हो सभी सुविधा

देश में बढ़ रहे कोरोना को लेकर सभी चिंतित हैं। इन दिनों अचानक से कोरोना के मामलों में लगातार उछाल आ रहा है। रक्षा मंत्री राजनाथ सिंह भी कोरोना के लेकर काफी चिंतित हैं।
पढ़ें रक्षा मंत्री ने इस संदर्भ में किया।

By Pooja Singh

नई दिल्ली: देश में बढ़ रहे कोरोना को लेकर सभी चिंतित हैं। इन दिनों अचानक से कोरोना के मामलों में लगातार उछाल आ रहा है। एक दिन में ढाई लाख से ज्यादा मामले भारत में दर्ज किए जा रहे हैं। ऐसे में सरकार को सख्ती बरतनी पड़ रही है ताकी संक्रमण की रफ्तार पर ब्रेक लगाया जा जा सके। अधिकतर राज्यों में नाइट कर्फ्यू और वीकेंड लॉकडाउन भी लगाया हुआ है। रक्षा मंत्री राजनाथ सिंह भी कोरोना को लेकर काफी चिंतित हैं। मंत्री ने सेना प्रमुख एम.एम नरवणे और डीआरडीओ चीफ से इस संदर्भ में बातचीत की। रक्षा मंत्री ने संकट के इस समय में सभी नागरिकों को सभी सुविधाएं उपलब्ध कराने को लेकर बातचीत दोनों प्रमुख से बात की।



पिछले 24 घंटे 2 लाख 59 हजार से ज्यादा मामले दर्ज

केंद्रीय स्वास्थ्य मंत्रालय की तरफ से सुबह आठ बजे जारी किए गए आंकड़ों के मुताबिक, देश में पिछले 24 घंटे में कोरोना के 2 लाख 59 हजार 170 नए मामले आने के बाद कुल पॉजिटिव मामलों की संख्या 1 करोड़ 53 लाख 21 हजार से अधिक हो गई है। इस दौरान हुई 1,761 नई मौतों के बाद कुल मौतों की संख्या 1,80,530 हो गई है। आंकड़ों के मुताबिक मृत्यु दर गिरकर 1.19 फीसद हो गई है। देश में सक्रिय मामलों की कुल संख्या 20,31,977 पहुंच गई है, जबकि कुल 1,31,08,582 मरीज ठीक हो चुके हैं।

बता दें कि देश में कोरोना वायरस के कुल मामले 19 दिसंबर को एक करोड़ के पार पहुंच गए थे। इसके 107 दिन बाद यानी पांच अप्रैल को मामले सवा करोड़ से अधिक हो गए, लेकिन संक्रमण के मामले डेढ़ करोड़ से अधिक होने में महज 15 दिन का समय लगा। भारतीय चिकित्सा अनुसंधान परिषद (आइसीएमआर) के मुताबिक देश भर में कोरोना संक्रमण का पता लगाने के लिए सोमवार को 15 लाख 19 हजार 486 नमूनों की जांच की गई।

<https://www.jagran.com/news/national-rajnath-singh-spoke-to-army-and-drdo-chief-said-offer-available-facilities-to-civilians-during-covid19-crisis-21574926.html>

IAF pressed into action for Covid management: Oxygen, equipment, medical personnel airlifted to Delhi

To assist the government in combating the Covid-19 pandemic, the Indian Air Force (IAF) is airlifting oxygen containers, cylinders, essential medicine, equipment, and medical personnel to different parts of the country

By Abhishek Bhalla

New Delhi: The demand for medical oxygen cylinders has grown exponentially as the second wave of Covid-19 infections sweeps through India. The Indian Air Force (IAF) has now started airlifting oxygen containers, cylinders, essential medicine, equipment and medical personnel to assist the government in combating the pandemic.

According to Air Force officials, the IAF has also airlifted doctors and nursing staff from Kochi, Mumbai, Vizag, and Bengaluru for the establishment of a Defence Development Research Organisation (DRDO) Covid-19 makeshift hospital in Delhi.

"The Air Force has also airlifted DRDO oxygen containers from Bangalore for Covid centres in Delhi," an official said.

Taking to Twitter, the Indian Air Force wrote, "The IAF transport fleet is supporting the fight against Covid-19. Airlift of medical personnel, critical equipment and medicines is underway for Covid Hospitals and facilities across the country."

Meanwhile, Defence Minister Rajnath Singh directed all defence establishments on Tuesday to ramp up efforts and assist civil authorities in extending all possible assistance to people across the country.

The defence minister attended a video conference with top ministry officials, including service chiefs and Chief of Defence Staff (CDS) Bipin Rawat. A roadmap to assist state governments was drawn during this meeting.

DRDO Chairman G Satheesh Reddy informed Defence Minister Rajnath Singh that the DRDO had established a Covid-19 facility in Delhi with 250 beds and that efforts are being made to increase the number of beds from 250 to 500, and then to 1,000 if necessary.

The ESIC Hospital in Patna, which was converted to a Covid-19 hospital, has commenced operations with 500 beds.

The DRDO is working on a 450-bed hospital in Lucknow, a 750-bed hospital in Varanasi, and a 900-bed hospital in Ahmedabad, said chairman G Satheesh Reddy.

In addition to this, Covid-19 hospitals are being set up in Lucknow, Varanasi, and Ahmedabad, with one already operational in Patna. There are also plans to establish two such hospitals in Haryana, G Satheesh Reddy told the defence minister.



The Indian Air Force (IAF) has also airlifted DRDO oxygen containers from Bangalore to Delhi's Covid-19 hospitals (Picture Credits: PTI)

Defence Minister Rajnath Singh also suggested that retired military doctors and nursing staff be enlisted for assistance if they volunteer.

<https://www.indiatoday.in/coronavirus-outbreak/story/iaf-pressed-into-action-for-covid-management-oxygen-equipment-medical-personnel-airlifted-to-delhi-1793627-2021-04-21>

Business Today

Wed, 21 April 2021

COVID-19 crisis: IAF, DRDO come to the rescue as India faces acute oxygen shortage

The Indian Air Force and Defence Research and Development Organisation have provided oxygen delivery systems in the wake of supply shortage and rising COVID-19 cases in India; here's what you need to know

Edited by Mehak Agarwal

As India faces rising COVID-19 cases and an acute shortage of oxygen cylinders, Defence Research and Development Organisation has said that an on-board oxygen delivery system used in the Indian Air Force's Light Combat Aircraft Tejas can be utilised.

This on-board oxygen generation technology was developed for LCA Tejas. Union Defence Minister Rajnath Singh was apprised about this technology in a COVID-19 preparedness review meeting with the armed forces and defence establishments.

The DRDO has developed SpO₂ (Blood Oxygen Saturation) supplemental Oxygen Delivery System to make up for the massive shortage of oxygen gas cylinders across the country. This is an automatic system developed by the Defence Bio-Engineering and Electro Medical Laboratory (DEBEL) of DRDO in Bengaluru.



Chairman of the Defence Research and Development Organisation (DRDO) Dr G Satheesh Reddy stated more plants can be supplied to cater to hospital requirements

The oxygen delivery system can be used both for soldiers at high-altitude areas and COVID patients as it delivers supplemental on the basis of the SpO₂ levels.

A 1,000 litre per minute capacity oxygen generation plants technology has been given to the industry and the Uttar Pradesh government has placed an order for five such plants.

In this meeting, the Chairman of the Defence Research and Development Organisation (DRDO) Dr G Satheesh Reddy stated more plants can be supplied to cater to hospital requirements.

This system reads SpO₂ levels of the patient from a wrist-worn pulse oximeter module through wireless interface and controls a proportional solenoid valve to regulate the oxygen supply to the patient. This prevents hypoxia, a fatal condition in which the amount of oxygen reaching tissues is inadequate to fulfil all the energy requirements of the body.

According to a DRDO's press note, "This automated, easy to use Oxygen Delivery System now available is a great boon particularly in these critical items when medical resources are stretched to their limits. Its proliferation would mitigate the crisis in management of such a huge number of COVID patients in many ways all across the country."

<https://www.businesstoday.in/current/economy-politics/covid-19-crisis-iaf-drdo-come-to-the-rescue-as-india-faces-acute-oxygen-shortage/story/437148.html>

LCA Tejas oxygen technology to be used for Covid patients, UP places orders for 5 plants

The Tejas light combat aircraft's "On-Board Oxygen Generation System (OBOGS)" has been transplanted into a civilian-use oxygen generation plant, which will be set up in the DRDO makeshift hospital in Lucknow to treat Covid-19 patients

By Abhishek Bhalla

Delhi/Lucknow: An on-board oxygen technology used in India's Light Combat Aircraft Tejas can now be used to mitigate the acute shortage of oxygen cylinders as India faces the worst crisis with a nationwide spike in cases like never before.

Defence Minister Rajnath Singh on Tuesday held a review meeting through video conference with the top officials of the Ministry including the Chief of Defence Staff and Chief of Army and Navy along with their Secretaries.

He called upon the armed forces to be in close contact with the state government and be ready to provide any assistance to them.

According to a statement from the Ministry of Defence, Rajnath Singh was informed that the industry has been given a 1,000 litre per minute capacity oxygen generation plants technology, and the Uttar Pradesh government has placed an order for five such plants based on the On-Board Oxygen Generation Technology developed for LCA Tejas.

During the meeting, Dr G Satheesh Reddy, chairman of DRDO said that the industry can supply more plants to meet the hospital's needs.

In an attempt to make up for the massive shortage of oxygen gas cylinders, the DRDO has developed SpO2 (Blood Oxygen Saturation) supplemental Oxygen Delivery System which can be used by soldiers posted at extreme high-altitude areas and also help Covid patients.

"This automatic system can also prove to be a boon during the current Covid-19 situation," the Ministry of Defence said in a statement.

The system, developed by DRDO's Defence Bio-Engineering & Electro Medical Laboratory (DEBEL), Bengaluru, delivers supplemental based on SpO2 (Blood Oxygen Saturation) levels and prevents the person from sinking into a state of Hypoxia, which is fatal in most cases if it sets in, the statement added.

Hypoxia is a condition in which the amount of oxygen reaching the tissues is insufficient to meet the body's total energy requirements. This is precisely the situation that occurs in a Covid patient as a result of virus infection, and it has been a leading factor in the current crisis.

DRDO Chairman Dr Reddy further said that SpO2 (Blood Oxygen Saturation) based supplemental oxygen delivery system developed for soldiers posted at extreme high-altitude areas can be used for Covid-19 patients as their conditions become similar.

<https://www.indiatoday.in/cities/lucknow/story/lucknow-drdo-makeshift-covid-hospital-to-use-lca-tejas-oxygen-technology-1793246-2021-04-21>



The two DRDO makeshift hospitals in Lucknow will feature a Medical Oxygen Plant for its own oxygen supply chain (Picture Credits: PTI/Representative)

खुलते ही फुल हो गया DRDO का कोविड हॉस्पिटल

दिल्ली कैंट के इस अस्पताल में कोरोना से संक्रमित बेहद गंभीर हालत वाले मरीजों को ही भर्ती किया जाएगा। वैसे तो यहां 500 बेड्स का अस्पताल बनाया जाना है, लेकिन अभी 250 बेड्स के साथ सोमवार से इस अस्पताल को शुरू करने का दावा किया गया था।

By Saroj Singh

हाइलाइट्स:

- हेल्पलाइन पर कॉल करते रहे लोग, नहीं मिला कोई जवाब
- इतने कॉल आने लगे कि हॉस्पिटल की हेल्पलाइन ठप हुई
- यहां 500 बेड का हॉस्पिटल बनेगा, अभी आधे बेड ही शुरू
- बेड 1000 तक करने की मांग कर रही है दिल्ली की सरकार

दिल्ली कैंट: डीआरडीओ ने एक बार फिर से अपना एक विशेष कोविड हॉस्पिटल तैयार कर सोमवार सुबह जब उसे मरीजों की भर्ती के लिए शुरू किया, तो चंद घंटों के अंदर ही सारे बेड फुल हो गए। यहां पर बेड मिलने की उम्मीद लगाए बैठे कई लोगों को निराशा हाथ लगी। डीआरडीओ ने कुछ हेल्पलाइन नंबर भी जारी किए थे, लेकिन इन नंबरों पर इतनी बड़ी तादाद में कॉल्स आने लगे कि हेल्पलाइन ही ठप हो गई। कुछ लोगों की कॉल जब लगी भी, तो घंटियां बजती रही, पर किसी ने कॉल पिक नहीं की। इस बदइंतजामी पर लोग काफी नाराज भी नजर आए। डीआरडीओ की अपनी वेबसाइट और बेड का स्टेटस बताने वाली दिल्ली सरकार की वेबसाइट पर जो फोन नंबर मुहैया कराए गए थे, वो भी 'आउट ऑफ सर्विस' या 'नॉट इन सर्विस' बता रहे थे। इस वजह से लोग और ज्यादा परेशान हो रहे थे।



डीआरडीओ हॉस्पिटल का कोविड सेंटर शुरू

जल्द बढ़ेगी कपैसिटी, हो सकेगा 500 मरीजों का इलाज

दिल्ली कैंट के इस अस्पताल में कोरोना से संक्रमित बेहद गंभीर हालत वाले मरीजों को ही भर्ती किया जाएगा। वैसे तो यहां 500 बेड्स का अस्पताल बनाया जाना है, लेकिन अभी 250 बेड्स के साथ सोमवार से इस अस्पताल को शुरू करने का दावा किया गया था। बताया जा रहा है कि ये सभी बेड्स पहले ही दिन और चंद घंटों के अंदर ही भर गए। कई लोग सीधे मरीजों को लेकर यहां पहुंच गए, लेकिन उन्हें निराशा ही हाथ लगी। कुछ लोगों को जांच के बाद लौटा दिया गया, तो वहीं बाद में पहुंचे लोगों को पता चला कि सारे बेड भर चुके हैं।

कहा जा रहा है कि हफ्ते भर के अंदर ही यहां 250 बेड्स और रेडी हो जाएंगे, जिन पर और मरीजों को भर्ती किया जा सकेगा। इस अस्पताल के सभी 500 बेड्स वेंटिलेटर की सुविधायुक्त होंगे और आर्मी व अर्धसैनिक बलों के डॉक्टर्स और हेल्थ सर्विसेज से जुड़े अन्य कर्मचारी यहां भर्ती होने वाले मरीजों का इलाज करेंगे। दिल्ली सरकार ने केंद्र से अपील की है कि इस अस्पताल में बेड्स की संख्या बढ़ाकर 1000 की जाए, ताकि ज्यादा से ज्यादा मरीजों का यहां इलाज किया जा सके।

<https://navbharattimes.indiatimes.com/metro/delhi/other-news/drdo-covid-hospital-full-in-one-day-after-opening-in-delhi/articleshow/82158399.cms>

DRDO to set up two COVID-19 hospitals in Panipat, Hisar: Health Minister Anil Vij

The Army's Western Command has been asked to provide doctors and other medical staff for the facilities, he said

Chandigarh: The Defence Research and Development Organisation (DRDO) will set up two dedicated COVID-19 hospitals of 500 beds each in Panipat and Hisar, Haryana's Home and Health Minister Anil Vij said on Wednesday.

The Army's Western Command has been asked to provide doctors and other medical staff for the facilities, he said.

"DRDO will set up two Dedicated Covid Hospitals in Haryana of 500 beds each at Panipat and Hissar," Vij tweeted.

"Work to start (on setting up of these hospitals) immediately," he added.

Haryana has registered a sharp increase in coronavirus cases in the last three weeks.

On April 20, the state recorded 7,811 new cases of COVID-19, its biggest single-day spike so far, while 35 people succumbed to the viral disease on Tuesday.

The number of active cases in the state is currently over 50,000.

Gurgaon, Faridabad and Sonipat districts, all falling in the National Capital Region, have seen a sharp jump in new cases recently, even as some others like Panchkula, Karnal and Kurukshetra also added to the surge.

Vij and Chief Minister Manohar Lal Khattar had earlier sought to assure the people on the COVID-19 situation, saying there was no need to panic and that the state has adequate beds, oxygen and medicines available.

<https://www.newindianexpress.com/nation/2021/apr/21/drdo-to-set-up-twocovid-19-hospitals-in-panipat-hisar-health-minister-anil-vij-2292828.html>



Haryana Home Minister Anil Vij (Photo | PTI)

Dry run of 900-bed DRDO-GU hospital in Ahmedabad today

Likely to start admitting patients from April 25 — or a day earlier if the dry run goes well, the facility is expected to ease the burden on public hospitals that are witnessing long queues of Covid-19 patients amid a surge in infection cases

By Ritu Sharma

The 900-bed dedicated Covid Care hospital, being set up in collaboration with the Defence Research and Development Organisation (DRDO) at Gujarat University's Convention and Exhibition Centre near GMDC ground in Ahmedabad's Memnagar, is set for a dry run Thursday.

Likely to start admitting patients from April 25 — or a day earlier if the dry run goes well, the facility is expected to ease the burden on public hospitals that are witnessing long queues of Covid-19 patients amid a surge in infection cases.

With Covid-19 cases mounting in the city, the state government on April 13 had announced the Dedicated Covid Care Hospital with 900 oxygen-equipped beds would start operating within two weeks. Of the total, at least 150 beds will be Intensive Care Units "which will also have arrangement for ventilators", the state government had then said. The facility will be further expanded by 500 beds, taking the total to 1,400 beds in the coming weeks, it had said.



The dedicated Covid care facility, equipped with oxygen supply, will start admitting patients from April 25. (Express Photo by Nirmal Harindran)

Being set up with an estimated expenditure of Rs 60 crore, the facility to provide free of cost Covid treatment has been created for at least three months. Its running cost, however, has been factored in for a period of six months. Of this, nearly 50 per cent cost will be shared by the state government and the remaining by the DRDO.

An oxygen tank with a standing capacity of a 50-55 metric ton (MT) will provide piped supply to each of the 900 beds, officials said. Recruitment of over 250 healthcare staff and specialists, including 200 staff nurses, for a period of 3-6 months is underway from Wednesday. The facility is also set to be equipped with nearly 150 medical and para-medical staff from the Armed forces. It is set to have a total of 700 medical and para-medical staff, including housekeepers.

Principal Secretary Education Anju Sharma will manage the operations of the facility and will be supported by Gujarat University vice-chancellor Himanshu Pandya and DRDO's Colonel B Chaubey along with other state government officials.

<https://indianexpress.com/article/cities/ahmedabad/dry-run-of-900-bed-drdo-gu-hospital-in-ahmedabad-today-7283757/>

DRDO setting up 900-bed hospital in Ahmedabad, 450-bed hospital in Lucknow, 750-bed facility in Varanasi

Both Uttar Pradesh and Gujarat have been witnessing a surge in COVID-19 cases like other states and health infrastructure there is coming under stress

New Delhi: As the coronavirus situation worsens in the country, the Defence establishment is coming to the aid of countrymen in every way possible.

On Tuesday, the Defence Research and Development Organisation (DRDO) announced that it is setting up hospitals in Lucknow and Varanasi in Uttar Pradesh and Ahmedabad in Gujarat.

According to the Ministry of Defence, DRDO chairman Dr G Satheesh Reddy informed during a ministerial meeting that the agency was working on setting up a 450-bed hospital in Lucknow, a 750-bed hospital in Varanasi and a 900-bed hospital in Ahmedabad.

It may be noted here that both Uttar Pradesh and Gujarat have been witnessing a surge in COVID-19 cases like other states and health infrastructure there is coming under stress.

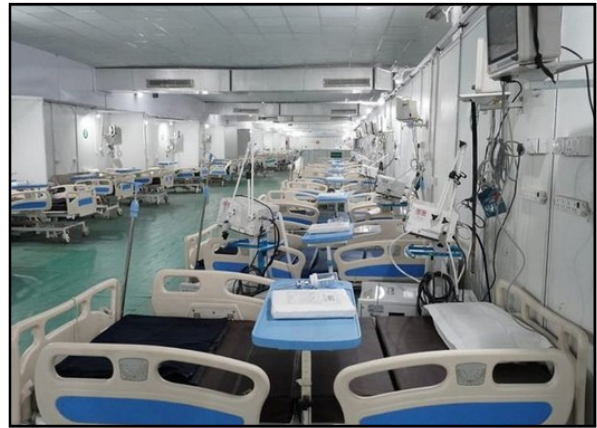
Defence Minister Rajnath Singh was today briefed about the measures taken by AFMS, DRDO, Defence Public Sector Undertakings (DPSUs), Ordnance Factory Board (OFB) and other departments of Ministry of Defence like the National Cadet Corps (NCC) in providing aid to the civil administration as they deal with the corona crisis.

“Defence Minister Rajnath Singh took a review of progress in COVID hospitals... He urged the DPSUs, OFB and DRDO to work on war footing to provide oxygen cylinders and extra beds to civil administration/state governments at the earliest,” it was reported.

The Defence Minister asked Defence PSUs, DRDO, Ordnance Factory Board to work on ‘war footing’ to provide oxygen cylinders and beds to state governments and also asked armed forces to remain in close contact with state governments and provide required assistance in dealing with COVID-19.

In an important decision, Defence Minister Rajnath Singh today also granted emergency financial powers to the three forces – Army, Navy and Air Force – to procure medical equipment, said officials.

<https://www.timesnownews.com/india/article/covid-19-drdo-setting-up-900-bed-hospital-in-ahmedabad-450-bed-hospital-in-lucknow-750-bed-facility-in-varanasi/747439>



DRDO's Covid-19 hospital near Delhi airport

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Tue, 20 April 2021 4:59PM

Webinar cum expo organised between Defence Ministries of India & Vietnam

A webinar cum expo was organised between Ministry of Defence, India and Ministry of National Defence, Vietnam on April 20, 2021. The theme of the webinar was 'India - Vietnam Defence Cooperation'. Various Indian companies such as Bharat Electronics Limited, Bharat Forge, Economic Explosives Limited, Garden Reach Shipbuilders & Engineers, Goa Shipyards Limited, HBL Power Systems, Larsen & Toubro Limited, Mahindra Defence, MKU, SMPP, Tata Advanced Systems made company and product presentations. Thirty-seven companies setup virtual exhibition stalls in the expo.

Ambassador, Embassy of India, Hanoi Shri Pranay Verma, Chief of General Department of Defence Industries, Ministry of National Defence, Vietnam Lt Gen Tran Hong Minh and other senior officials from both sides participated in the webinar. Joint Secretary (Defence Industries Production), MoD, Shri Anurag Bajpai emphasised that the mission for 'Self-Reliant India' is not just inward looking, but also about producing cost effective quality products and catering to the whole world especially friendly nations. He envisaged that Indian shipbuilding has come of age and gained tremendous expertise in this field. Indian shipyards are willing to work with Vietnamese shipyards for construction, repair and maintenance of platforms.

The webinar was organised under the aegis of Department of Defence Production, Ministry of Defence through FICCI. It is part of the series of webinars which are being organised with friendly foreign countries in order to boost defence exports and achieve defence export target of \$5 billion by 2025.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1712913>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 20 April 2021 4:59PM

भारत और वियतनाम के रक्षा मंत्रालयों के बीच वेबिनार एवं एक्सपो का आयोजन

दिनांक 20 अप्रैल, 2021 को रक्षा मंत्रालय और वियतनाम के राष्ट्रीय रक्षा मंत्रालय के बीच एक वेबिनार एवं एक्सपो का आयोजन किया गया था। इस वेबिनार का विषय 'भारत- वियतनाम रक्षा सहयोग' था। भारत इलेक्ट्रॉनिक्स लिमिटेड, भारत फोर्ज, इकोनॉमिक एक्सप्लोसिक्स लिमिटेड, गार्डन रीच शिपबिल्डर्स एंड इंजीनियर्स, गोवा शिपयार्ड लिमिटेड, एचबीएल पावर सिस्टम्स, लार्सन एंड टुब्रो लिमिटेड, महिंद्रा डिफेंस, एमकेयू, एसएमपीपी, टाटा एडवांस्ड सिस्टम्स जैसी विभिन्न भारतीय कंपनियों ने कंपनी और उत्पाद संबंधी प्रस्तुतियां दीं। 37 कंपनियों ने एक्सपो में आभासी तरीके से प्रदर्शनी स्टॉल लगाए।

हनोई में भारतीय दूतावास में राजदूत श्री प्रणय वर्मा, वियतनाम के राष्ट्रीय रक्षा मंत्रालय में सामान्य रक्षा उद्योग विभाग के प्रमुख लेफ्टिनेंट जनरल ट्रान हांग मिन्ह और दोनों पक्षों के अन्य वरिष्ठ अधिकारियों ने वेबिनार में भाग लिया। रक्षा मंत्रालय के संयुक्त सचिव (रक्षा उद्योग उत्पादन) श्री अनुराग बाजपेयी ने इस बात पर जोर दिया कि आत्मनिर्भर भारत मिशन न सिर्फ अंतर्मुखी है, बल्कि इसमें लागत प्रभावी गुणवत्ता वाले उत्पादों का उत्पादन और पूरी दुनिया को विशेष रूप से मैत्रीपूर्ण राष्ट्रों की आवश्यकताओं को पूरा करना भी है। उन्होंने परिकल्पना की कि भारतीय जहाज निर्माण परिपक्व हो गया है और इस क्षेत्र में हमने जबरदस्त विशेषज्ञता प्राप्त की है। भारतीय शिपयार्ड प्लेटफार्मों के निर्माण, मरम्मत और रखरखाव के लिए वियतनामी शिपयार्डों के साथ काम करने के इच्छुक हैं।

वेबिनार का आयोजन फिक्की के माध्यम से रक्षा उत्पादन विभाग के तत्वावधान में किया गया था। यह अनेक वेबिनारों की श्रृंखला का हिस्सा है जो रक्षा निर्यात को बढ़ावा देने और 2025 तक 5 अरब डॉलर के रक्षा निर्यात लक्ष्य को प्राप्त करने के उद्देश्य से मित्र देशों के साथ आयोजित की जा रही हैं।

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1713048>

Indian Air Force Chief RKS Bhadauria holds talks with French Air Force Chief Gen Philippe Lavigne

Synopsis

The Indian Air Force said Gen Lavigne and Air Chief Marshal Bhadauria in their talks noted the steady growth of operational exchanges between the two forces and explored ways to expand the cooperation further.

Chief of Air Staff Air Chief Marshal RKS Bhadauria on Tuesday held talks with Gen Philippe Lavigne, Chief of Staff of French Air and Space Force (FASF), on ways to further expand cooperation between the two sides.

Air Chief Marshal Bhadauria is on a five-day visit to France from Monday.

The Indian Air Force said Gen Lavigne and Air Chief Marshal Bhadauria in their talks noted the steady growth of operational exchanges between the two forces and explored ways to expand the cooperation further.

"Air Chief Mshl RKS Bhadauria visited @Armee_de_lair HQs & called on Gen Philippe Lavigne to discuss op issues common to the two Air Forces. The Chiefs noted the steady growth of operational exchanges & explored avenues to expand IAF- FASF ties," the IAF tweeted.

On Monday, it said Air Chief Marshal Bhadauria's visit will be a significant step in further enhancing mutual cooperation between the two air forces.

Gen Philippe Lavigne visited India in February last year.

The cooperation between the Indian and the French air forces have seen gradual expansion in the last few years.

Both the air forces have been carrying out exercise series 'Garuda'.

<https://economictimes.indiatimes.com/news/defence/indian-air-force-chief-rks-bhadauria-holds-talks-with-french-air-force-chief-gen-philippe-lavigne/articleshow/82177303.cms>



Chief of Air Staff Air Chief Marshal RKS Bhadauria with Gen Philippe Lavigne, Chief of Staff of French Air and Space Force

भारत के वायु सेना प्रमुख आरकेएस भदौरिया ने की फ्रांस के वायु सेना प्रमुख से बातचीत

भारत के वायु सेना प्रमुख एयर चीफ मार्शल आरकेएस भदौरिया ने मंगलवार को दोनों पक्षों के बीच सहयोग का विस्तार करने के तरीकों पर फ्रांसीसी वायु और अंतरिक्ष बल (एफएएसएफ) के चीफ ऑफ स्टाफ जनरल जनरल फिलिप के साथ बातचीत की।

By Shashank Pandey

नई दिल्ली: वायु सेना प्रमुख एयर चीफ मार्शल आरकेएस भदौरिया ने मंगलवार को फ्रांस एयर एंड स्पेस फोर्स (एफएएसएफ) के प्रमुख जनरल फिलिप् लावीग्ने से बातचीत की और दोनों पक्षों के बीच सहयोग को और आगे बढ़ाने के तरीकों पर चर्चा की। एयर चीफ मार्शल भदौरिया सोमवार से फ्रांस की पांच दिवसीय यात्रा पर हैं। भारतीय वायु सेना ने कहा कि जनरल लावीग्ने और एयर चीफ मार्शल भदौरिया ने बातचीत के दौरान दोनों बलों के बीच अभियानगत सहयोग के तेजी से बढ़ने की बात को स्वीकार किया और सहयोग को और आगे बढ़ाने के तरीकों पर विचार-विमर्श किया। वायु सेना ने ट्वीट किया, एयर चीफ मार्शल आरकेएस भदौरिया ने आर्मी डि लाएर मुख्यालय पहुंच कर जनरल फिलिप् से मुलाकात की और दोनों देशों की वायु सेनाओं के बीच साझा मुद्दों पर चर्चा की। दोनों प्रमुखों ने तेजी से बढ़ते अभियानगत सहयोग को स्वीकार किया और आपसी संबंधों को बढ़ाने पर चर्चा की।



वायु सेना प्रमुख आरकेएस भदौरिया सोमवार को फ्रांस के दौरे पर रवाना हुए थे। उनकी यात्रा को आपसी सहयोग बढ़ाने की दिशा में महत्वपूर्ण माना जा रहा है। इस बात की संभावना है कि एयर चीफ मार्शल भदौरिया अपनी यात्रा के दौरान फ्रांस के बोरडाक्स स्थित मेरीनैक एयर बेस पर पांच-छह राफेल विमानों के बेड़े को हरी झंडी दिखाएंगे। सूत्रों ने बताया कि राफेल विमान की निर्माता कंपनी दासौ एविएशन की योजना अप्रैल के आखिर तक छह लड़ाकू विमान भारत भेजने की है। लड़ाकू विमानों की नई खेप आने से वायु सेना को राफेल का दूसरा स्क्वाड्रन तैनात करने में मदद मिलेगी। राफेल के दूसरे स्क्वाड्रन को बंगाल के हासिमारा एयर बेस में तैनात किया जाएगा। राफेल के पहले स्क्वाड्रन को अंबाला एयर फोर्स स्टेशन पर तैनात किया गया था।

वायु सेना ने एक बयान जारी कर कहा कि एयर चीफ मार्शल भदौरिया 19-23 अप्रैल तक फ्रांस की यात्रा पर रहेंगे। इससे दोनों देशों की वायु सेनाओं के बीच संवाद का स्तर मजबूत बनाने में मदद मिलेगी। आपसी सहयोग बढ़ाने की दिशा में उनकी यह यात्रा महत्वपूर्ण कदम साबित होगी। बताते चलें कि फ्रेंच एयर एंड स्पेस फोर्स के प्रमुख जनरल फिलिप लेविन ने पिछले साल फरवरी में भारत की यात्रा की थी। भारत ने सितंबर 2016 में 36 राफेल विमानों की खरीद के लिए फ्रांस के साथ अंतर-सरकारी समझौता किया था। यह करार लगभग 58,000 करोड़ रुपये का था। इसके तहत दासौ एविएशन अब तक वायु सेना को 14 लड़ाकू विमानों की आपूर्ति कर चुकी है। राफेल विमानों की पहली खेप पिछले साल 29 जुलाई को भारत आई थी।

<https://www.jagran.com/news/national-indian-air-force-chief-rks-bhadauria-holds-talks-with-french-air-force-chief-21577700.html>

Four more Rafale aircraft arrive in India from France

New Delhi: The Indian Air Force (IAF) on Wednesday said the fifth batch of the Rafale aircraft arrived in India after flying a distance of almost 8,000 km from France.

The IAF did not disclose the number of aircraft that landed in India but people familiar with the development said four jets were part of the new batch.

The IAF said mid-air refuelling to the fleet was provided by the air forces of France and the United Arab Emirates (UAE).

"After a direct ferry from #MerignacAirBase, France, the 5th batch of Rafales arrived in India on 21 Apr. The fighters flew a distance of almost 8,000 Kms with air-to-air refuelling support by @Armedelair and UAE AF. IAF thanks both the Air Forces for their co-operation," it said in a tweet.

Earlier, the aircraft were flagged off from the Merignac airbase in France by Chief of Air Staff Air Chief Marshal RKS Bhadauria, who is on a visit to France.

The IAF chief also visited a Rafale aircraft training centre on the third day of his five-day visit to the European country.

"Air Chief Mshl RKS Bhadauria on an official tour to France lauds pilots & sees off the next batch of Rafales on a non stop flight to India with mid air refueling by French Air force & UAE. Thanks France esp FASF & French Industry for timely delivery & pilot training on schedule despite covid," the Indian embassy in France wrote on Twitter.

In his brief remarks, Air Chief Marshal Bhadauria said some of the Rafale aircraft have been delivered a "little bit" ahead of time and it has contributed to the overall combat potential of the IAF.

Ahead of his visit, military officials in Delhi said Air Chief Marshal Bhadauria's trip to France is expected to boost cooperation between the IAF and the French Air and Space Force (FASF).

"This ferry, which is the fifth from here, marks the end of the third batch of our pilots and all our maintenance crew. The Rafale training centre has provided world-class training and it is because of the level and quality of training that we were able to operationalise the aircraft quickly," he said.

The IAF chief also thanked the French government and the French air force for providing the required support for the training programme as well as for the ferrying of the aircraft to India.

The arrival of the new batch of the aircraft will pave the way for the IAF to raise a second squadron of Rafale jets. The new squadron will be based at the Hasimara air base in West Bengal.

The first Rafale squadron is based at the Ambala air force station. A squadron comprises around 18 aircraft.

India had signed an inter-governmental agreement with France in September 2016 for the procurement of 36 Rafale fighter jets at a cost of around Rs 58,000 crore.

With the arrival of the new batch, the number of Rafale jets with the IAF has gone up to 18.

The first batch of five Rafale jets arrived in India on July 29 last year.

On Tuesday, Air Chief Marshal Bhadauria held talks with General Philippe Lavigne, Chief of Staff of the FASF, on ways to further expand cooperation between the two sides.

(This story has not been edited by THE WEEK and is auto-generated from PTI)

<https://www.theweek.in/wire-updates/national/2021/04/21/del117-def-rafale-arrival.html>

Development activities will have to be enhanced in border areas for reverse migration: CDS

Addressing Uttarakhand police officers on the subject of “Role of Uttarakhand in Tackling National Security Challenges”, General Rawat said that road, health and education facilities will have to be enhanced in border areas for reverse migration

Dehradun: Chief of Defence Staff General Bipin Rawat Tuesday said that migration from international borders was not good for national security and development activities need to be increased in border areas for reverse migration. Addressing Uttarakhand police officers on the subject of “Role of Uttarakhand in Tackling National Security Challenges”, General Rawat said that road, health and education facilities will have to be enhanced in border areas for reverse migration.



Uttarakhand shares a 350-km border with China and a 275-km boundary with Nepal. The CDS said there is a favourable atmosphere in the state for tourism and industrial activities. DGP Ashok Kumar assured General Rawat of cooperation on reverse migration, international border security and other issues.

<https://indianexpress.com/article/india/development-activities-will-have-to-be-enhanced-in-border-areas-for-reverse-migration-cds-7282241/>

INDIA
TODAY

India to retire first Kilo-class submarine this year | India Today Insight

But its submarine woes are unlikely to end soon as it stares at a lost decade of its underwater arm

By Sandeep Unnithan

Delhi: The Indian Navy is decommissioning the INS Sindhudhvaj, a Kilo-class submarine, sometime this year. It will set in motion a process of phasing out of a class of boats that have formed the backbone of the navy’s underseas fleet for nearly three decades. The decommissioning ceremony was due in Mumbai this April but is now delayed by two months awaiting clearances from the defence ministry. The Sindhudhvaj was acquired from the Soviet Union in 1987. With its retirement, the navy’s submarine arm dips to 14 units. Seven of these submarines are in the Kilo class.



INS Sindhudhvaj (S56) is a Sindhughosh-class submarine of the Indian Navy

Dubbed the ‘Kilo’ class by NATO, the Project 877 EKMs are one of the world’s commonly visible conventional submarines with 62 units currently in service across nine navies in

the world. India acquired eight such subs between 1986 and 1991. It later acquired two more submarines from the Russian Federation, between 1998 and 2000. They were the navy's first submarines that could fire anti-ship and land attack cruise missiles from beneath the surface, making them a formidable force multiplier in the naval fleet.

One unit, the INS Sindhurakshak, was lost in an accident in 2013 and a second, the Sindhuvir, was transferred to the Myanmar navy last year.

The Kilos are being replaced by the French Scorpene submarines which are being built under licence by the Mazagon Dock Shipbuilders Ltd. Three of the 'Kalvari class' have so far been inducted; the third, the INS Karanj, was commissioned in Mumbai on March 11 this year. Three more Scorpenes, the Vela, Vagir and Vagsheer are to be commissioned by 2023. But these will not meet the navy's requirements for a force of 24 conventional submarines. The closest it got to that figure was in 1995 when it had 20 submarines. Since then, the pace of retirements has outstripped acquisitions. The navy's submarine arm is now staring at a lost decade between 2021 and 2030 where its fleet will stagnate. This is when its maritime threat perceptions have significantly escalated with the explosive growth in the Chinese navy and its increasing presence in the Indian Ocean.

Mazagon Docks Ltd, which built the Scorpenes, is believed to have made an offer for a further three units to be built at its Mumbai yard, but this has not found favour with the navy. Nor has a new offer for six Project 636 improved Kilos from Russia's Rosoboronexport (believed to have been made last year). The Russian shipyard says it can deliver the first unit in five years and complete deliveries of all six in a decade.

The navy is focused on its future conventional submarines--the Project 75 'India' boats to be made by an Indian firm in partnership with a foreign original equipment manufacturer (OEM) which will give India the capability to build its own conventional submarines. Project 75, first proposed nearly two decades ago, is yet to deliver a single unit. Legal issues have delayed the issue of the Request for Proposals from the MoD to a 'strategic partnership' between an Indian yard and a foreign OEM. Even if the project moves at warp speed, it will take at least eight years before a new submarine joins the fleet.

As a stop-gap, three Kilo class submarines have been put through a second medium refit (MR) at a Russian shipyard with a fourth scheduled to depart this year. A medium refit is usually done only once in the 30-year life of a submarine. The second refit slaps on an additional decade to the submarine hull taking it to around 40 years. These MRs, costing around \$200 million (Rs 1,400 crore) each, were initiated around five years ago when it became increasingly clear that the navy was not getting new submarines in a hurry. With the delays in Project 75I and the dip in the force levels, the navy could well be forced to take a call to upgrade the only three Kilos which have not had a second medium refit. This will enable them to serve through the lost decade.

<https://www.indiatoday.in/india-today-insight/story/india-to-retire-first-kilo-class-submarine-this-year-1793193-2021-04-20>

Can the United States work with India to counter China?

The two countries know they need to work together, but will having a common enemy be enough?

By Emili Tamkin

In January the Atlantic Council, a think tank based in Washington, DC, published a report entitled *The Longer Telegram*. Modelled after the 8,000-word telegram that George Kennan sent the State Department in 1946 from and about the Soviet Union, this report declared, “The single most important challenge facing the United States and the democratic world in the 21st century is the rise of an increasingly authoritarian China under Xi Jinping”, and set about describing a US strategy.

India is mentioned no fewer than 19 times. India, the report says, needs to be induced “to abandon its final political and strategic reservations against” a fully operationalised Quad (the strategic partnership established between the US, India, Japan and Australia). The US, China, and India should have trilateral talks on climate change, the report stated. Chinese strategy towards India will be uncertain. A US coalition to deal with China must ultimately include India. And so on.



President Joe Biden and US secretary of state Antony Blinken participate in a virtual meeting with leaders of Quadrilateral Security Dialogue countries on 12 March 2021

The Atlantic Council is one of many organisations in Washington to suggest that the United States should partner with India to counter China. The Center for a New American Security, another DC think tank, has launched an Indo-Pacific Security Program, and in February held a virtual event on “India, China, and the Quad: The Future of US Strategy in the Indo-Pacific”. In March, US defence secretary Lloyd Austin stopped off in India on his first international trip. At secretary of state Antony Blinken’s confirmation hearing, he was asked by Senator Mitt Romney of Utah how the US can strengthen its ties with India. “I think India has been very much a bipartisan success story over successive administrations,” Blinken said, noting the Indo-Pacific and climate change as two particular areas of potential cooperation.

There is, then, an emerging consensus in Washington that the United States and India need to partner together.

But what, given India’s other partnerships and domestic situations, does that look like in practice?

The short version is that New Delhi also understands that it has to work with Washington.

“Most people accept it as inevitable,” said Rajesh Rajagopalan, a professor of international politics at Jawaharlal Nehru University. That doesn’t mean it’s a particularly popular idea. But there is a sense that India has tried to reach out to and work with China, and, even so, 20 Indian troops were killed by Chinese forces in a disputed Himalayan region last year. “What China is doing is seen as some kind of betrayal.”

Relations between the United States and India have been slowly, steadily warming since at least the mid-2000s, when the two signed the US-India Civil Nuclear Agreement. India has always been pointedly non-aligned, but was close to the Soviet Union and then Russia, which still provides a reported 60 per cent of India’s defence supplies. Certainly, China is not the only reason for the

growth of the US-India relationship; personal ties and immigration from India to the United States have unquestionably brought the two countries closer together. Still, China has helped.

“I do not think, particularly on the defence and security side, you would have seen India and the US engage at the level they are without shared concerns about the challenges a rising China’s behaviour is posing,” said Tanvi Madan, senior fellow at the Brookings Institution.

“They don’t have an identical view, but they have enough convergence,” Madan said. “It gives both countries the incentive to manage differences.”

Those differences, however, will continue to exist.

There’s Russia, for one. Moscow may have not done the India-Russia relationship any favours by getting as close as it has to Beijing, but, as a matter of principle, India will not have its relationships dictated by the United States. And on a practical level, “You can’t unwind trillions of dollars of front-line equipment that come from Russia,” said Vipin Narang, an associate professor of political science at the Massachusetts Institute of Technology. “You need spare parts for that, you need maintenance for that.”

US understanding of this dynamic will be tested when the first missile batteries of the S-400 missile defence system India is purchasing from Russia arrive later this year. Austin reportedly already raised concerns over the purchase. Under the Countering America's Adversaries Through Sanctions Act, the United States could sanction India over the purchase. India is expected to get a waiver, but if it doesn’t, any sanctions would in all likelihood create a significant rupture.

There’s also the matter of the Indian strategic community, some parts of which are sceptical about how closely to work with the United States. Earlier this month, the *USS John Paul Jones* entered India’s Exclusive Economic Zone. The United States regularly conducts such exercises, but this one created a furore in the media.

The “strategic empathy” that existed in the historic relationship between India and the Soviet Union, inherited by India and Russia, doesn’t exist to the same extent between India and the United States, Rajagopalan said. There is “far more likely to be strong reaction to things that the United States does that are seen as not favourable to India”, he said. The ship was one such example.

The matter of human rights and democracy is another. Biden has suggested bringing together a global summit of democracies. But such a summit could raise questions about India’s democratic fundamentals, an issue being thrown into starker relief as the country struggles with record-high cases of Covid while Prime Minister Narendra Modi continues to hold political rallies. For that matter, it could raise questions about the state of democracy in America, too.

“For Biden, it’s not a winning hand, especially for Democrats in Congress, to paint it as an alliance of democracies,” Narang said. “If this is about China, let’s just say it’s about China.”

The catch, though, is that for a closer US-India partnership to last, the relationship can’t only be about China.

It is “not healthy for any relationship to depend on just one pillar”, Madan, author of *Fateful Triangle: How China Shaped US-India Relations During the Cold War*, said.

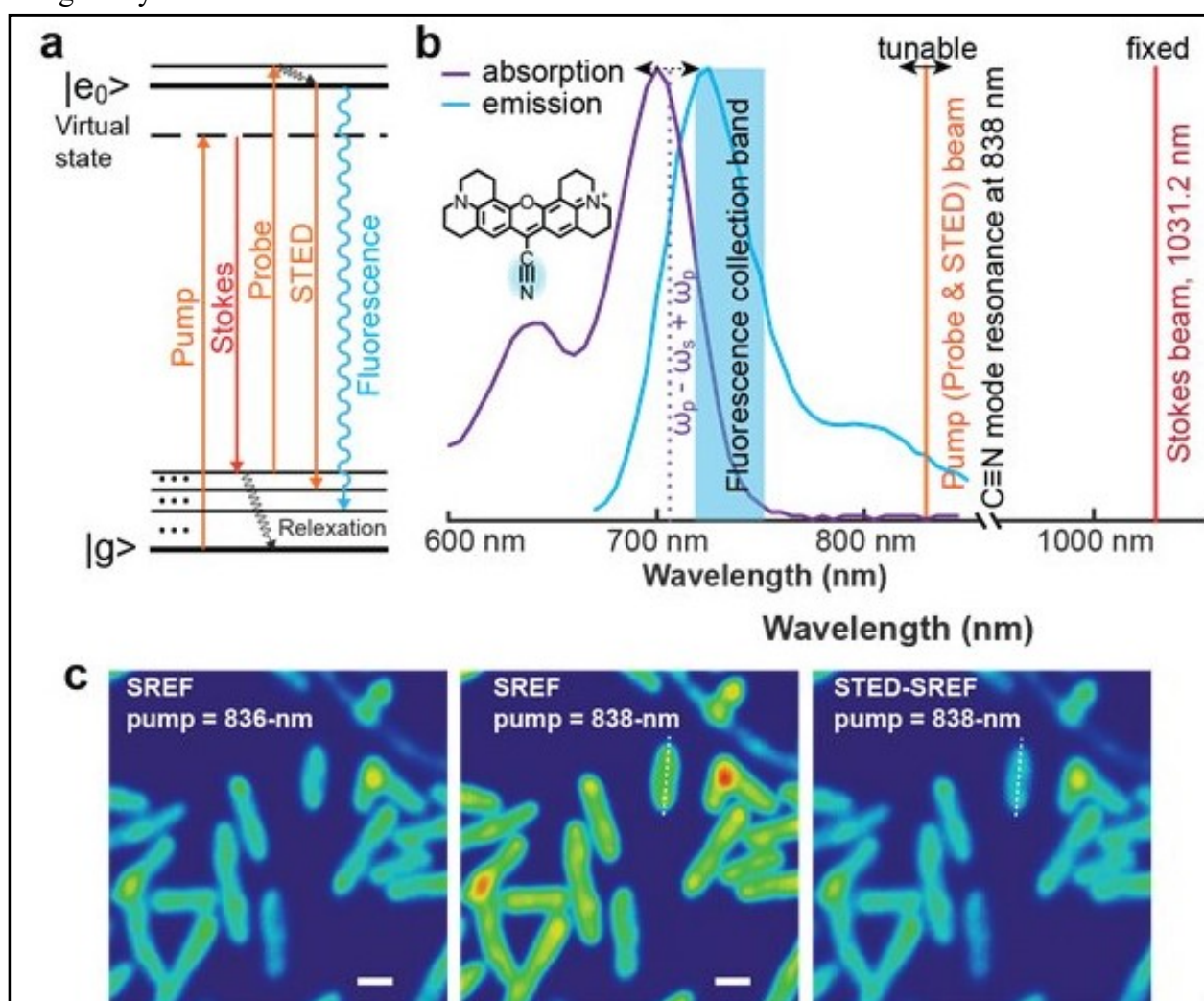
There are convergences between India and the United States on China, but divergences, too. And if the relationship is all about China and Indian-US cooperation in the Indo-Pacific, then those differences could make or break the relationship. If you have, as Madan put it, “just one pillar bearing all the weight”, that pillar can only bend so far before it breaks.

<https://www.newstatesman.com/international/places/2021/04/can-united-states-work-india-counter-china>

Thu, 22 April 2021

Vibrational microscopy goes super resolution

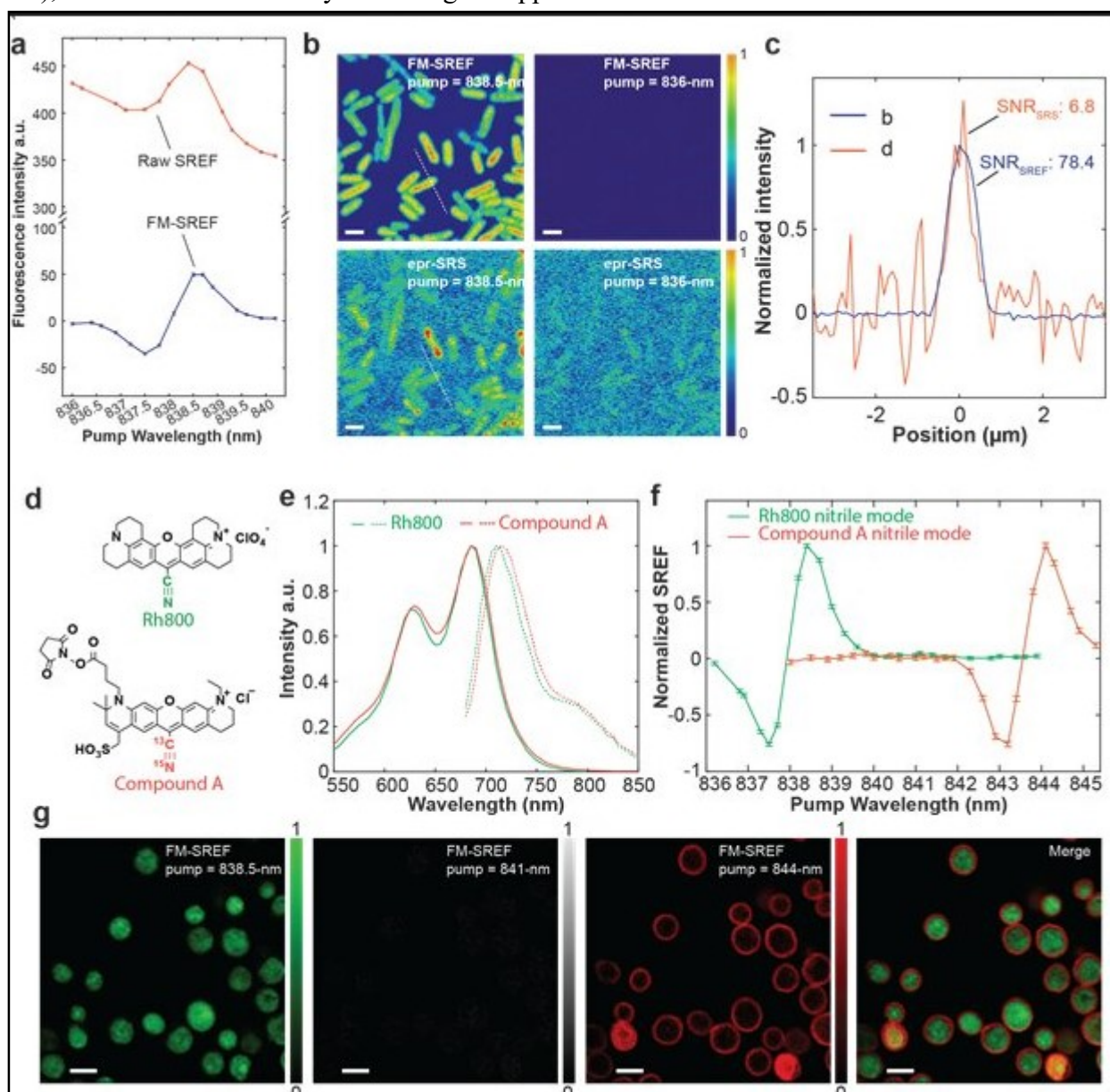
True super-resolution imaging beyond the diffraction limit remains a major challenge for far-field Raman microscopy especially in biological applications. Harnessing Stimulated Raman Excited Fluorescence (SREF) as an ultrasensitive vibrational contrast, a team at Columbia University has recently invented a novel super-resolution vibrational microscopy. Their new method opens up super-resolution, nanometer-spectral-resolution multicolor vibrational imaging of biological systems.



a, Energy diagram of STED-SREF. b, Spectroscopy configuration of STED-SREF. The nitrile mode of Rhodamine 800 (Rh800) is used here. c, SREF/STED-SREF imaging of Rh800 stained E. coli cells with pump wavelengths set at 836 nm (off resonance of the nitrile mode) and 838 nm (vibrational resonance of the nitrile mode). Direct coupling of stimulated emission depletion (STED) with SREF imaging fails to achieve desired resolution improvements. The anti-Stokes fluorescence background (shown in SREF pump=836 nm) has an undesired role in preventing direct adoption of super-resolution fluorescence technique. Credit: Hanqing Xiong†, Naixin Qian†, Yupeng Miao, Zhilun Zhao, Chen Chen, Wei Min.

It has been a long pursuit to develop super-resolution imaging techniques for Raman microscopy, which has intrinsic advantages of chemical specificity over its fluorescence counterpart. Despite the perceived importance and extensive research efforts, true super-resolution

(defined as diffraction-unlimited) Raman imaging of biological systems in the optical far-field remains challenging due to the deficiency in sensitivity for conventional Raman scattering. Consequently, those reported super-resolution vibrational imaging methods are based on excitation saturating, depleting, or high-order nonlinearity of the Raman transitions. These require extremely intense laser power in order to achieve a moderate resolution improvement (often less than a factor of 2), which inhibits its utility for biological application.

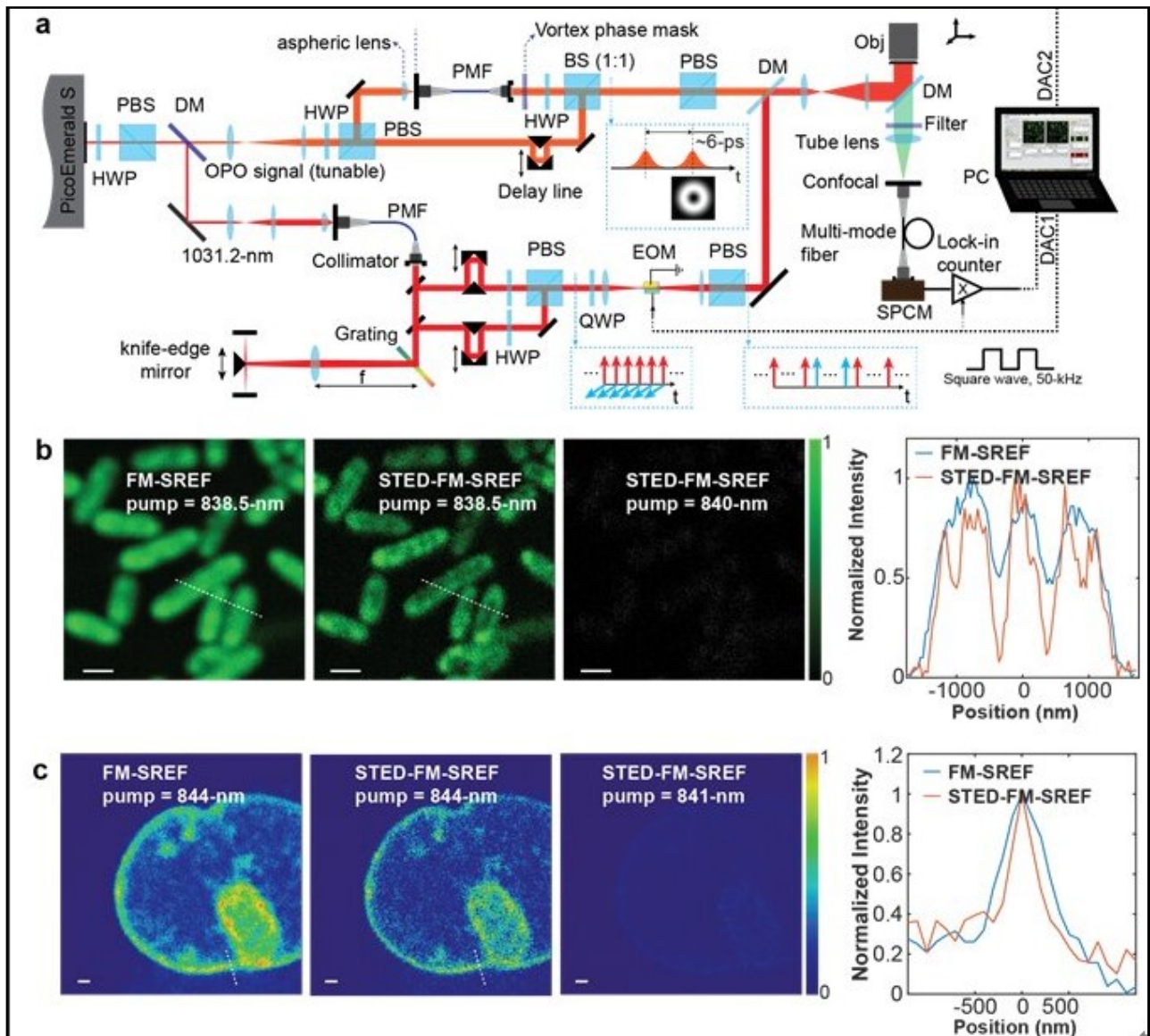


a, the raw SREF spectrum of Rh800 nitrile mode acquired by conventional SREF excitation (red curve) and corresponding background-free FM-SREF spectrum acquired by FM-SREF excitation. b, the FM-SREF imaging and electronic pre-resonance stimulated Raman scattering (epr-SRS) imaging of Rh800 stained *E. coli* cells. c, the corresponding intensity distribution for FM-SREF and epr-SRS along the corresponding white dashed lines in (b). d, chemical structures of the two SREF dyes employed. e, the absorption spectra (solid curves) and emission spectra (dash curves) of the two dyes in water, which are not resolvable for conventional fluorescence spectroscopy. f, the FM-SREF spectra of the nitrile modes of the two dyes. g, multicolor FM-SREF imaging of *S. cerevisiae* cells. Credit: Hanqing Xiong[†], Naixin Qian[†], Yupeng Miao, Zhilun Zhao, Chen Chen, Wei Min.

In a new paper published in *Light: Science & Applications*, a team of scientists, led by Professor Wei Min from Columbia University, USA, has developed a novel super-resolution vibrational microscopy harnessing Stimulated Raman Excited Fluorescence (SREF) as an ultrasensitive vibrational contrast. SREF couples the vibrational excitation with fluorescence detection and enables all-far-field Raman spectroscopy with sensitivity down to single-molecule. However, direct coupling of stimulated emission depletion (STED) with SREF imaging fails to achieve

super-resolution imaging due to the presence of the anti-stokes fluorescence background, which cannot be depleted by the STED beam.

In this new work, the team devised a frequency-modulation (FM) strategy to remove this broadband background. By temporally modulating the excitation frequency on- and off- the targeted vibrational resonance but still within the background's broad linewidth, they can generate an intensity modulation on the pure vibrational signal (but not on the background). The background-free vibrational signal can be subsequently demodulated by a lock-in detection. Comparing with the typical raw SREF spectrum, the spectrum acquired by FM-SREF represents the pure SREF signal, which enables high-contrast background-free SREF imaging. They further synthesized new isotope-edited SREF dyes to facilitate multicolor FM-SREF biological imaging with sharp vibrational contrast. Two vibrational colors are separated by FM-SREF with minimal cross-talk, which is nearly impossible by conventional fluorescence microscopy. Such chemical specificity of vibrational imaging has unique advantages for multiplexed optical imaging.



a, the system diagram of STED-FM-SREF microscopy. b, imaging of the same Rh800-stained *E. coli* cells by FM-SREF microscopy and STED-FM-SREF microscopy and the corresponding intensity distributions along the dash lines. c, imaging of the same compound-A-stained Cos7-cell nucleus by FM-SREF microscopy and STED-FM-SREF microscopy and the corresponding intensity distributions along the dash lines. Credit: Hanqing Xiong†, Naixin Qian†, Yupeng Miao, Zhilun Zhao, Chen Chen, Wei Min

Finally, by integrating STED with background-free FM-SREF, they accomplished high-contrast super-resolution vibrational imaging with STED-FM-SREF, whose spatial resolution is only determined by the signal-to-noise. They demonstrated more than two times resolution

improvement in biological systems with moderate laser excitation power. With future optimization on the instrumentation and imaging probes, STED-FM-SREF microscopy is envisioned to aid a wide variety of biological applications, with its superb resolution, high sensitivity, unique vibrational contrast, and biocompatible excitation power.

More information: Hanqing Xiong et al, Super-resolution vibrational microscopy by stimulated Raman excited fluorescence, *Light: Science & Applications* (2021). DOI: [10.1038/s41377-021-00518-5](https://doi.org/10.1038/s41377-021-00518-5)

Journal information: [Light: Science & Applications](https://phys.org/news/2021-04-vibrational-microscopy-super-resolution.html)
<https://phys.org/news/2021-04-vibrational-microscopy-super-resolution.html>



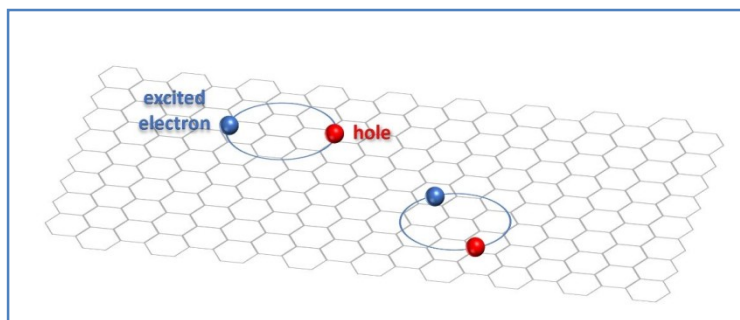
Thu, 22 April 2021

Scientists capture first ever image of an electron's orbit within an exciton

In a world first, researchers from the Okinawa Institute of Science and Technology Graduate University (OIST) have captured an image showing the internal orbits, or spatial distribution, of particles in an exciton—a goal that had eluded scientists for almost a century. Their findings are published in *Science Advances*.

Excitons are excited states of matter found within semiconductors—a class of materials that are key to many modern technological devices, such as solar cells, LEDs, lasers and smartphones.

"Excitons are really unique and interesting particles; they are electrically neutral which means they behave very differently within materials from other particles like electrons. Their presence can really change the way a material responds to light," said Dr. Michael Man, co-first author and staff scientist in the OIST Femtosecond Spectroscopy Unit. "This work draws us closer to fully understanding the nature of excitons."



Excitons are technically not particles, but quasiparticles (quasi-meaning "almost" in Latin). They are formed by the electrostatic attraction between excited, negatively charged electrons, and positively charged holes. Holes are spaces left behind by the excited electrons and are themselves a type of quasiparticle. Credit: OIST

Excitons are formed when semiconductors absorb photons of light, which causes negatively charged electrons to jump from a lower energy level to a higher energy level. This leaves behind positively charged empty spaces, called holes, in the lower energy level. The oppositely charged electrons and holes attract and they start to orbit each other, which creates the excitons.

Excitons are crucially important within semiconductors, but so far, scientists have only been able to detect and measure them in limited ways. One issue lies with their fragility—it takes relatively little energy to break the exciton apart into free electrons and holes. Furthermore, they are fleeting in nature—in some materials, excitons are extinguished in about a few thousandths of a billionth of a second after they form, when the excited electrons "fall" back into the holes.

"Scientists first discovered excitons around 90 years ago," said Professor Keshav Dani, senior author and head of the Femtosecond Spectroscopy Unit at OIST. "But up until very recently, one could generally access only the optical signatures of excitons—for example, the light emitted by an exciton when extinguished. Other aspects of their nature, such as their momentum, and how the electron and the hole orbit each other, could only be described theoretically."

However, in December 2020, scientists in the OIST Femtosecond Spectroscopy Unit published a paper in *Science* describing a revolutionary technique for measuring the momentum of the electrons within the excitons.

Now, reporting in *Science Advances*, the team used the technique to capture the first ever image that shows the distribution of an electron around the hole inside an exciton.

The researchers first generated excitons by sending a laser pulse of light at a two-dimensional semiconductor—a recently discovered class of materials that are only a few atoms in thickness and harbor more robust excitons.

After the excitons were formed, the team used a laser beam with ultra-high energy photons to break apart the excitons and kick the electrons right out of the material, into the vacuum space within an electron microscope.

The electron microscope measured the angle and energy of the electrons as they flew out of the material. From this information, the scientists were able to determine the initial momentum of the electron when it was bound to a hole within the exciton.

"The technique has some similarities to the collider experiments of high-energy physics, where particles are smashed together with intense amounts of energy, breaking them open. By measuring the trajectories of the smaller internal particles produced in the collision, scientists can start to piece together the internal structure of the original intact particles," said Professor Dani. "Here, we are doing something similar—we are using extreme ultraviolet light photons to break apart excitons and measuring the trajectories of the electrons to picture what's inside."

"This was no mean feat," continued Professor Dani. "The measurements had to be done with extreme care—at low temperature and low intensity to avoid heating up the excitons. It took a few days to acquire a single image."

Ultimately, the team succeeded in measuring the exciton's wavefunction, which gives the probability of where the electron is likely to be located around the hole.

"This work is an important advancement in the field," said Dr. Julien Madeo, co-first author and staff scientist in the OIST Femtosecond Spectroscopy Unit. "Being able to visualize the internal orbits of particles as they form larger composite particles could allow us to understand, measure and ultimately control the composite particles in unprecedented ways. This could allow us to create new quantum states of matter and technology based on these concepts."

More information: "Experimental measurement of the intrinsic excitonic wave function" *Science Advances* (2021). advances.sciencemag.org/lookup.../1126/sciadv.abg0192

Journal information: *Science Advances* , *Science*
<https://phys.org/news/2021-04-scientists-capture-image-electron-orbit.html>

New optics-on-a-chip device paves way to capturing fast chemical, material and biological processes

Researchers have developed new X-ray optics that can be used to harness extremely fast pulses in a package that is significantly smaller and lighter than conventional devices used to modulate X-rays. The new optics are based on microscopic chip-based devices known as microelectromechanical systems (MEMS).

"Our new ultrafast optics-on-a-chip is poised to enable X-ray research and applications that could have a broad impact on understanding fast-evolving chemical, material and biological processes," said research team leader Jin Wang from the U.S Department of Energy's Argonne National Laboratory. "This could aid in the development of more efficient solar cells and batteries, advanced computer storage materials and devices, and more effective drugs for fighting diseases."

In *The Optical Society (OSA) journal Optics Express*, the researchers demonstrated their new X-ray optics-on-a-chip device, which measures about 250 micrometers and weighs just 3 micrograms, using the X-ray source at Argonne's Advanced Photon Source synchrotron. The tiny device performed 100 to 1,000 times faster than conventional X-ray optics, which tend to be bulky.

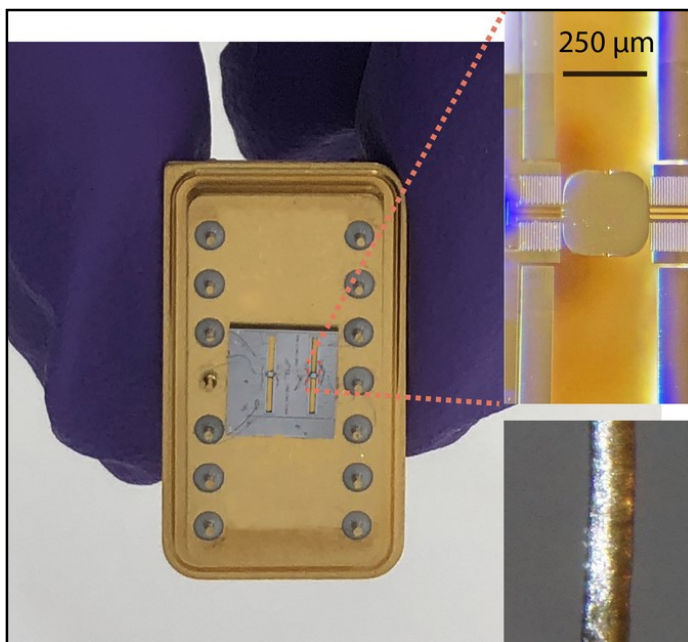
"Although we demonstrated the device in a large X-ray synchrotron facility, when fully developed, it could be used with conventional X-ray generators found in scientific labs or hospitals," said Wang. "The same technology could also be used to develop other devices such as precise dosage delivery systems for radiation therapy or fast X-ray scanners for non-destructive diagnostics."

Capturing fast processes

X-rays can be used to capture very fast processes such as chemical reactions or the quickly changing dynamics of biological molecules. However, this requires an extremely high-speed camera with a fast shutter speed. Because many materials that are opaque to light are transparent to X-rays it can be difficult to improve the speed of shutters effective for X-rays.

The new X-ray MEMS device is used inside this experiment enclosure at the Advanced Photon Source. Shown is the 6-circle diffractometer that manipulates the MEMS optics in a vacuum chamber. Credit: Jin Wang

To solve this challenge, the research team, consisting of scientists from Argonne's Advanced Photon Source and Center for Nanoscale Materials, turned to MEMS-based devices. "In addition to being used in many of the electronics we use daily, MEMS are also used to manipulate light for



This photograph shows two MEMS elements on a single chip, with the active elements of $250\ \mu\text{m} \times 250\ \mu\text{m}$. A micrograph (top inset) the actual size of the diffractive element, as compared to a section of human hair (bottom inset). Credit: Jin Wang

high-speed communication," said Wang. "We wanted to find out if MEMS-based photonic devices can perform similar functions for X-rays as they do with visible or infrared light."

In the new work, the researchers show that the extremely small size and weight of their MEMS-based shutter allows it to oscillate at speeds equivalent to about one million revolutions per minute (rpm). The researchers leveraged this high speed and the MEMS material's X-ray diffractive property to create an extremely fast X-ray shutter.

Boosting shutter speed

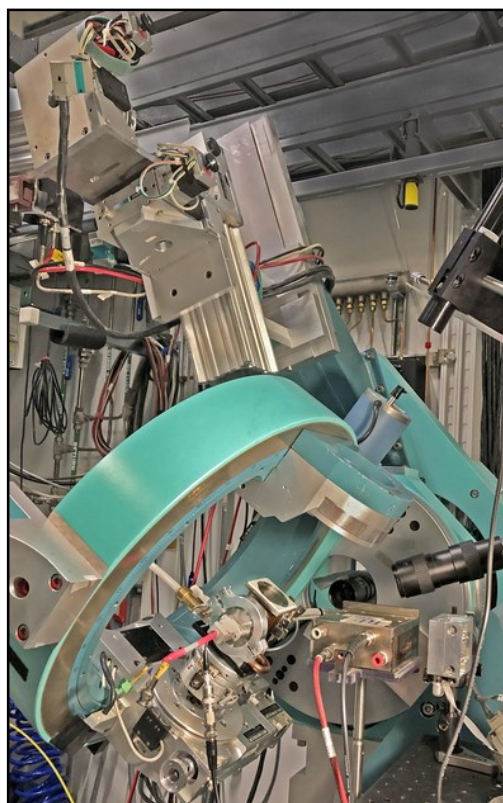
Using their new optics-on-a-chip with X-rays produced by the Advanced Photon Source, the researchers demonstrated that it could provide a stable shutter speed as fast as one nanosecond with an extremely high on/off contrast. This could be used to extract single X-ray pulses from the source, even if the pulses were only 2.8 nanoseconds apart from each other.

"We show that our new chip-based technology can perform functions not possible with conventional large optics," said Wang. "This can be used to create ultrafast probes for studying fast processes in novel materials."

The researchers are now working to make the devices more versatile and robust so that they can be used continuously over long periods of time. They are also integrating the peripheral systems used with the tiny chip-based MEMS devices into a deployable stand-alone instrument.

More information: Pice Chen et al. Optics-on-a-chip for ultrafast manipulation of 350-MHz hard x-ray pulses, *Optics Express* (2021). DOI: [10.1364/OE.411023](https://doi.org/10.1364/OE.411023)

Journal information: [Optics Express](https://phys.org/news/2021-04-optics-on-a-chip-device-paves-capturing-fast.html)
<https://phys.org/news/2021-04-optics-on-a-chip-device-paves-capturing-fast.html>



The new X-ray MEMS device is used inside this experiment enclosure at the Advanced Photon Source. Shown is the 6-circle diffractometer that manipulates the MEMS optics in a vacuum chamber. Credit: Jin Wang



Thu, 22 April 2021

Covaxin neutralises double mutant strain in India: Research body ICMR

COVID-19 Vaccine India: Bharat Biotech's Covaxin has received Emergency Use Authorizations (EUAs) for COVID-19 treatment in India and in several countries across the world with another 60 in the process

New Delhi: Made-in-India COVID-19 vaccine, Covaxin, neutralises multiple variants of SARS-CoV-2 and effectively works against the double mutant strain as well, the Indian Council of Medical Research (ICMR) said today.

Bharat Biotech's Covaxin has received Emergency Use Authorizations (EUAs) for COVID-19 treatment in India and in several countries across the world with another 60 in the process.

"ICMR study shows Covaxin neutralises against multiple variants of SARS-CoV-2 and effectively neutralises the double mutant strain as well," the ICMR tweeted.

ICMR-National Institute of Virology has successfully isolated and cultured multiple variants of concern of SARS-CoV-2 virus: B.1.1.7 (the UK variant), B.1.1.28 (Brazil variant) and B.1.351 (South Africa variant).

ICMR-NIV has demonstrated the neutralisation potential of Covaxin against the UK variant and Brazil variant, the top health research body said.

ICMR-NIV recently has been successful in isolating and culturing the double mutant strain B.1.617 SARS-CoV-2 identified in certain regions of India and several other countries, the ICMR stated.

"Covaxin has been found to effectively neutralise the double mutant strain as well," it said. *(Except for the headline, this story has not been edited by NDTV staff and is published from a syndicated feed.)*

<https://www.ndtv.com/india-news/covid-19-vaccine-covaxin-neutralises-double-mutant-strain-in-india-research-body-icmr-2418587>



Made-in-India COVID-19 vaccine, Covaxin, neutralises multiple variants of SARS-CoV-2 COVID-19 virus

