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समाचार पत्रों से चयित अंश Newspapers Clippings

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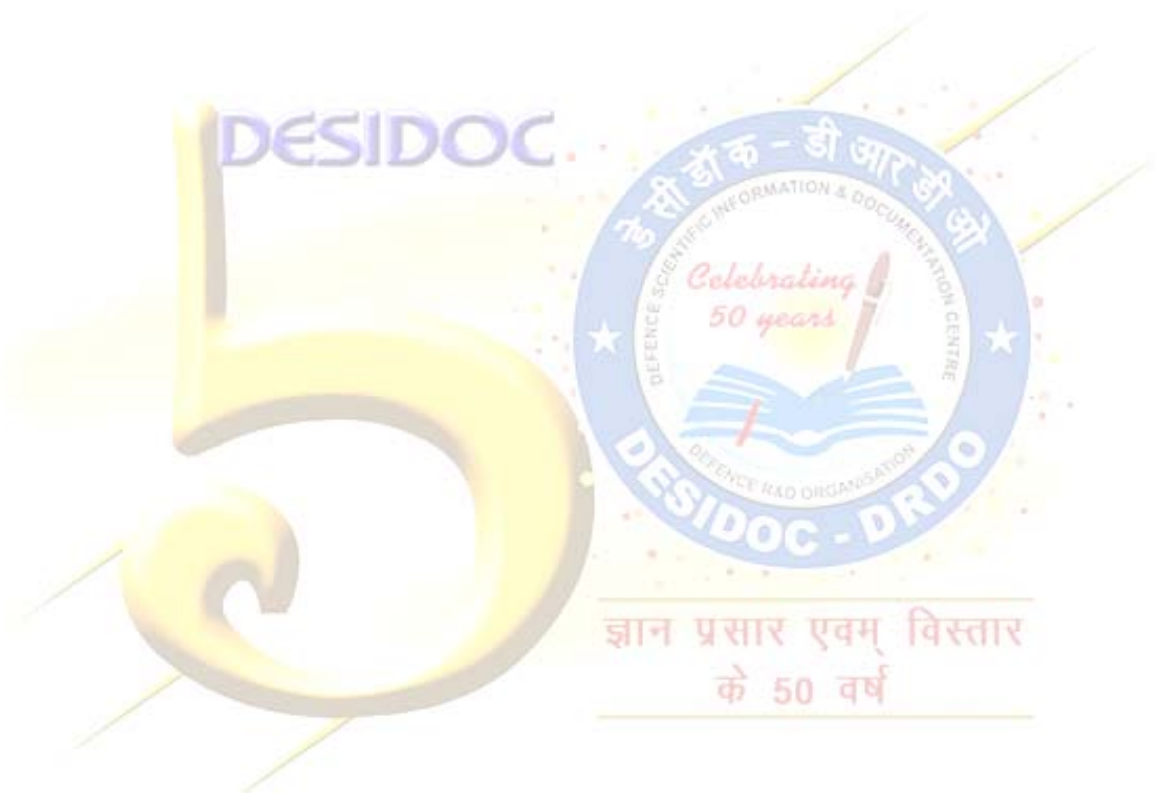


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Remembering Dr APJ Abdul Kalam



Press Information Bureau
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Mon, 27 Jul 2020 8:59PM

DRDO launches 'Dare to Dream 2.0' contest for innovators and startups on 5th death anniversary of former president Dr APJ Abdul Kalam

Defence Research and Development Organisation (DRDO) has launched its innovation contest 'Dare to Dream 2.0' on the 5th death anniversary of former President and noted scientist Dr APJ Abdul Kalam here today. Dr Kalam, also known as missile man, had the vision of self-reliance. The scheme is being launched for emerging technologies to promote the individuals & startups for innovation in defence and aerospace technologies in the country after the call of 'Atmanirbhar Bharat' given by Prime Minister Shri Narendra Modi.

The 'Dare to Dream 2.0' is an open challenge to promote the innovators and startups of the country. The winners will be decided after due evaluation by an expert committee. Award money, up to Rs 10 lakh for startup and Rs five lakh to individual category, will be given to the winners.

Raksha Mantri Shri Rajnath Singh has expressed his happiness to announce the contest for the 'Ignited Minds', whether innovators or startups. Further information will be available on DRDO website www.drdo.gov.in soon.

<https://pib.gov.in/PressReleaseDetail.aspx?PRID=1641649>

ज्ञान पसार एवम् विस्तार
NBT
नवभारत टाइम्स

Tue, 28 July 2020

डीआरडीओ ने कलाम की पांचवी पुण्यतिथि पर नवोन्मेषकों को प्रोत्साहित करने के लिए प्रतियोगिता शुरू की

नयी दिल्ली, 27 जुलाई (भाषा) रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने सोमवार को पूर्व राष्ट्रपति एपीजे अब्दुल कलाम अजाद की पांचवी पुण्यतिथि के मौके पर भारत में रक्षा उभरती प्रौद्योगिकी में नवोन्मेषकों को प्रोत्साहित करने के लिए एक प्रतियोगिता शुरू की। रक्षा मंत्रालय की एक विज्ञप्ति में कहा गया है कि "डेयर टू ड्रीम 2.0" प्रतियोगिता के विजेता का चयन विशेषज्ञ समिति के मूल्यांकन के बाद किया जाएगा। बयान के मुताबिक "विजेता को स्टार्टअप श्रेणी में 10 लाख रुपये और व्यक्तिगत श्रेणी में पांच लाख रुपये की पुरस्कार राशि दी जाएगी।" (यह आर्टिकल एजेंसी फीड से ऑटो-अपलोड हुआ है। इसे नवभारतटाइम्स.कॉम की टीम ने एडिट नहीं किया है।)

<https://navbharattimes.indiatimes.com/india/drdo-launches-competition-to-encourage-innovators-on-kalams-fifth-death-anniversary/articleshow/77208642.cms>

DRDO launches 'dare to dream 2.0' contest for startups with the aim to promote innovators

The Defence Research Development Organisation (DRDO) on Monday launched 'Dare to Dream 2.0' contest for innovators and those looking to launch a startup

By Madhurima Mishra

The Defence Research Development Organisation (DRDO) on Monday launched 'Dare to Dream 2.0' contest for innovators and those looking to launch a startup on the 5th death anniversary of former President of India and noted scientist Dr. APJ Abdul Kalam. The DRDO in a statement said that Dr Kalam, who was also known as the 'Missile man' supported the vision of self-reliance. Hence drawing inspiration from his vision, the contest has been launched to back emerging technologies and promote the individuals and their startups for innovation in the field of defence, aerospace technologies in the country following the call of Prime Minister Narendra Modi of 'Atmanirbhar Bharat'.

The Dare to dream 2.0 scheme aims to promote innovators and startup culture in the country. The winners will be picked following due evaluation by an expert committee. Award money, up to Rs.10 lakh for startup and Rs five lakh in the individual category, will be given to the winners. Defence Minister Rajnath has also lauded the initiative and expressed his happiness to announce the contest for the 'Ignited Minds'.

"Innovative solutions and ideas are invited for the challenges in defence and aerospace fields. The Winners will receive award money up to 10 lakhs for startups and up to 5 lakhs for individuals," tweeted the Office of Defence Minister of India.

To participate in the contest individuals should be citizens of India who are above 18 years of age. Start-ups controlled by Indians and recognized by DIPP can participate. Participants will need to give an executive summary of their innovation, and how it would impact the future of the scientific sphere in context.

Participants will be required to provide a set of information such as what their innovation, provide information in detail how they plan to transform their idea into a product of utility, the resources on hand, the resources required, the timeframes, the constraints foreseen and any other additional requirements. More details about the challenge will be announced on the DRDO website. This initiative amid coronavirus pandemic, when many have lost their job will provide the needed push.

The DRDO since the first leg of the lockdown has been very monumental in aiding the war against coronavirus. It is these testing times had come forward to help combat the pandemic. The defence organisation in the past three months has developed several innovations like to help fight COVID-19. The biggest contribution by DRDO in the war against Coronavirus has been the 1000 bed hospital it constructed in the national capital with ICU capacity of 250 beds in just 12 days.

<https://www.republicworld.com/india-news/city-news/drdo-launches-dare-to-dream-2-dot-0-contest-for-startups-and-individuals.html>



Image credits: @DRDO_India (Twitter)

Remembering Dr APJ Abdul Kalam's contribution to DRDO and ISRO on his 5th death anniversary

Dr Kalam is known as Missile Man of India because of his major contribution in the field of technology and space in India

By Ashri Khandelwal

Key Highlights

- **Dr Kalam was a legendary scientist, politician and teacher**
- **He was awarded the country's highest civilian honour, the Padma Bhushan, Padma Vibhushan and Bharat Ratna**

On his 5th death anniversary today, the Defence Research and Development Organisation (DRDO) remembered Dr APJ Abdul Kalam, popularly known as the Missile Man of India. He was a great humanitarian and a visionary who served as the 11th President of India from 2002 to 2007, taught students and achieved milestones as a scientist.

Dr Kalam passed away on July 27, 2015, while delivering a lecture to students at the Indian Institute of Management, Shillong. But, he is still fondly remembered by the citizens of India as a source of inspiration.

In his words, "You have to dream before your dreams can come true."

On his death anniversary today, we look back at his contribution to the Indian Space Research Organisation (ISRO) and DRDO.

Dr APJ Abdul Kalam's contribution to ISRO and DRDO

1. Dr Kalam started his career at DRDO in 1958 after graduating from the Madras Institute of Technology.
2. He supervised the Pokhran-II nuclear tests and served as the Scientific Adviser to Defence Minister and Secretary, Department of Defence Research & Development from 1992 to 1999.
3. Kalam later joined the ISRO where he was instrumental in putting the Rohini-I satellite in low-earth orbit with help of the SLV-III.
4. After working at ISRO for 19 years, he returned to DRDO and played a significant role in developing missiles like Agni and Prithvi under the Integrated Guided Missile Development Programme (IGMDP).
5. Dr Kalam was also part of the Indian National Committee for Space Research (INCOSPAR), which was set up by Dr Vikram Sarabhai.



Dr APJ Abdul Kalam

<https://www.timesnownews.com/technology-science/article/remembering-dr-apj-abdul-kalams-contribution-to-drdo-and-isro-on-his-5th-death-anniversary/627605>

Tue, 28 July 2020

Remembering Dr A.P.J Abdul Kalam

*Life is the most difficult exam. Many people fail because they try to copy others.
Not realizing that everyone has a different question paper". Dr Kalam*

By Rayees Ahmad Kumar

Dr A.P.J Abdul Kalam was born on 15 October 1931 in a Tamil Muslim family to Jainulabdeen , a boat owner and Ashiamma, a housewife at Remashwaram Tamil Nadu. He came from a poor background and started working at an early age to support his family's income. After completing school. Dr APJ Abdul Kalam distributed newspapers in order to financially contribute to his father's income. In his school years, he had average grades, but he was described as a bright and hardworking student who had a strong desire to learn and spend hours on his studies especially mathematics.

After completing his school education at the Remashwaram Elementary School, Dr APJ Abdul Kalam went on to attend Saint Joseph's College Tiruchirapali then affiliated with university of Madras, from where he graduated in physics in 1954.

Towards the end of the course, he wasn't enthusiastic about the subject. He then moved to Madras to study Aerospace Engineering in 1955.

While Dr Kalam was working on a senior class project, the Dean was dissatisfied with the lack of progress and threatened revoking his scholarship unless the project was finished within the next two days. He worked tirelessly on the project and met the deadline, impressing the Dean. For him becoming a fighter pilot was a dearest dream but he failed to realize it as he bagged the ninth position when only eight slots were available in the IAF. Dr APJ Abdul Kalam is popularly known as the Missile Man of India for his work on the development of ballistic missile and Launch Vehicle technology. He played a pivotal, technical and political role in India's Pokhran-II nuclear tests in 1998.

After graduating from Madras Institute of Technology in 1960, Dr Kalam joined Defence Research and Development Organisation (DRDO) as a scientist. Dr APJ Abdul Kalam started his carrier by designing a small helicopter for the Indian Army, but remained unconvinced with the choice of his job at DRDO. Dr Kalam was also part of the INCOSPAR committee working under Vikram Sarabhai, the renowned space scientist. In 1969 he was transferred to Indian Space Research Organisation ISRO where he was the project director of the India's first indigenous Satellite Launch Vehicle PSLIII which successfully deployed the Rohini Satellite in earths orbit in July 1980.

Joining ISRO was Dr Kalams biggest achievement in life. In 1970s Dr Kalam also directed two projects namely project Devil and project Valliant, which sought to develop ballistic missiles from the technology of the successful SLV programme. Despite the disapproval of union cabinet, Prime Minister Indira Ghandi allotted secret funds for these aerospace projects through her discretionary powers under Dr APJ Abdul Kalams directorship. The Pokhran-II nuclear tests were conducted where he played an intensive political and technological role. Dr Kalam served as the chief project coordinator along with R.Chitambaram during the testing phase.

Dr APJ Abdul Kalam served as the 11th President of India from July 2002 to July 2007. During his term as president, he was affectionately known as the people's President. In his book India 2020, Dr Kalam strongly advocates an action plan to develop India into a knowledge superpower and a developed nation by the year 2020.

In May 2011 , Dr APJ Abdul Kalam launched his mission for the youth of the nation called the WHAT CAN I GIVE MOVEMENT with a central theme to defeat corruption. He also had interest in writing Tamil poetry and in playing Veenai , a south Indian string instrument.

Dr APJ Abdul Kalam has received the honorary doctorates from 40 universities. In 1979 Dr Kalam received India's highest civilian award the Bharat Ratna for his tremendous contribution to the scientific research and modernisation of defence technology of India.

While delivering a lecture at the Indian Institute Of Management Shillong , Dr APJ Abdul Kalam collapsed and died from an apparent Cardiac Arrest on 27th of July 2015 at the age of 83.

(Rayees Ahmad Kumar, Teaacher at Govt BHS Anderwan Ganderbal)

<https://kashmirobsvber.net/2020/07/27/remembering-dr-a-p-j-abdul-kalam/>



Tue, 28 July 2020

DRDO pays tribute to Dr APJ Abdul Kalam on 5th death anniversary

New Delhi: Defence Research and Development Organisation (DRDO) Chairman Dr G Satheesh Reddy paid tributes to Dr APJ Abdul Kalam at the DRDO Bhawan on the former President's fifth death anniversary on Monday.

The event was attended by a number of senior officials of the DRDO.

Earlier in the day, Home Minister Amit Shah tweeted, "Tributes to Dr APJ Abdul Kalam, an epitome of intellect, wisdom and simplicity. A People's President, who left indelible marks on several fields ranging from science to politics."

Dr Kalam was also a leading nuclear scientist of the country and was known as the 'Missile Man of India'. He was India's president between July 25, 2002 and July 25, 2007. He passed away on July 27, 2015, at the age of 83. (ANI)

<https://www.bignewsnetwork.com/news/265908724/drdo-pays-tribute-to-dr-apj-abdul-kalam-on-5th-death-anniversary>



ज्ञान प्रसार एवम् विस्तार
के 50 वर्ष

पांचवीं पुण्यतिथि पर पूर्व राष्ट्रपति डॉ.एपीजे अब्दुल कलाम को ISRO और DRDO ने किया याद

भारत के मिसाइल निर्माण क्षेत्र में डॉ.एपीजे कलाम के प्रमुख योगदान के चलते उन्हें भारत के मिसाइल मैन के रूप में जाना जाता है। भारत के पूर्व राष्ट्रपति स्वर्गीय डॉ.एपीजे अब्दुल कलाम की आज (27 जुलाई) पांचवीं पुण्य तिथि है। इस मौक पर रक्षा अनुसंधान और विकास संगठन ने उन्हें याद किया। हर भारतीय उन्हें मिसाइल मैन के नाम से जानते हैं। वे एक महान मानवतावादी और दूरदर्शी व्यक्ति थे।

डॉ.कलाम का निधन 27 जुलाई, 2015 को इंडियन इंस्टीट्यूट ऑफ मैनेजमेंट शिलांग में छात्रों को व्याख्यान देते हुए हुआ। उन्हें भारत के नागरिकों के लिए प्रेरणा स्रोत के रूप में याद किया जाता है और भविष्य में भी याद किया जाता रहेगा। उन्होंने कहा था आपको अपने सपने सच करने से पहले सपने देखने होंगे। उनकी पुण्यतिथि पर आज हम भारतीय अंतरिक्ष अनुसंधान संगठन (ISRO) और DRDO में उनके योगदान को जानते हैं। उन्होंने 2002 से 2007 तक भारत 11वें राष्ट्रपति के तौर पर देश की सेवा की। उन्होंने ने छात्रों को पढ़ाया और वैज्ञानिक के तौर पर बड़ी उपलब्धि हासिल की।

डॉ.कलाम ने 1958 में मद्रास इंस्टीट्यूट ऑफ टेक्नोलॉजी से स्नातक होने के बाद DRDO में अपना करियर शुरू किया।

उन्होंने पोखरण- II परमाणु परीक्षणों का पर्यवेक्षण किया और 1992 से 1999 तक रक्षा मंत्री और रक्षा अनुसंधान एवं विकास विभाग के वैज्ञानिक सलाहकार के रूप में कार्य किया।

कलाम ने बाद में इसरो में ज्वाइन किया जहां उन्होंने एसएलवी- III की मदद से रोहिणी- I उपग्रह को लो अर्थ ऑर्बिट में स्थापित करने में महत्वपूर्ण भूमिका निभाई। 19 वर्षों तक इसरो में काम करने के बाद, उन्होंने DRDO में वापसी की और इंटीग्रेटेड गाइडेड मिसाइल विकास कार्यक्रम (IGMDP) के तहत अग्नि और पृथ्वी जैसी मिसाइलों को विकसित करने में महत्वपूर्ण भूमिका निभाई। डॉ.कलाम इंडियन नेशनल कमेटी फॉर स्पेस रिसर्च (INCOSPAR) का भी हिस्सा थे, जिसे डॉ.विक्रम साराभाई ने स्थापित किया था।

<https://www.samaybhaskar.com/isro-and-drdo-remember-former-president-dr-aj-abdul-kalam-on-the-fifth-death-anniversary/>

The Tribune

Tue, 28 July 2020

Israeli team working with DRDO to develop rapid COVID-19 testing kit arrives in India

A high-level team of researchers from Israel arrived in Delhi on Monday

New Delhi: A high-level team of researchers from Israel arrived here on Monday to take forward the work it has been doing with India to develop a rapid testing kit for COVID-19 which can give the result within 30 seconds.

Israel's Ambassador to India Ron Malka said if the testing kit is developed, it could be a "game changer" in the battle against COVID-19.

The Israeli defence ministry research and development team has been working with India's chief scientist K Vijay Raghavan and Defence Research and Development Organisation (DRDO) to develop rapid testing for COVID-19 in less than 30 seconds, the Israeli Embassy had said last week.

The team from the Directorate of Defence Research and Development (DDR&D) in the Israeli Ministry of Defence will conduct a series of "final stages of testing" to determine the effectiveness of a number of rapid diagnostic solutions with their Indian counterparts.

The special flight, which arrived here in the morning, also brought with it breakthrough emerging Israeli technologies for combating COVID-19, Malka said.

Latest medical equipment developed in Israel to fight COVID-19 has been brought on the special flight, he said.

"We also brought on this flight advanced respirators that are banned for export in Israel but a waiver was given to bring them to India," he added.

Since the outbreak of the global pandemic, Israeli Prime Minister Benjamin Netanyahu and Prime Minister Narendra Modi have held three telephonic conversations in which they promised mutual assistance in dealing with the virus and committed to joint technological and scientific research between the two countries.

<https://www.tribuneindia.com/news/nation/israeli-team-working-with-drdo-to-develop-rapid-covid-19-testing-kit-arrives-in-india-118576>



A high-level team of researchers from Israel arrived in Delhi on Monday

चीन के सैन्य ठिकानों के ऊपर से गुजरा भारत का 'कौटिल्य', खौफ में आया 'ड्रैगन'

दुनिया भर में दादागीरी दिखाने वाला चीन भारत के 'कौटिल्य' से डर से खौफ में आ गया है।

नई दिल्ली: दुनियाभर में दादागीरी दिखाने वाला चीन भारत के 'कौटिल्य' से डर से खौफ में आ गया है। भारत का इमिसैट नाम का एक खुफिया सैटेलाइट चीन के कब्जे वाले तिब्बत के ऊपर से गुजरा है। इस सैटेलाइट में 'कौटिल्य' नाम का ELINT यानी इलेक्ट्रॉनिक इंटेलिजेंस सिस्टम लगा हुआ है। इस सिस्टम की खूबी यह है कि वह हजारों किमी दूर अंतरिक्ष से जमीन पर एक मीटर तक के दायरे में हो रही गतिविधियों की भी साफ तस्वीरें खींच सकता है।

बता दें कि इमिसैट स्वदेश में विकसित है। इस सैटेलाइट का निर्माण डिफेंस रिसर्च ऐंड डिवेलपमेंट ऑर्गनाइजेशनन (DRDO) ने किया है। यह सैटेलाइट इंटेलिजेंस इनपुट जुटाने का काम करता है। इसकी खूबी यह है कि यह रक्षा क्षेत्र की अहम जानकारियां जुटा सकता है। इस सैटेलाइट का ELINT सिस्टम दुश्मन के क्षेत्र में ट्रांसमिशन के लिए इस्तेमाल होने वाले रेडियो सिग्नल्स को भी पढ़ लेता है।

सूत्रों के मुताबिक लद्दाख के पेंगोंग सो के फिंगर 4 को लेकर हुई भारत-चीन की बातचीत के बेनतीजा होने के एक ही दिन बाद यह सैटेलाइट तिब्बत के उस हिस्से के ऊपर से गुजरा है। जो चीन की पीपल्स लिबरेशन आर्मी (पीएलए) के कब्जे में है। माना जा रहा है कि उसने तिब्बत में चीन से जुड़ी कई अहम जानकारियां जुटाई है। इसमें तिब्बत में सैन्य मोर्चों के जमावड़े और अन्य ढांचागत परियोजनाओं की जानकारियां भी शामिल हैं। इस इलाके में EMISAT के गुजरने से चीन में हड़कंप मचा है।



बता दें कि लद्दाख के दुर्गम इलाके में पिछले तीन महीने से चीन और भारत की सेनाएं आमने सामने खड़ी हैं। चीन ने लद्दाख के 4 इलाकों में घुसपैठ की थी। जिसमें वह तीन इलाकों में तो पीछे हटने के लिए राजी हो गया है। लेकिन पेंगोंग झील इलाके में वह कोई हामी नहीं भर रहा है। इसके उलट वह पेंगोंग झील और देपसांग के इलाके में अपनी सैन्य मौजूदगी मजबूत करने में लगा है। उसने शिनजियांग इलाके में भी अपनी सेना की मौजूदगी बढ़ा दी है। साथ ही तिब्बत और उससे सटे 7 एयरबेसों पर नए लड़ाकू विमान तैनात कर दिए हैं। चीन के नापाक मंसूबे देखकर भारत भी अपनी सुरक्षा तैयारियों को लगातार मजबूत करने में लगा हुआ है।

<https://zeenews.india.com/hindi/pakistan-china/china-scared-of-indias-kautilya/718518>

Explained: How India spy satellite EMISAT keeps an eye on the borders

Amid simmering tensions between India and China at the Line of Actual Control in Ladakh, India's spy satellite EMISAT has succeeded in gathering information about the positions of the Chinese People's Liberation Army (PLA). It is to be noted that EMISAT which carries Kautilya is operated by the Defence Research and Development Organisation (DRDO)

Edited By Tanweer Azam

Highlights

1. *India's spy satellite EMISAT has succeeded in gathering information about the positions of the Chinese People's Liberation Army (PLA).*
2. *It is to be noted that EMISAT which carries Kautilya is operated by the Defence Research and Development Organisation (DRDO).*
3. *Kautilya, which is an ELINT (electronic intelligence) package, carried out a pass over the positions of Chinese troops in occupied Tibet near Arunachal Pradesh.*

Amid simmering tensions between India and China at the Line of Actual Control in Ladakh, India's spy satellite EMISAT has succeeded in gathering information about the positions of the Chinese People's Liberation Army (PLA). It is to be noted that EMISAT which carries Kautilya is operated by the Defence Research and Development Organisation (DRDO).

Kautilya, which is an ELINT (electronic intelligence) package, carried out a pass over the positions of Chinese troops in occupied Tibet near Arunachal Pradesh.

EMISAT is a satellite built around ISRO's Mini Satellite-2 bus weighing about 436 kg. The satellite was successfully placed in its intended sun-synchronous polar orbit of 748 km height by PSLV-C45 on April 01, 2019. The satellite is intended for electromagnetic spectrum measurement.

EMISAT is country's first electronic surveillance satellite. It is a very powerful electronic intelligence/surveillance satellite which has been developed in India jointly by ISRO and Defence Research and Development Organization (DRDO).

Space-based electronic intelligence or ELINT from the 436-kg spacecraft will add teeth to situational awareness of the Armed Forces as it will provide location and information of hostile radars placed at the borders; this will be another dimension to current land or aircraft-based ELINT, according to defence experts who did not wish to be named.

ISRO, which is said to have built the satellite body for the DRDO payload, merely said the spacecraft would measure the electromagnetic spectrum.

The Union Defence Ministry's annual report of 2013-14 mentioned about Project Kautilya - for Space Borne ELINT System which involves the development of Electronic Intelligence payload for integration on an indigenous minisatellite.

The ELINT includes recordings and analysis of intercepted signals and helps create an RF signature of a radar which can, in turn, be used for locating and quickly identify the radar in subsequent encounters.

<https://zeenews.india.com/india/explained-how-india-spy-satellite-emisat-keeps-an-eye-on-the-borders-2298597.html>



India's light tank debate crosses shores

The PLA's aggressive deployment in eastern Ladakh and its potential of quickly escalating into a full-blown conflict has seen the Indian army going in for fast track purchases to meet equipment shortfalls

By Sandeep Unnithan

The PLA's aggressive deployment in eastern Ladakh and its potential of quickly escalating into a full-blown conflict has seen the Indian army going in for fast track purchases to meet equipment shortfalls. On the list is a requirement for up to 300 air-transportable light tanks. There is a debate underway within the government — a section of the establishment favours imports, another wants the light tanks to be built indigenously.

Top candidates for fast track imports include Russia's 18-ton Sprut light tank. The Sprut's 125 mm main gun, derived from Russian MBTs, means commonality of ammunition with the army's existing T-90 and T-72 tanks. The Russian side indicates that the first 20 tanks could be made available in a few months. The indigenous alternative is a DRDO- L&T team up for a 35-ton tank based on the army's in-service K9 'Vajra' 155 mm self-propelled howitzer. The 100th unit of the Vajra, based on the Hanwha Techwin K-9, is to be delivered to the army this December. It was part of a Rs 4,500 crore contract signed in 2017 with all guns built indigenously by L&T at its Hazira plant. Discussions over the last two years have picked up speed. The project aims to field the first three tank prototypes in 18 months at a project cost of under Rs 200 crore. The DRDO design swaps the K9's 155/52 mm howitzer with a modular turret and 105 mm gun made by Belgian firm John Cockerel Defence SA. The gun can fire at a 42-degree elevation, suited for mountain warfare. L&T's highly automated production line set to be idle by the year-end can churn these tanks at a rate of nearly 100 tanks a year. The K9 light tank's 1000 Horse Power engine will give it a power-to-weight ratio of 28 HP/ tonne.

What might finally happen — as CDS General Bipin Rawat has indicated in the past — is a balance between desi and videshi. The Army might end up importing a regiment of tanks (45 vehicles) and opt for indigenous tanks to make up the numbers.

(Courtesy of *Mail Today*)

<https://www.dailyo.in/variety/indian-army-weapons-sprut-light-tank-k9-vajra-l-amp-t-tanks-drdo/story/1/33389.html>



PM Modi on a K9 Vajra at the inauguration of the L&T facility in Hazira, Surat in 2019. (Photo: Twitter/ @narendramodi)



Tue, 28 July 2020

New Commandant for Naval Academy

M.A. Hampiholi takes charge

Kannur: Vice Admiral M.A. Hampiholi on Monday took charge as the Commandant, Indian Naval Academy (INA), from Vice Admiral Dinesh K. Tripathi who completed a tenure of over 13 months.

Vice Admiral Tripathi was accorded a warm send-off, with the traditional “Pulling Out” ceremony. He had taken over as the Commandant on June 12, 2019. During his tenure, the academy saw marked transformation in infrastructure and training facilities. Under his leadership, the INA was bestowed with the President’s Colour for rendering 50 years of yeoman service in shaping Naval leaders for the Indian Navy, Coast Guard and friendly foreign countries.

Vice Admiral Hampiholi is an alumnus of the National Defence Academy, Khadakwasla; Defence Services Staff College, Wellington; the erstwhile College of Naval Warfare, Karanja; and the prestigious National Defence College, New Delhi. The Flag Officer is a specialist in anti-submarine warfare and has commanded IN Ships Nashak (Missile Vessel), Magar (Landing Ship Tank (Large)) and Talwar (Frigate).

His shore commands include Commandant, National Coast Guard, Mauritius, during 2003 to 2005 and Commandant, Naval Academy, and Commanding Officer, INS Mandovi, Goa, during 2007 to 2009. He has the rare distinction of commanding the Indian Naval Academy twice, albeit at different locations and in different ranks.

On promotion to the rank of Vice Admiral in 2019, he assumed charge as the Director General of Naval Operations, prior to being appointed as the eighth Commandant of the INA. He is a recipient of the Nao Sena Medal and the Ati Vishisht Seva Medal.

<https://www.thehindu.com/news/national/kerala/new-commandant-for-naval-academy/article32207749.ece>

New Rafale Jets fly out of France, arrival in India on July 29: All you need to know

New Delhi: A new batch of five Rafale jets fly out of France on Monday to join the growing Indian fleet of aircraft and are scheduled to arrive in the country two days later. The aircraft will be refuelled by French Air Force tanker aircraft on their way to an airbase in the UAE before leaving for India.

All you need to know:

- The three twin-seat and two single-seat Rafales will touch down at the Ambala air base, in Haryana, on July 29.
- The Rafale aircraft will cover the distance of 7,000 km from France to India with air-to-air refuelling and a single stop en route in UAE.
- The jets will be armed with deadly weapons, advanced avionics, radars, electronic warfare systems and self-protection suites to ensure superior survivability in hostile contested airspaces.
- The Rafales will be combat-deployable when they arrive at Ambala, capable of firing its over 300 km range Scalp air-to-ground cruise missiles and other weapons.
- European missile maker MBDA's Meteor beyond visual range air-to-air missile will also be the mainstay of the weapons package of the Rafale jets. Meteor is the next generation of BVR air-to-air missile (BVRAAM) designed to revolutionise air-to-air combat. The integration of the 120-150 km range missiles will take some time.
- The Rafales will also be equipped with MICA weapon system which is integrated into IAF's Mirage 2000 aircraft.
- The jets will have a combat range of 780-km to 1,650-km depending on the mission.
- They will have 13 'India-specific enhancements' such as radar enhancements, Israeli helmet-mounted displays, low-band jammers, 'cold start' capability from high-altitude regions, 10-hour flight data recording, infrared search and tracking systems.
- These enhancements will become fully operational after 'software certification'.
- India's ambassador to France Jawed Ashraf who was there to see-off the Rafale aircraft, said that the long awaited and much-needed two squadrons of Rafale would add great strength to IAF and defence capabilities. He met the IAF pilots and wished them a safe flight to India.
- French defence major Dassault Aviation, the company which manufactures Rafale, has since October 2019 handed over a total of ten aircraft to the IAF. Five will stay back in France for training mission. The ceremony of the first handover was attended by the French minister for armed forces Madame Florence Parly and the Indian Defence minister Rajnath Singh.
- In September 2016, the Indian government had placed an order of 36 Rafale jets with Dassault Aviation in a deal worth Rs 59,000 crore. The delivery of all 36 aircraft will be completed as per schedule by the end of 2021.
- In accordance with the contract, Indian Air Force pilots and supporting personnel have been provided full training on aircraft and weapon systems by Dassault. At least 12 IAF pilots have been trained in operating Rafale. Further batches of IAF pilots will continue training over the next nine months.
- In a gesture of friendship, government of France will send an aircraft with medical equipment and experts on July 26 to support India's efforts against the Covid-19 pandemic.

(With inputs from agencies)

<https://timesofindia.indiatimes.com/india/new-rafales-fly-out-of-france-arrival-in-india-on-july-29-all-you-need-to-know/articleshow/77192026.cms>

Rafale jets on the way: 7,000-km journey from France, and what next

The aircraft will be inducted at Air Force Station Ambala on Wednesday, subject to weather, the IAF has said. The final induction ceremony will take place in the second half of August

By Krishn Kaushik

New Delhi: The first batch of the much-awaited Rafale fighter jets took off from France today (July 27) and are enroute to India. India had bought 36 twin-engine fighter planes from Dassault Rafale for an estimated Rs 58,000 crore, through an inter-governmental agreement signed in 2016.

How many jets are coming right now?

The first batch includes five aircraft, being flown by Indian Air Force pilots. They took off from the Merignac airbase near Bordeaux in France.

The first fighter jet was handed over to the Indian Air Force in October 2019, in France, in a ceremony attended by Defence Minister Rajnath Singh and French Minister for Armed Forces Florence Parly.

Ten aircraft have been delivered on schedule, as per a statement by the Indian Embassy in France on Monday. Of these ten, five have left for India, while the other five will remain in France for training missions.

When will they reach India?

The first five Rafale fighter jets will reach Ambala Air Force Station on Wednesday.

The distance covered by them is close to 7,000 kms, and will require air-to-air refuelling. While the distance can be covered within a day as well, with the refuelling, it has been planned that the jets will make a stop in United Arab Emirates.

They will be taken to the Al Dhafra French air base near Abu Dabhi on Monday, and will take off from there for Ambala on Wednesday morning.

Are all the five jets the same?

No, the jets India has bought are a mix of single-seater and two-seater planes. The jets on their way to India are also a mix of both.

Interestingly, the twin-seater air planes have the current Air Force chief Air Chief Marshal RKS Bhadauria's initials, "RB", as he played a significant role in negotiating the deal.

The single-seater aircraft have the initials of the last chief of Air Force, retired Air Chief Marshal Birender Singh Dhanoa.

When will the other jets come?

Of the ten delivered to the Air Force, five are in France for training. Pilots and support personnel of the Indian Air Force have been given complete training about the aircraft and the weapon systems by Dassault in France.

According to the Indian Embassy in France, IAF batches will continue to be trained in France for the next nine months.

The delivery of all the 36 jets is scheduled by the end of 2021.

What happens when they reach India?

The aircraft will be inducted at Air Force Station Ambala on Wednesday, subject to weather, IAF had said on July 20. The final induction ceremony will take place in the second half of August.

The IAF aircrew and ground crew have undergone comprehensive training on the aircraft, including its highly advanced weapons systems, which are fully operational now. Post arrival, efforts will focus on operationalisation of the aircraft at the earliest, IAF had stated.

The immediate focus when they reach will be to ensure that the pilots and ground crew put their heads down and become integrated with the overall IAF operations at the earliest. Further, it is important that the ferry-in of fighters as well as move of support crew is completed safely and swiftly.

Which squadron will they join?

The first jets will comprise the resurrected No 17 'Golden Arrows' squadron of the Air Force, and will be stationed in Ambala. The Golden Arrows were raised in 1951 and have been involved in a number of significant operations through their history, including the Kargil War. But after the Air Force started to phase out the Mig-21, which were operated by the Golden Arrows, the squadron was disbanded in 2016.

It has been resurrected now for the multi-role, state-of-the-art Rafale.

<https://indianexpress.com/article/explained/five-rafale-jets-leave-for-india-what-happens-next-6525806/>

THE ECONOMIC TIMES

Tue, 28 July 2020

Indian Air Force's Rafale locks in on China and Pakistan with SCALP, Meteor missiles

Long wait

The first batch of five Rafale jets on Monday took off from France for India, officials said. The multi-role fighter aircraft are scheduled to arrive at Ambala air force station on Wednesday, nearly four years after India signed an inter-governmental agreement with France to procure 36 Rafale jets for the Indian Air Force under a Rs 59,000-crore deal.

What does its induction mean?

For almost two decades, the IAF has been perceived to be handicapped on long-range weapons and sensors vis-a-vis PAF. Rafale will reverse this & give IAF the decisive edge with better sensors and weapons. Each Rafale in the air would require at least two F16s for a counter-challenge.

Air superiority

Officials say for each Pak F16 in the air, two Su30MKI jets have to be scrambled because of superior radar & missiles of American jets. Combined with the upcoming deliveries of the S400 air defence system next year, it will greatly enhance Indian air superiority in the region.

What are the weapons Rafale can carry?

- **SCALP:** Precision long-range ground attack missile that can take out targets with extreme accuracy. Has a range of much over 300 km, which means that for Balakot-type operation Indian jets would not need to cross LoC and could conduct the strike from within Indian airspace.
- **METEOR:** Beyond visual range air-to air missile that is possibly the best in its class. Can take out enemy aircraft at a range of over 100 km. Has a no escape zone of over 60 km and the missile easily outclasses the American origin.

India specific enhancements

While other nations, including France and Egypt operate Rafale jets, the ones supplied to India are more advanced and modified to meet specific requirements. Helmet mounted sights & targeting system to give the pilots lightning quick ability to shoot off weapons. Ability to take off from high altitude air bases like Leh on a 'cold start' for quick reaction deployment AMRAAM currently with Pakistan with dead accuracy.

<https://economictimes.indiatimes.com/news/defence/indian-air-forces-rafale-locks-in-on-china-and-pakistan-with-scalp-meteor-missiles/india-specific-enhancements/slideshow/77195580.cms>

Rafale to bring a quantum jump in IAF's capability against both Pakistan and China, says expert

“With this induction, Rafale will become the most advanced aircraft in IAF's fighter fleet, and brings to fruition a more than two-decades-long, often disrupted, Indian acquisition process of the MRCA/MMRCA,” says Air Marshal M Matheswaran (retd)

By Huma Siddiqui

July 29th will be a red-letter day for the Indian Air Force (IAF) when five Rafale aircraft would fly into Ambala airbase as part of No 17 Squadron, and begin a new chapter in IAF's history. “With this induction, Rafale will become the most advanced aircraft in IAF's fighter fleet, and brings to fruition a more than two-decades-long, often disrupted, Indian acquisition process of the MRCA/MMRCA,” says Air Marshal M Matheswaran (retd).

Sharing his views with Financial Express Online, Air Marshal M Matheswaran (retd), President of ‘The Peninsula Foundation’- a policy think tank based in Chennai, says, “Given the current stand-off with China in Ladakh, which resulted in the death of 20 Indian soldiers, the induction of the Rafale couldn't have been more timely. IAF has already deployed significantly in the region to send out a clear message to the People's Liberation Army (PLA) against any further adventurism across the LAC. Rafale brings with it very advanced capabilities such as long-range and state-of-the-art AESA radar, coupled with its BVR missile – Meteor. Besides, it brings a plethora of precision weapon capabilities such as the SCALP cruise missile and a range of sensors. Although five aircraft are too few a number, they will still bring a significant jump in capabilities to complement IAF's mainstay aircraft, the Su-30 MKI.”

According to Air Marshal Matheswaran (retd), “It would take almost a year before the first squadron is fully equipped with its strength of 18 aircraft and all associated equipment and weapons, as well as the training of all its aircrew. Similarly, the second squadron is expected to be operational by the middle of 2022. So it would be at least a year before the Rafale brings the weight of its significant capabilities to air operations in the region. It is sure to bring a quantum jump in IAF's conventional deterrent capability against both adversaries – Pakistan and China. However, the willingness to use such capabilities without hesitation will be important. This is clearly in the domain of political leadership.”

“Two strategically important airbases, Ambala in the west and Hasimara in the east, will house the first and second squadron respectively. Both bases have established the huge infrastructure necessary for Rafale operations. From an economic point of view, investment in such infrastructure should normally be optimal with a minimum of two squadrons. Obviously, that leaves the option of inducting two more squadrons with the government. If that happens, it would be a huge shot in the arm for the IAF and India's conventional deterrent capability,” he concludes.

<https://www.financialexpress.com/defence/rafale-to-bring-a-quantum-jump-in-iafs-capability-against-both-pakistan-and-china-says-expert/2036197/>

Rafale 1st imported jet since 90s

Set to be inducted on July 29 / More advanced than China, Pak fighters

New Delhi: Rafale fighter jets, India's latest military acquisition, are set to arrive at the Ambala airbase in Haryana on July 29. The jets are fitted with "deadly" missiles and weapons, which are a way ahead when compared with similar capabilities of Pakistan and China.

This will be the first induction of the new type of foreign-origin jets since Sukhoi started coming in late 1990s. A total of 272 Sukhoi are on order. Another 12, other than these 272, are to be added. Deliveries of such huge numbers are usually staggered. The only other induction of jets has been LCA Tejas, an indigenous product.

Last week, the Indian Air Force (IAF) had said its pilots and ground crew, after having undergone training, were "fully operational". India and China are locked in a tense stand-off since early May. Owing to Ambala's location, Rafale can take off and fly northeastwards towards the G219 highway of China.



Five of these Rafale jets will be flown in from France by Indian pilots. They will be fuelled mid-air. Pilots will take a break at the base of a friendly country in West Asia before flying into Ambala. Post-arrival, efforts will focus on operationalising the aircraft at the earliest. A formal induction ceremony will take place in the second half of August.

The jets come fitted with weapons and missiles from European missile-maker MBDA. These will include Meteor, a beyond visual range air-to-air missile, that can hit enemy targets in the air 150 km away. The Meteor is powered by a rocket-ramjet motor that gives it far more engine power and much longer range. This means it can travel much farther, giving Meteor the ability to chase down and destroy agile hostile fighters.

India's Rafale fighters will also be equipped with the SCALP deep-strike cruise missile. It can strike at hardened and protected targets deep inside hostile territory without the need for Rafale to enter hostile airspace. SCALP has long range, around 300 km, and it can hit targets in Pakistan and China even if it is hovering over Jalandhar or even Chandigarh.

Importance

Rafale is a medium multi-role combat aircraft that is said to boost India's air dominance exponentially, currently safeguarded by fighter jets like Russia-made Sukhoi Su-30MKI and MiG-29, along with French Mirage-2000 and indigenously built HAL Tejas.

- It can fire Meteor missiles to hit targets that are out of visual range
- It is a twin engine fighter aircraft
- Rafale fighter jets can help out each other mid-air
- SCALP missiles can smash on-ground targets 300 kilometres away
- It can carry six AASM missiles at a time
- It has a holographic cockpit display

Features of the war bird

Top speed : 1,389 km/h

Range : 3,700 km

Weight :9,979 kg

<https://www.tribuneindia.com/news/nation/rafale-1st-imported-jet-since-90s-118391>

In China's troop movements in Ladakh's depth areas, a hint about its real plan

India's last outpost at Daulat Beg Oldi DBO lies at a height of 16,000 feet just south of Karakoram pass and on banks of Chip-Chap river, north of the Galwan-Shyok confluence

By Shishir Gupta

New Delhi: With the Chinese People's Liberation Army (PLA) deploying close to 50,000 troops in Aksai Chin, the Indian Army for the first time has deployed a squadron (12) T-90 missile firing tanks, armoured personnel carriers (APCs) and a full troop brigade (4,000 men) at Daulat Beg Oldi (DBO) to prevent any Chinese aggression from the Shaksgam-Karakoram pass axis, according to top military commanders familiar with the matter.

India's last outpost at Daulat Beg Oldi DBO lies at a height of 16,000 feet just south of Karakoram pass and on banks of Chip-Chap river, north of the Galwan-Shyok confluence.

As some bridges on the Darbuk-Shyok-DBO road cannot handle the weight of a 46 ton T-90 tank, the Indian Army commanders sent the T-90 tanks after the June 15 Galwan flare-up by fording the rivers and rivulets using specialized equipment. The armoured personnel carriers (APCs) or infantry combat vehicles, M 777 155mm howitzers, and 130 mm guns had already been sent to DBO after Chinese aggression at patrolling points 14, 15, 16, 17 and the Pangong Tso finger features.



India has moved 12 T-90 tanks, armoured personnel carriers and 4,000 soldiers to Daulat Beg Oldi to prevent any Chinese aggression (HT Photo)

While India and China have decided to first totally disengage and then de-escalate from the area, the Indian Army is not only matching troop strength but also keenly watching the PLA deployment of tanks, air defence radars and surface to air missiles in Aksai Chin.

The disengagement is work-in-progress with each side verifying the movements of the other, the commanders, who asked not to be identified said.

While the Indian military has also decided to black-top the advance landing ground at DBO, the main reason for deploying tanks in the area is to prevent any sudden Chinese move from the north, they added.

Already China has built some 36 kilometres of road in the Shaksgam Valley (5163 square kilometres were illegally ceded by Pakistan to China in 1963), and Indian military planners fear that PLA will link the G-219 (Lhasa-Kashgar) highway to Karakoram pass through the Shaksgam pass.

Even though this will require tunnelling under the permafrost of Shaksgam glacier, the Chinese have the technical ability to complete the job.

The fear is that once the link is completed, the PLA will put pressure on DBO from the north as it needs a buffer to prevent the Indian Army from targeting the road.

According to the military commanders, the main purpose of PLA aggression this summer was to clear all the friction points with the Indian Army along the 1147 km long line of actual control (LAC) in East Ladakh and impose the 1960 map claim. However, this attempt was forcefully repelled by the men of 16 Bihar who took on the 3 Mechanized Infantry of Xinjiang Military district on June 15 at Galwan.

This plan dovetailed into a larger plan of linking the G219 highway to G314 (Kashgar-Islamabad Karakoram highway) via Karakoram-Shaksgam pass axis in order to save not only time but distance.

A fruition of this plan would have made Indian army positions untenable not only at DBO but also at Siachen as the outpost is linked to Sansoma (crucial base on Nubra river before Siachen) via Saser la-Murgo axis.

In many ways, Pervez Musharraf's plan to interdict Srinagar-Kargil highway and starve Indian positions at Siachen during the 1999 Kargil war between India and Pakistan has a parallel in China's Xi Jinping's attempt to interdict the DSDBO road to cut off DBO 21 years later.

<https://www.hindustantimes.com/india-news/india-moves-squadron-of-missile-firing-t-90-tanks-to-last-post-near-karakoram-pass/story-h4LtB6PZXtiYpMadupySlK.html>

hindustantimes

Tue, 28 July 2020

How the cold will alter the India-China power equation next month in Ladakh

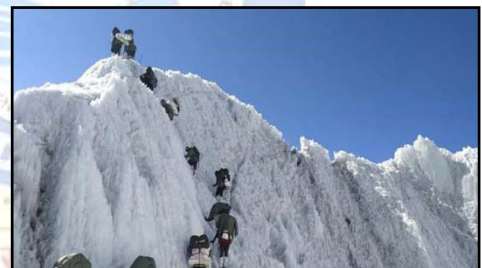
According to accounts given by the survivors of the clash, a large number of Chinese PLA troops came in an armoured personnel carrier and soon started dropping down due to lack of oxygen at 16000 feet when the fisticuffs began between the two armies. If lack of oxygen did not get them, then the frozen Galwan river did the job

By Shishir Gupta

New Delhi: On June 15 evening when the Indian Army troops clashed with People's Liberation Army (PLA) at Galwan, the temperature of the river was close to zero (and below it in some places) and a large number of troops on both sides fatally succumbed to hypoxia (low oxygen levels because of the altitude) and hypothermia (excessive cold), people familiar with the matter said.

According to Indian military commanders, this information is relevant because starting September, the weather will start taking a hand in Eastern Ladakh, where Indian and Chinese troops are still locked in a stand-off as an uneasy truce between the two countries plays out.

According to accounts given by the survivors of the clash, a large number of Chinese PLA troops came in an armoured personnel carrier and soon started dropping down due to lack of oxygen at 16000 feet when the fisticuffs began between the two armies. If lack of oxygen did not get them, then the frozen Galwan river did the job.



Adverse weather conditions, including up to seven feet of snow, can put the PLA at a disadvantage because its army in Akasi Chin is largely made of conscripts. (Twitter/@proudhampur)

While the Chinese PLA has not revealed the number of troops from III mechanized infantry of Xinjiang Military District that lost their lives in the clash, these are more, and not less than that suffered by the Indian side which loses 20 soldiers, the military commanders added, asking not to be named. Throughout the intervening night of June 15 and 16, two Chinese PLA helicopters carted the dead and injured to nearby hospitals or to hyperbaric chambers in depth areas.

Although both sides decided to disengage after the Special Representative level dialogue on July 5, the exercise is long drawn out with winter ready to move into the theatre next month and firmly set in September in all the friction points. "It is not the temperature that will kill but the wind which increases the chill factor. Add to this the rarefied atmosphere at Galwan, Gogra-Hot Springs and the weather takes a turn for the worse," said a senior military commander.

The military commanders said adverse weather conditions, including up to seven feet of snow, could put the Chinese at a disadvantage because its army in Akasi Chin is largely made of conscripts, who were drafted for a three month annual summer exercise in Tibet and Xinjiang in return for the state taking care of their future education. The PLA conscripts are used to moving on

armoured carriers in contrast to their Indian counterparts who not only patrol on foot but live in the worst of weather conditions whether in Siachen or in Sikkim or in Thag La ridge in Tawang, the commanders added.

The Indian Army has been fighting since 1984 in Siachen, Kashmir and North-east mountain theatre, the commanders pointed out. Even today, the Indian Army mans Indira Col west, the farthest point on Siachen Glacier, Sikkim finger area, Doklam, and posts in the mountain ridges in Arunachal Pradesh.

The Indian Army has specialized in high altitude warfare and has the capacity to take on the enemy from the front as it proved during the 1999 Kargil war, where it fought from heights of Muskoh to Chorbat La in the Gilgit Baltistan area, the commanders said.

As both India and China are fully deployed in Aksai Chin area and de-escalation is still some time away, the PLA will soon have to take a call on whether to end its aggression and restore status quo ante or be prepared to spend nights on Tibetan plateau where temperatures of 25 degrees below zero is normal, analysts said. Winter does not take toll on the troops alone but also on equipment with artillery barrels and engines freezing.

The other issue that the PLA will also have to keep in mind is that the Indian Army is deployed all along the 3488 km long Line of Actual Control between the two countries, while the PLA is only deployed in selected places, the analysts added. This includes Sikkim, where the Indian Army surrounds the Chumbi Valley from three sides.

<https://www.hindustantimes.com/india-news/cold-will-add-new-twist-to-stand-off-from-september/story-Xs8fiZcdjpXnqFzZLRtRWK.html>

ThePrint

Tue, 28 July 2020

In mountains, China's military prowess has a vertical limit. 1962 is a half truth

What happens when two competing and nearly comparable military powers like China and India deploy their military might against each other in the Himalayas?

By Vivek Chadha

China's misadventure into the Indian territory is premised on the vast differential in the size of both countries' economies and the military capability gap that has only grown since the two nations went to war in 1962. However, even as this is true on paper, its implications as they translate into actions are often lost sight of.

Military conflict was and will remain a clash of wills, and not merely weapons in varying numbers and of different generations. A war can be lost despite occupying contested land or even uncontested land over the years.

What happens when competing and nearly comparable military powers deploy their might against each other? What if they do it in an area where the very concept of military operations as applicable to plains and deserts is vastly different? And what if it all plays out in the backdrop of obvious caution forced by the shadow of nuclear weapons on both sides? Some of these questions can be best answered by highlighting the characteristics of fighting a battle in the mountains.

War in high altitudes

Mountains by their very nature favour a defender. An attacker has to create a situation wherein a defender is outwitted and loses nerve to be defeated decisively. Since there are very few countries that have actually fought in high altitude areas (over 9,000 feet above mean sea level), here are a few examples that relate to experiences within the subcontinent.

During the 1947-48 operations in Jammu and Kashmir, the conflict was inching towards its terminal phase. The Army was finding it difficult to break through the Zojila Pass, which was critical for the defence of the area. It was Major General K.S. Thimayya (later General and Chief of Army Staff) who came up with the audacious plan to lead the attack with tanks in November 1948, despite the challenging terrain and local ground conditions at approximately 11,500 feet.

The 7 Cavalry, led by Lieutenant Colonel Rajinder Singh "Sparrow", brought forward their tanks, the Stuarts, dismantled without turrets, duly camouflaged, to Srinagar and from there to the battle zone. Thimayya sat on the leading tank, as the attacking forces surprised the Pakistanis and achieved a complete rout of the enemy forces, forcing them to flee the battlefield. It was not the numbers but the manner in which the forces were employed that played a crucial role in the battle.

Almost 17 years later, the battle of Haji Pir was fought in 1965. It witnessed Major R.S. Dayal (later Lieutenant General and Western Army Commander) take a long and arduous march to reach close to enemy positions. He successfully evicted the enemy by virtue of achieving complete surprise at the objective. He did this despite a force ratio of 1:1, which is considered grossly inadequate even in the plains. The tactical victory at Haji Pir pass facilitated the complete rout of the enemy.

More recently, in Kargil in 1999, the Indian armed forces proved that they could achieve what few armies would even dare to attempt, at altitudes ranging from 14,000-16,000 feet. Despite the unparalleled feats of valour, progress was slow and gradual, spread over months. The success at Kargil must be seen in the right context to understand the sheer scale of the achievement, especially when it is compared with Siachen Glacier.

A decade prior to the Kargil conflict, Pakistan, stung by India's control over the Siachen Glacier area, made multiple attempts at evicting the Indian Army from the Salto Ridge, but failed every single time. Their attempt also includes an operation launched by then Brigadier Parvez Musharraf in 1987. That indicates the nature of the challenge fighting in mountains, and especially in high altitude regions, presents.

What went wrong in 1962

Past feats notwithstanding, the 1962 war stands out as a clear failure. However, it is relevant to place its reality in perspective. There is little doubt that the senior leadership of the Army fell short of its past credible standards. And this is not limited to the oft-quoted example of Lt Gen B.M. Kaul. The defeat of the Army, especially in the Eastern Sector, took place in the minds of the military and political leaders, much before it did in the battlefield. In fact, even where the Army was defeated, there were bright spots like the Battle of Namka Chu in Arunachal Pradesh or the Battle of Rezang La in Ladakh, which proved that the soldiers and their immediate commanders, given the right leadership, could have stopped the Chinese in their tracks.

Less than five years later in 1967, it was proved by Maj Gen Sagat Singh during the skirmish at Nathu La. It was during this border clash that the Chinese withdrew with far more casualties than the Indian side, despite them firing the first salvo. One wishes that this incident too was more widely known just as those associated with the 1962 are.

Fighting in the mountains, and that too at the kind of altitude that exists along the LAC, is difficult even in the best of times. And when the opposition is determined and well led, there is little chance of achieving outright victory. Unlike the plains and deserts, where mechanised forces can sweep the battlefield, deploying infantry along spurs is an uphill task. The effect of artillery is reduced due to the impact of altitude and issues related to accuracy because of the small target are presented. A minor variation in weather conditions or angle of fire can take shells well beyond the intended target. Air bombing also suffers from similar constraints as operations in Kargil proved in 1999.

In mountains, strength is relative

So, the size of an army that has not experienced a bullet fired in anger for the last 40 years must be seen in the context of existing realities. Conversely, the impact of a group of highly trained and experienced sub-units, inserted at the point of decision, can be far greater as witnessed in the battle

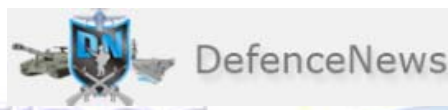
of Haji Pir pass. Similarly, the readiness of an acclimatised force is more important than formations taken in by the miracles that technology can conjure. Mountains have and will continue to prove that when all else fails, it is the foot soldier who can capture and hold ground.

The backdrop of this reality will suggest why the Chinese State-controlled media repeatedly brings up 1962. They realise that certain sections on the Indian side, despite Nathu La in 1967, had created a defensive cocoon around themselves. This section did not lose confidence in their armed forces, which proved their mettle soon thereafter in 1971. Instead, and worse, they doubted their own ability to assert and stand up to a bully.

Conflict is neither desirable nor should the wise invite it. However, it is equally important to understand that military reality in the context of India and China is closer to Nathu La of 1967 rather than Sela of 1962.

(Col Vivek Chadha (Retd) is a Research Fellow at the Manohar Parrikar Institute for Defence Studies and Analyses. Views are personal.)

<https://theprint.in/opinion/in-mountains-chinas-military-prowess-has-a-vertical-limit-1962-is-a-half-truth/467671/>



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India shows interest to acquire Russian 2S25M Sprut-SDM1 self-propelled anti-tank tracked armored

“Amidst the ongoing standoff in Ladakh, India has sent out a Request for Information (RFI) to Russia for its Sprut light tanks. India has not yet disclosed the exact numbers of tanks to be purchased,” said the website Indian Defence Industries (IDI), citing unnamed sources.

The Sprut-SDM1 is a deeply updated variant of the renowned Sprut-SD air-droppable SPATG. Russia’s arms exporting company Rosoboronexport (a subsidiary of state corporation Rostec) introduced an export-oriented variant of the system to the global market in mid-2018. According to the company, the Sprut-SDM1 land platform (its export-oriented model is designated ‘an amphibious light tank’, not ‘a SPATG’) combines high maneuverability and decent firepower. The new system features firepower of the main battle tank and can be airdropped.



The export-oriented Sprut-SDM1 is initially intended for naval infantry and ground troops; however, it can be operated as a traditional light tank in an effective manner. The platform’s armament suite integrates a 125 mm tank cannon, a guided weapon, and a remotely operated weapon system with a 7.62 mm general-purpose machinegun. It should be mentioned that the Sprut-SDM1 fires on-the-move and when swimming. Its sensor suite allows the crew to engage targets round-the-clock and in low-visibility environments. The light tank also features a modern highly automated fire-control system.

The Sprut-SDM1’s firepower capabilities seem to be on par with those of main battle tanks: the platform’s guided weapon allows the system to engage heavy targets, which are protected by explosive reactive armor, at a distance of up to 5 km.

The combat vehicle weighs some 18 t and is powered by a 450-hp engine, producing a road speed of up to 70 km/h and a cruising range of 500 km. As mentioned earlier, the platform is amphibious and can swim for seven hours. The Sprut-SDM1 is manned by a three-strong crew.

The new light tank has two main competitors in the global market, namely the Chinese Type 15 light tank and the Turkish Kaplan MT medium tank. Being a vehicle of the same class, the Sprut-SDM1 has two advantages — a main battle tank-type main gun and amphibious capabilities. Both Type 15 and Kaplan MT carry 105 mm main guns with shortened barrels, while the Sprut-SDM1 is armed with the 125 mm cannon that features higher muzzle velocity and lethality. The use of a guided weapon (neither Type 15 nor Kaplan MT deploys such a capacity) dramatically increases the platform's distance of firing, turning it into 'a long hand' on the battlefield.

The second advantage of the new platform is its tactical flexibility — the Sprut-SDM1 can fire during swims. The system can also be air-transported by a heavy helicopter or a medium airlifter. The combination of light ballistic protection and high maneuverability provides the light tank with decent combat survivability.

The Sprut-SDM1 can be effectively used over rough and mountainous terrains.

<https://www.defencenews.in/article/India-shows-interest-to-acquire-Russian-2S25M-Sprut-SDM1-self-propelled-anti-tank-tracked-armored-891857>



DEFENCE AVIATION POST

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Tue, 28 July 2020

Lockheed Martin to hold virtual India defence suppliers conference

Lockheed Martin announced that it would hold its 7th edition of the annual India Suppliers Conference and Exhibition virtually. Themed 'Making India part of the Global Supply Chain', the 5-day conference will be started from on 27 July.

Organized by the Society of Indian Defence Manufacturers, the 2020 India Suppliers Conference is co-hosted with the Confederation of Indian Industry (CII) and Lockheed Martin to strengthen the supplier ecosystem in India.

The Conference and Exhibition will be held in a virtual-only format on 'CII HIVE' platform this year in response to the COVID-19 pandemic. It will anchor conversations around partnership opportunities that fuel 'Atmanirbhar Bharat' Abhiyaan, strengthen India-U.S. defence industrial strategic ties, particularly 'Make-in-India' partnerships into the future.

Commenting on the Conference, William L Blair, Vice President and Chief Executive, Lockheed Martin India said, "We are excited to host the annual Indian Suppliers Conference and Exhibition for the seventh year running and facilitate meaningful discussions and interactions between current and prospective defence and aerospace industry partners in India. For over three decades, Lockheed Martin has been a committed member of the Indian aerospace and defence industry. We continue to contribute to industry and look forward to further strengthening the foundations of the defence ecosystem and support the vision of 'Atmanirbhar Bharat'.

The Conference will provide an opportunity to the Indian Industry/Micro, Small & Medium Enterprises (MSMEs) to understand and interact with all of Lockheed Martin businesses along with their partners who are looking to source from India. It will be attended by representatives from Indian Ministry of Defence, U.S. government, Indian and Global industry leaders and participation from industry.

The last two conferences were attended by close to 300 delegates and saw participation from around 120 companies of all sizes — large, MSMEs and start-ups.

<https://www.defenceaviationpost.com/2020/07/lockheed-martin-to-hold-virtual-india-defence-suppliers-conference/>

Why in-space will be more challenging than Chandrayaan-2

As part of the Rs 21 lakh crore economic package, privatisation of space activities was announced by the Centre

By G Madhavan Nair

As part of the Rs 21 lakh crore economic package, privatisation of space activities was announced by the Centre. This was followed up, with rocket speed, by the announcement to set up IN-SPACe for promotion of private participation in Indian space programmes, including exploration of planets. The Centre's recent move has been welcomed by many but several questions—why is it needed at this time of Covid-19, what are the tangible benefits and whether adequate preparations are made—remain unanswered.

The Indian space programme is under a fully empowered Space Commission, directly reporting to the prime minister. The Commission is entrusted with implementing all activities related to space research in India. It has done exceptionally well as demonstrated by the development of homegrown technologies for satellites and powerful rockets for taking them to outer space. It is an excellent example of Atmanirbhar Bharat.



For representational purposes (Amit Bandre | Express Illustrations)

The result is India has emerged as a global player in this field on par with developed nations. The uniqueness of ISRO is that it has evolved innovative techniques and put them to use for the benefit of the common man. Disaster management, telemedicine, tele-education and natural resource surveys are notable among them, not to mention applications to meet national security needs.

The uniqueness of ISRO's management system is that almost all technologies are available under one roof. This enables total system realisation end-to-end, starting from concept to detailed engineering, manufacturing and testing in a seamless manner. The space body's unity of command, participatory management and totally transparent review system, that can be summed up as ISRO culture, is responsible for its unmatched success story. Simple missions for atmospheric studies to most complex missions to the Moon and Mars are proof of the success of the existing system. In short, India's space programme is running like a well-oiled machine.

Right from the beginning, ISRO has taken the lead in ensuring use of industrial capability and academic talents in implementing its missions. The net result: ISRO's manpower has remained stable despite a nearly 10-fold increase in the number of missions in the last 10 years. In fact, the portion of ISRO's budget expenditure through industry has increased several-fold and is about 60% of its budget today. This in turn has provided more than 20,000 job opportunities outside ISRO.

The commercial activities of ISRO are managed through Antrix corporation as well as the newly formed NewSpace India Limited. The NSIL is mandated to expand and expedite technology transfer and total system realisation by private players. It also earns nearly `2,000 crore by selling space-based services in India and abroad, and has scope to double within the next five years. These independent corporations are doing nothing but space promotion.

The main reason private players are not getting into the arena is due to the heavy investment required, long gestation period, high risks and paltry return on investment, not exceeding single digits at the end of the day. The industrialisation is moving forward only due to the GOCO (government owned contractor operated) model adopted by ISRO. All large-capital investments are made by the government; companies carry out production activities based on ISRO designs. If total privatisation has to materialise, the industries will have to invest heavily on facilities and in human resources. Retaining trained manpower for long periods is going to be a challenge for the industry.

Nobody has reported any problems so far and no control or restriction is placed on private participation in space. Then why is there a hue and cry for privatisation? In that context, IN-SPACE is like treating a healthy person for a non-existing ailment. While the name IN-SPACE sounds good, it stands for Indian National Space Promotion and Authorisation Centre and is meant to promote private industry participation; the moment authorisation is added, it amounts to control or licensing. How can conflicting functions such as promotion and authorisation be combined into one entity?

Now, can the new entity function effectively? The Department of Space can at best transfer satellite or launcher manufacture to industry. But the revenue out of this is small, less than 10%. The remaining is through services like satellite communication or earth observation data utilisation. For satellite communications, ISRO's role is limited only to leasing out transponders in its satellites. The necessary operating license and monitoring is done by the Department of Telecom and the I&B Ministry. Without participation of these departments in IN-SPACE, how can it take up promotion activities effectively? Similar is the situation in earth observation. It has considerable impact on national security. Mapping is controlled by the Survey of India. Without active involvement of these agencies, IN-SPACE can only be a coordinating agency.

Look at a satellite launch vehicle like PSLV. Its delivery capability is more than that of an IRBM (intermediate-range ballistic missile). Technology associated with launch vehicles and missiles is a guarded secret. In the name of industrialisation, can this be handed over to a private player without adequate safeguards? Today in India, there are only policy guidelines for satellite communication and remote sensing applications, which are nearly 20 years old and outdated. Hence, a prerequisite for the new initiative to succeed is a comprehensive space law that will ensure security for the sensitive technologies as well as compliance with international space treaties and MTCR.

To be effective, IN-SPACE has to be constituted with the full participation of DoT, Ministry of Defence and Survey of India as well as use community and private players. The scope and modus operandi have to be carefully chalked out. There are serious doubts on the economic gains out of privatisation. The assessment of a \$300 billion international space business is correct. But most of these are contained and guarded in developed countries. Once they have the capability, they will not even consider farming out to agencies outside their countries. India's share in this is less than fraction of a percent. Even if this increases tenfold, the size of the market will be less than \$3 billion.

A major part of space application in India is for societal benefit and security purposes. They are not charged at market rates. Once we embark on privatisation, huge funding will have to be found by user agencies. Additional job creation is questionable and attracting foreign investment in areas of low returns is a mirage. The government has taken a decision to implement IN-SPACE. ISRO is a well-disciplined organisation. It will have to take up the challenge of implementing an unproven novel concept. It will have to spend a lot of its time and resources first to get out of the flutter created by this small step and evolve a new managerial mechanism to make the next step. This is going to be more challenging than Chandrayaan-2.

(G Madhavan Nair, Former ISRO Chairman)

<https://www.newindianexpress.com/opinions/2020/jul/27/why-in-space-will-be-more-challenging-than-chandrayaan-2-2175237.html>

Researchers create 'decoy' coatings that trick infrared cameras

By Thomas Lee

Light can sometimes play tricks on our eyes. If you look at a shiny surface, what you see will largely depend on the surrounding environment and lighting conditions.

Berkeley researchers have now taken ocular distortion a step further, finding a way to imbed visual "decoys" into surfaces of objects in a way that can fool people into thinking they detect a specific image in the infrared that actually isn't there.

In a new paper published today in the journal *Advanced Materials*, Junqiao Wu, UC Berkeley professor of materials science and engineering, and post-doctoral researcher Kechao Tang described a process in which they created special structures made from delicately engineered thin films of tungsten-doped vanadium dioxide.

Infrared light is invisible to the human eye, but can be detected by a range of devices, such as night-vision goggles and thermal-imaging cameras. The coatings developed by Berkeley researchers can effectively tune target objects into emitting the same infrared radiation as the surrounding environment, making them invisible to infrared detection devices.

But what makes the researchers' work particularly novel is that they can manipulate the coatings in a way that a person trying to view the object with such a device would instead see a false image.

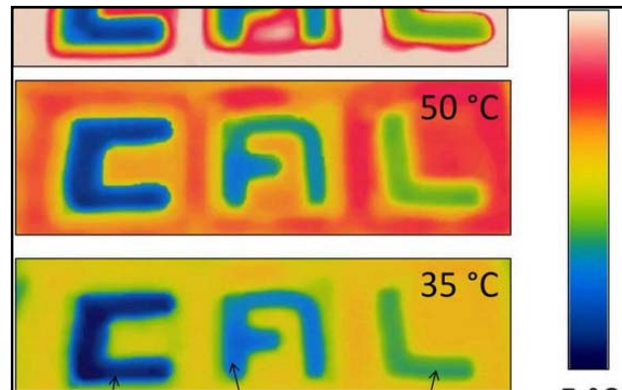
"This structure offers a general platform for unprecedented manipulation and processing of infrared signals," the researchers wrote in the paper.

To create the structures, Wu and his team focused on coating objects with tungsten-doped vanadium dioxide, a substance that at certain temperatures can phase shift from an insulator, which suppresses electric conductivity, to a metal, which conducts electricity.

With judicious engineering of the doping profile, the insulator-metal phase transition can even out, allowing the substance to emit a constant level of thermal radiation over wide range of temperature variations (15-70 degrees Celsius). This state of equilibrium prevents a camera from detecting the true infrared signals that an object normally emits around room temperature.

Other researchers have explored concealing infrared emissions with different phase-changing materials. Previously, scientists at the University of Wisconsin at Madison experimented with samarium nickel oxide, while engineers at Zhejiang University in Hangzhou, China focused on germanium-antimony-tellurium to achieve thermal camouflage.

But Berkeley researchers, backed by the National Science Foundation and the Bakar Fellows Program, say their technology represents several advancements. They grew ultra-thin layers of vanadium dioxide (less than 100 nanometers thick) on structures made from borosilicate glass and sapphire. Using pulsed lasers, researchers doped the films with different amounts of tungsten and then transferred the material onto a special adhesive tape called polyethylene (PE) film tape.



The letters C-A-L appear cool even when the environment is hot. UC Berkeley engineers develop a decoy that fools infrared cameras into perceiving a designated temperature rather than the actual temperature of the object. Credit: Kechao Tang

The researchers say this method provides better, more consistent camouflage because the product is mechanically flexible, power free and inherently self-adaptive to temporal fluctuation as well as spatial variation of the target temperature.

Additionally, by manipulating the configuration and composition of tungsten-doped vanadium dioxide on coatings applied to the PE tape, researchers can create an infrared decoy.

"How we grow the material changes the image people ultimately think they see," Wu said.

In the paper, researchers described encoding the letters C-A-L onto samples that they later placed on the surface of an object. The color of the letters represents the temperature people see when viewing from an infrared camera. For example, the blue C shows it is at a constant 5 degrees Celsius, the lighter blue A at a constant 15 degrees Celsius, and the green L at a constant 25 degrees Celsius, regardless of the actual temperature of the samples.

Even though the object's actual temperature varies widely from 35-65 degrees Celsius, a person who views the object through night-vision goggles will distinctly see a colder "CAL" that is independent of the actual temperature.

"We can both erase real information and create false information," Wu said, "CAL stays cool when the environment is hot."

This kind of technology could prove useful for military and intelligence agencies, as they seek to thwart increasingly sophisticated surveillance technologies that pose a threat to national security. It might also incubate future encryption technology, allowing information to be safely concealed from unauthorized access.

More information: Kechao Tang et al. A Thermal Radiation Modulation Platform by Emissivity Engineering with Graded Metal-Insulator Transition, *Advanced Materials* (2020). [DOI: 10.1002/adma.201907071](https://doi.org/10.1002/adma.201907071)

Journal information: [Advanced Materials](https://phys.org/news/2020-07-decoy-coatings-infrared-cameras.html)
<https://phys.org/news/2020-07-decoy-coatings-infrared-cameras.html>



Tue, 28 July 2020

Researchers build first AI tool capable of identifying individual birds

New research demonstrates for the first time that artificial intelligence (AI) can be used to train computers to recognize individual birds, a task humans are unable to do. The research is published in the British Ecological Society journal *Methods in Ecology and Evolution*.

"We show that computers can consistently recognize dozens of individual birds, even though we cannot ourselves tell these individuals apart. In doing so, our study provides the means of overcoming one of the greatest limitations in the study of wild birds—reliably recognizing individuals." Said Dr. André Ferreira at the Center for Functional and Evolutionary Ecology (CEFE), France, and lead author of the study.

In the study, researchers from institutes in France, Germany Portugal and South Africa describe the process for using AI to individually identify birds. This involves collecting thousands of labeled images of birds and then using this data to train and test AI models. This study represents the first successful attempt to do this in birds.



Two sociable weavers with the bounding boxes illustrating the individual identification performed by the computer. Credit: Annie Basson and André Ferreira

The researchers trained the AI models to recognize images of individual birds in wild populations of great tits and sociable weavers and a captive population of zebra finches, some of the most commonly studied birds in behavioral ecology. After training, the AI models were tested with images of the individuals they had not seen before and had an accuracy of over 90% for the wild species and 87% for the captive zebra finches.

In animal behavior studies, individually identifying animals is one of the most expensive and time-consuming factors, limiting the scope of behaviors and the size of the populations that researchers can study. Current identification methods like attaching color bands to birds' legs can also be stressful to the animals.

These issues could be solved with AI models. Dr. André Ferreira said: "The development of methods for automatic, non-invasive identification of animals completely unmarked and unmanipulated by researchers represents a major breakthrough in this research field. Ultimately, there is plenty of room to find new applications for this system and answer questions that seemed unreachable in the past."

For AI models to be able to accurately identify individuals they need to be trained with thousands of labeled images. Companies like Facebook are able to do this for human recognition because they have access to millions of pictures of different people that are voluntarily tagged by users. But, acquiring such labeled photographs of animals is difficult and has created a bottleneck in research.

The researchers were able to overcome this challenge by building feeders with camera traps and sensors. Most birds in the study populations carried a passive integrated transponder (PIT) tag, similar to the microchips implanted in pet cats and dogs. Antennae on the bird feeders were able to read the identity of the bird from these tags and trigger the cameras.

Being able to distinguish individual animals from each other is important for the long-term monitoring of populations and protecting species from pressures such as climate change. While some species such as leopards have distinct patterns that allow humans to recognize them by eye, most species require additional visual identifiers, such as color bands attached to birds' legs, for us to tell them apart. Even then, methods like this are extremely time consuming and error prone.

AI methods like the one shown in this study use a type of deep learning known as convolutional neural networks, these are optimal for solving image classification problems. In ecology, these methods have previously been used to identify animals at a species levels and individual primates, pigs and elephants. However, until now it hasn't been explored in smaller animals like birds.

The authors caution that the AI model is only able to re-identify individuals it has been shown before. "The model is able to identify birds from new pictures as long as the birds in those pictures are previously known to the models. This means that if new birds join the study population the computer will not be able to identify them." said Dr. André Ferreira.

The appearance of individual birds can change over time, for instance molting, and it's not known how the performance of the AI model will be affected. Images of the same bird taken months apart could be mistakenly identified as different individuals.

The authors add that both these limitations can be overcome with large enough datasets containing thousands of images of thousands of individuals over long periods of time, which they are currently trying to collect.

More information: André C. Ferreira et al, Deep learning-based methods for individual recognition in small birds, *Methods in Ecology and Evolution* (2020). DOI: [10.1111/2041-210X.13436](https://doi.org/10.1111/2041-210X.13436)

Journal information: [Methods in Ecology and Evolution](https://phys.org/news/2020-07-ai-tool-capable-individual-birds.html)
<https://phys.org/news/2020-07-ai-tool-capable-individual-birds.html>

Scientists develop novel transparent broadband electromagnetic interference shielding materials

By Zhang Nannan

The Flexible Optoelectronic Material Group led by Prof. Song Weijie at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) has proposed and successfully fabricated visibly transparent electromagnetic interference (EMI) shielding materials with high EMI shielding effectiveness (SE) and visible transmittance. The study was published in *ACS Applied Materials & Interfaces*.

The development of microwave wireless communication facilitates people's daily life, but it also brings about more complex electromagnetic environment. The emerging 5G and 6G wireless telecommunications working at higher frequencies and larger bandwidths would definitely provide an avenue to the Internet of Things (IoT), automated driving, smart cities, while they challenge the EMI shielding materials as well. Novel EMI shielding materials need to be developed for preventing unwanted high-frequency microwave signals.



Fig. The samples of transparent EMI shielding materials fabricated through (a) a laboratory facility and (b) a pilot plant facility. Credit: NIMTE

Recently, researchers at NIMTE developed visibly transparent EMI shielding materials using an ultrathin silver layer sandwiched by oxides (SLSO) as building blocks. The samples with a double-sided SLSO (D-SLSO) structure exhibited an EMI SE of over 60 dB for 10-40 GHz with a visible transmittance close to 90%, which is even comparable with those of bare polyethylene terephthalate (PET) and glass substrates.

In addition, the dual role of D-SLSO structure was clarified: it not only enhances EMI shielding via a Fabry–Pérot resonant cavity for microwave electromagnetic waves (EMWs), but also functions as antireflection coatings for visible EMWs.

The research group has been devoted to the optimization and large-area fabrication of D-SLSO EMI shielding materials. The D-SLSO materials with a width of 600 mm have been successfully produced through a pilot plant facility.

Moreover, the effectiveness and the stability of the transparent EMI shielding materials have been confirmed through applications in radio frequency (RF) devices.

More information: Changwei Yuan et al. Record-High Transparent Electromagnetic Interference Shielding Achieved by Simultaneous Microwave Fabry–Pérot Interference and Optical Antireflection, *ACS Applied Materials & Interfaces* (2020). DOI: [10.1021/acsami.0c05334](https://doi.org/10.1021/acsami.0c05334)

Journal information: *ACS Applied Materials and Interfaces*

<https://phys.org/news/2020-07-scientists-transparent-broadband-electromagnetic-shielding.html>

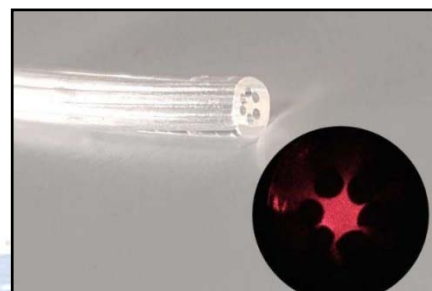
Researchers develop an optical fiber made of gel derived from marine algae

By Jose Tadeu Aranrtes

An optical fiber made of agar has been produced at the University of Campinas (UNICAMP) in the state of São Paulo, Brazil. This device is edible, biocompatible and biodegradable. It can be used in vivo for body structure imaging, localized light delivery in phototherapy or optogenetics (e.g., stimulating neurons with light to study neural circuits in a living brain), and localized drug delivery.

Another possible application is the detection of microorganisms in specific organs, in which case the probe would be completely absorbed by the body after performing its function.

The research project, which was supported by São Paulo Research Foundation—FAPESP, was led by Eric Fujiwara, a professor in UNICAMP's School of Mechanical Engineering, and Cristiano Cordeiro, a professor in UNICAMP's Gleb Wataghin Institute of Physics, in collaboration with Hiromasa Oku, a professor at Gunma University in Japan.



Edible, biocompatible and biodegradable, these fibers have potential for various medical applications. Credit: Eric Fujiwara

An article on the study is published in *Scientific Reports*.

Agar, also called agar-agar, is a natural gelatin obtained from marine algae. Its composition consists of a mixture of two polysaccharides, agarose and agarpectin. "Our optical fiber is an agar cylinder with an external diameter of 2.5 millimeters [mm] and a regular inner arrangement of six 0.5 mm cylindrical airholes around a solid core. Light is confined owing to the difference between the refraction indices of the agar core and the airholes," Fujiwara told.

"To produce the fiber, we poured food-grade agar into a mold with six internal rods placed lengthwise around the main axis," he continued. "The gel distributes itself to fill the available space. After cooling, the rods are removed to form airholes, and the solidified waveguide is released from the mold. The refraction index and geometry of the fiber can be adapted by varying the composition of the agar solution and mold design, respectively."

The researchers tested the fiber in different media, from air and water to ethanol and acetone, concluding that it is context-sensitive. "The fact that the gel undergoes structural changes in response to variations in temperature, humidity and pH makes the fiber suitable for optical sensing," Fujiwara said.

Another promising application is its simultaneous use as an optical sensor and a growth medium for microorganisms. "In this case, the waveguide can be designed as a disposable sample unit containing the necessary nutrients. The immobilized cells in the device would be optically sensed, and the signal would be analyzed using a camera or spectrometer," he said.

More information: Fujiwara et al., Agarose-based structured optical fiber, *Scientific Reports* (2020). DOI: [10.1038/s41598-020-64103-3](https://doi.org/10.1038/s41598-020-64103-3)

Journal information: *Scientific Reports*

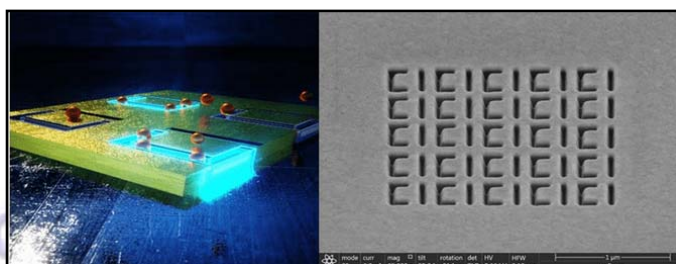
<https://phys.org/news/2020-07-optical-fiber-gel-derived-marine.html>

Researchers develop new technique for precise nanoparticle trapping

The ability to isolate and track nanoparticles is essential to have a close look at viruses, proteins, or DNA.

To trap such particles, a laser beam must be rigidly focused to a point that generates a powerful electromagnetic field. This beam will have the ability to hold particles similar to a pair of tweezers. However, this method is hampered by certain natural limitations.

The most prominent among these are the size limitations—the method is not applicable if the particle is too small. Until now, optical tweezers have not been able to hold particles such as individual proteins, which measure only a few nanometers in diameter.



The asymmetric split rings successfully trapped 20 nm polystyrene particles at certain regions. Image Credit: Okinawa Institute of Science and Technology Graduate University.

Latest advances in nanotechnology have enabled scientists in the Light-Matter Interactions for Quantum Technologies Unit at the Okinawa Institute of Science and Technology Graduate University (OIST) to design a method for accurate trapping of nanoparticles.

In this research, the team addressed the natural limitations by designing optical metamaterials-based tweezers. Metamaterials are synthetic materials with particular properties that do not occur by nature. For the first time, the researchers used this type of metamaterial for trapping single nanoparticle.

Being able to manipulate or control these small particles is crucial for advances in biomedical science. The potential applications for society are far-reaching.

Dr Domna Kotsifaki, Staff Scientist, Okinawa Institute of Science and Technology

Kotsifaki is the study first author of the research paper that was published in *Nano Letters*. Dr Kotsifaki explained that by trapping such nanoparticles, scientists could observe the advancement of cancer, develop effective drugs, and optimize biomedical imaging.

This novel method has two desirable capabilities—it can steadily trap the nanoparticles by making use of low-intensity laser power and can be utilized for a long period while preventing damage to the sample by light.

This was the result of the metamaterial selected by the researchers. This metamaterial is highly sensitive to variations in the surrounding environment, and hence enables the use of low-intensity laser power.

Metamaterials have unusual properties due to their unique design and structure. But this makes them very useful. Over the last few years, a whole new era of devices with novel concepts and potential applications has been created from them. From the metamaterial, we fabricated an array of asymmetric split rings using a beam of ions – tiny, charged particles – on a 50 nm gold film.

Dr Domna Kotsifaki, Staff Scientist, Okinawa Institute of Science and Technology

To check if the method was successful, the researchers irradiated the device using near-infrared light and trapped polystyrene particles measuring 20 nm at specific regions on it.

Together with her collaborators, Dr Kotsifaki looked for the trap stiffness, which relates to trapping performance.

The achieved trapping performance was several times better than that of conventional optical tweezers and the highest reported to date as far as we know. As the first group to use this device for precision nanoparticle trapping, it has been rewarding to contribute to such progress in this research area.

Dr. Domna Kotsifaki, Staff Scientist, Okinawa Institute of Science and Technology

Currently, the team plans to tune the device to check whether these tweezers can be employed in real-world applications. Particularly, in the upcoming days, this device could be used to make lab-on-chip technologies, which are hand-held, diagnostic tools that can offer results in an inexpensive and efficient manner.

Besides its applications in the field of biomedical science, this study has offered new and basic insights into nanotechnology and the behavior of light at the nanoscale.

Apart from Dr Domna Kotsifaki, the research group included Professor Síle Nic Chormaic, who heads the OIST Unit, and staff scientist, Dr Viet Giang Truong.

Journal Reference

Kotsifaki, D. G., *et al.* (2020) Fano-Resonant, Asymmetric, Metamaterial-Assisted Tweezers for Single Nanoparticle Trapping. *Nano Letters*. doi.org/10.1021/acs.nanolett.0c00300.

Source: <https://www.oist.jp/>

<https://www.azonano.com/news.aspx?newsID=37458>



Tue, 28 July 2020

On India's coronavirus vaccine, a soothing update of first success from Rohtak

Dr. Savita Verma, principal investigator of the vaccine trial team said that six volunteers were administered the vaccine as a part 2 of the clinical trials phase 1, on Saturday

New Delhi: In a significant progress towards indigenous vaccine development front, India's COVID-19 vaccine, COVAXIN, achieved success in a section of part 1 human trials at PGI Rohtak. On Saturday, part 1 of the first phase trials got completed at the Post-Graduate Institute of Medical Sciences, Rohtak, news agency ANI reported.

Afterward, part 2 of the first phase clinical trial began at PGI Rohtak on Saturday.

Dr. Savita Verma, principal investigator of the vaccine trial team said that six volunteers were administered the vaccine as a part 2 of the clinical trials phase 1, on Saturday. The trials, which began on 17 July 2020 at PGI Rohtak had three volunteers administered with the vaccine, all of whom showed a suitable response to be considered part one of the first phase clinical trial of COVAXIN a success.

The trials of COVAXIN, an indigenous COVID vaccine, developed by Hyderabad-based Bharat Biotech in collaboration with the Indian Council for Medical Research (ICMR) and Pune-based National Institute of Virology (NIV), started its clinical trials at AIIMS Patna on 15th July, followed by PGI-Rohtak and AIIMS-Delhi on Friday. There are a total of 12 vaccine clinical trial sites in India, for the development of COVAXIN.

All about 'Covaxine' so-far

Bharat Biotech's vaccine candidate reportedly developed an 'effective' immune response during the pre-clinical phase of its trials between mid-June and early-July. Covaxine is an inactivated vaccine that utilizes the dead novel Coronavirus vaccine to evoke an immune response against the COVID-19.

A total of three doses of the vaccine under trial will be given to the volunteers. After each dosage, the volunteer will remain under observation as per the ICMR guidelines so as to ascertain the immune response as projected against the virus. A total of 163 vaccine candidates remain under development worldwide, of which over a dozen have reached human trial-phase, including Bharat Biotech's COVAXIN.

<https://english.jagran.com/india/on-indias-coronavirus-vaccine-a-soothing-update-of-first-success-from-rohtak-10014502>



Moderna begins 3rd stage of trial for potential COVID-19 vaccine

By Don Jacobson

Drugmaker Moderna said Monday it has begun a 30,000-patient, third-stage clinical trial for its COVID-19 vaccine candidate -- a day after receiving an additional \$472 million from the U.S. government.

Called the COVE, or Coronavirus Efficacy, study, the trial is being performed at 100 clinical research sites in collaboration with the National Institute of Allergy and Infectious Diseases and the U.S. Biomedical Advanced Research and Development Authority, or BARDA.

Moderna said it has begun dosing human participants.

"We are grateful to the efforts of so many inside and outside the company to get us to this important milestone," Moderna CEO Stephane Bancel said in a statement.

"We look forward to this trial demonstrating the potential of our vaccine to prevent COVID-19, so that we can defeat this pandemic."

Moderna said Sunday it received the new federal funding to support late-stage clinical development as part of the Trump administration's Operation Warp Speed initiative to find a COVID-19 vaccine.

BARDA has so far allocated nearly \$1 billion in total funding to Moderna for its vaccine candidate, mRNA-1273. Phase 1 trial results showed the vaccine spurred antibody reactions in all 45 participants, with no serious side-effects, following two injections over the course of four weeks.

The primary endpoint of the new, larger study will be preventing COVID-19. Secondary endpoints include preventing severe COVID-19 cases and infection by SARS-CoV-2, the novel coronavirus that causes the disease.

"The company remains on track to be able to deliver approximately 500 million doses per year, and possibly up to 1 billion doses per year, beginning in 2021," Moderna said.

Moderna's vaccine candidate is the fifth to enter third-stage studies and the second outside of China, according to the World Health Organization. Britain's University of Oxford and European drugmaker AstraZeneca started a combined Phase 2/3 study in May.

https://www.upi.com/Top_News/US/2020/07/27/Moderna-begins-3rd-stage-of-trial-for-potential-COVID-19-vaccine/4391595848461/



Moderna said Monday it's on track to deliver 500 million doses of its vaccine per year, and possibly as many as 1 billion doses per year beginning in 2021. File Photo by CJ Gunther/EPA-EFE

Covid-19 infections leave an impact on the heart, raising concerns about lasting damage

By Elizabeth Cooney

Two new studies from Germany paint a sobering picture of the toll that Covid-19 takes on the heart, raising the specter of long-term damage after people recover, even if their illness was not severe enough to require hospitalization.

One study examined the cardiac MRIs of 100 people who had recovered from Covid-19 and compared them to heart images from 100 people who were similar but not infected with the virus. Their average age was 49 and two-thirds of the patients had recovered at home. More than two months later, infected patients were more likely to have troubling cardiac signs than people in the control group: 78 patients showed structural changes to their hearts, 76 had evidence of a biomarker signaling cardiac injury typically found after a heart attack, and 60 had signs of inflammation.

These were relatively young, healthy patients who fell ill in the spring, Valentina Puntmann, who led the MRI study, pointed out in an interview. Many of them had just returned from ski vacations. None of them thought they had anything wrong with their hearts.

“The fact that 78% of ‘recovered’ [patients] had evidence of ongoing heart involvement means that the heart is involved in a majority of patients, even if Covid-19 illness does not scream out with the classical heart symptoms, such as anginal chest pain,” she told STAT. She is a cardiologist at University Hospital Frankfurt. “In my view, the relatively clear onset of Covid-19 illness provides an opportunity to take proactive action and to look for heart involvement early.”

The other study, which analyzed autopsy results from 39 people who died early in the pandemic and whose average age was 85, found high levels of the virus in the hearts of 24 patients.

“We see signs of viral replication in those that are heavily infected,” Dirk Westermann, a cardiologist at the University Heart and Vascular Centre in Hamburg, said in an interview. “We don’t know the long-term consequences of the changes in gene expression yet. I know from other diseases that it’s obviously not good to have that increased level of inflammation.”

Taken together, the two studies, published Monday in *JAMA Cardiology*, suggest that in many patients, Covid-19 could presage heart failure, a chronic, progressive condition in which the heart’s ability to pump blood throughout the body declines. It is too soon to say if the damage in patients recovering from Covid-19 is transient or permanent, but cardiologists are worried.

“These are two studies that both suggest that being infected with Covid-19 carries a high likelihood of having some involvement of the heart. If not answering questions, [they] prompt important questions about what the cardiac aftermath is,” said Matthew Tomey, a cardiologist and assistant professor of medicine at the Icahn School of Medicine at Mount Sinai Health System in New York. He was not involved in either study.

“The question now is how long these changes persist,” he added. “Are these going to become chronic effects upon the heart or are these — we hope — temporary effects on cardiac function that will gradually improve over time?”

Since the pandemic began, people with underlying cardiovascular problems such as high blood pressure, coronary artery disease, or heart failure have been known to be at higher risk for infection and death. The connection between Covid-19 and blood clots emerged later, after doctors began connecting the pulmonary aneurysms, strokes, and heart attacks they were seeing to the virus.

Cardiac problems in recovering patients could belong to a pattern of lingering symptoms. Tomey sees signs of weakness in patients who had Covid-19 in March or April, when the disease was surging in New York.

“Patients come to my office saying, ‘hey, I’m a 31-year-old who used to run and be completely unlimited in my exercise, and now I get palpitations walking across the street. Or I get out of breath climbing up to my second-floor apartment,’” he said. “Individuals are exquisitely tuned in to their own capacity for exercise, so I take that very seriously. Our challenge is to understand the why.”

Marc Pfeffer, a cardiologist at Brigham and Women’s Hospital in Boston, called both the autopsy and MRI studies a sobering warning. He was not involved in either. He’s concerned about relatively young people losing their cardiac health reserves, which typically decrease with age and can set the stage for heart failure.

“We knew that this virus, SARS-Cov-2, doesn’t spare the heart,” he said. “We’re going to get a lot of people through the acute phase [but] I think there’s going to be a long-term price to pay.”

In an editorial about the two studies, Clyde Yancy, a cardiologist at Northwestern’s Feinberg School of Medicine, and Gregg Fonarow, a cardiologist at UCLA’s Geffen School of Medicine, pushed for more research into the problem.

“If this high rate of risk is confirmed, ... then the crisis of COVID-19 will not abate but will instead shift to a new de novo incidence of heart failure and other chronic cardiovascular complications,” they wrote. “We are inclined to raise a new and very evident concern that cardiomyopathy and heart failure related to Covid-19 may potentially evolve as the natural history of this infection becomes clearer.”

Asked if there is something that can be done for patients now, Mount Sinai’s Tomey said, “I would love to have the answer to that question.”

<https://www.statnews.com/2020/07/27/covid19-concerns-about-lasting-heart-damage/>

The logo for Medical Xpress, featuring the text "Medical Xpress" in white on a blue rectangular background. The "X" is stylized with a yellow and green DNA double helix structure.

Tue, 28 July 2020

Eight things you need to know about the worldwide hunt for a COVID-19 vaccine

By Gillian Rutherford

With more than 100 teams around the world racing to find a vaccine against SARS-CoV-2, including three at the University of Alberta, what are the chances of getting something that works?

The World Health Organization's list shows 21 vaccine projects in either phase 1 or 2 of clinical trials, and two projects, one in China and the other in the U.K., in phase 3. The top two report they are seeing protective antibodies created in their trials, but even they can't say for sure whether, or when, their vaccines might be ready for widespread distribution.

There's a lot at stake, with nearly 16 million of the world's 7.5 billion people already infected and more than 600,000 dead—and the numbers are growing exponentially. And while public health measures such as social distancing and masks seem to be keeping the lid on the pandemic in Canada, outbreaks continue now that the economy is reopening and fears are mounting about a second wave in the fall.

"We've seen the measures that are needed to slow the virus down are fairly extreme and are not sustainable to the degree that they were started at, although they were totally necessary," said Lynora Saxinger, a U of A infectious diseases specialist and co-chair of Alberta Health Services' Scientific Advisory Group on COVID-19. "It's hard to figure out how to keep the virus from spreading without a vaccine."

Some U of A experts, such as virologist David Marchant and biological scientist David Wishart, are on the record expressing doubt about the chances of ever finding a vaccine—because of the

technical and safety challenges, not to mention production and distribution obstacles—while others, such as virologist Michael Houghton, medical microbiologist David Evans and oncologist John Lewis, are forging ahead with solid funding and high hopes for their vaccine approaches.

Folio asked the U of A's leading experts in viruses and infectious diseases, medical ethics and drug manufacturing to map out what it will take to develop, test, manufacture and administer an effective vaccine against COVID-19.

1. There is cause for cautious optimism

A typical vaccine can take a decade or more to develop, and for some diseases, such as HIV/AIDS and hepatitis C, nothing has yet been approved despite decades of work. That said, vaccines have been developed for more than 20 life-threatening diseases, preventing millions of potential deaths each year from smallpox, diphtheria, measles and polio, among other diseases. The pressure for success—scientific, economic, political, social and humanitarian—has never been so intense. Never before have so many scientific teams dropped everything and pivoted to study a single global problem.

"We just can't afford to wait 10 years," said Tom Hobman, a cell biologist and former Canada Research Chair in RNA virus host interactions.

"There are some people who said we should have let the virus run its course," rather than bringing the world to a halt with public health measures to prevent the spread and spending billions on research to find vaccines and antiviral treatments, he said. "I don't agree with that approach.

"If you look at it strictly from a biological standpoint—in the animal world, that's what happens—but as humans we don't do that. I'm really encouraged by the news that we're hearing (about promising projects) and I'm cautiously optimistic."

Saxinger said one cause for optimism is the sheer force with which COVID-19 has hit the world.

"One of the reasons that vaccine development is historically really slow is that a lot of the diseases that we are making vaccines for are not very common in the community, so enrolling enough people into the trial to test efficacy takes many years," she said. "The trials for COVID will recruit very quickly and have results quickly because it's basically tearing around the globe and creating havoc.

"It's just such an explosive epidemic in so many places that I think we'll get answers more quickly," she said. "This is not our usual vaccine situation."

Saxinger's reading of the science is that thanks to the huge international co-operative effort, enough is already understood about the immune response to the virus that it is probable a vaccine will be found to provide protection.

"We're not sure for how long the protection will last," she cautioned. "But there's a very good chance that we'll have a vaccine."

2. More than one vaccine may work

Another reason for optimism is the number of projects underway and the variety of technological approaches being taken. At its basic level, a vaccine's job is to prime the immune system so it is ready to mount a powerful defence as soon as it encounters a virus. But there are many ways to do that. Each technology presents its own advantages and disadvantages.

The traditional approach is to give a small dose of weakened or inactivated pathogen, or just a part of it, so your body will recognize the real thing when it shows up. These vaccines can take time to develop and may require large manufacturing facilities, which don't exist in the numbers required to inoculate the world.

A newer technology involves using another harmless virus as a "vector" or delivery vehicle for a part of the COVID-19 virus, but again, this kind of vaccine may be relatively complex to manufacture and there is concern about the safety of repeated doses, which may be required to "boost" immunity. Nucleic acid (DNA and RNA) based vaccines look promising because they are relatively cheap and easy to make, but no such vaccine has yet been approved for human use

against other diseases, although many have been in development with promising results. Concerns remain about potential changes to recipients' chromosomes, so these vaccine options will have to pass critical safety hurdles.

Hobman said it is a plus that so many different platforms are being tested, because it creates a competitive incentive. He pointed out that there are several manufacturers of influenza vaccines who take different approaches to the annual cocktail that is given to prevent the most prevalent strains of flu each year. Those vaccines are often far from perfect, providing less than 30 percent efficacy, he said.

"They still do provide benefits by reducing transmission and lessening the course of the disease," he said. "It doesn't have to be perfect."

He said a likely scenario is that one or two types of vaccine will be ready first and will provide some immunity, but because it seems that immunity does not last long even among those who have had COVID-19, a booster inoculation will likely be required, possibly using one of the technologies that is slower to develop.

"I actually would be really happy if multiple vaccines are proven to work, and they were all manufactured in different ways, because then there's less likely to be bottlenecks in production that would affect our ability to scale up," Saxinger said.

"Billions of doses will be needed and anything that will help diffuse the manufacturing, and allow countries to make their own, would be excellent," she said.

3. It won't happen quickly

Much media coverage has speculated about getting a vaccine ready to go by the end of this year, but Saxinger believes the very best-case scenario would be to have vaccines ready for widespread public inoculation of Canadians by the end of 2021.

"All of these various factors about how they are made and how they work and how they can be tested make it a complex playing field," she said.

Hobman pointed out that while finding a viable vaccine candidate is challenging enough, the testing takes time and can't be rushed, although some testing phases can be done in parallel. Then there's the licensing process, manufacturing and distribution of billions of doses, all of which present huge logistical challenges.

"It's not trivial," said Hobman, whose lab is working on interferon and other potential antiviral candidates to treat patients until a vaccine is ready to go.

Hobman explained the safety and efficacy testing for a vaccine involves numerous steps, none of which can be skipped. It starts with preclinical testing in small animals such as ferrets and mice. Then phase 1 testing evaluates whether the vaccine is safe for healthy individuals and whether it can induce an immune response. In phase 2, you're looking at a larger group of people to monitor safety and to see how dosage affects antibody production. Then in phase 3 you do large-scale testing with thousands of people to see whether the vaccine really does provide protection against the virus. How many people who are vaccinated get sick, how severe are their symptoms, are there side-effects and how well can those be managed?

"Vaccines are like any drug," he said. "Some people do react poorly, but it's usually a very small percentage, and we have to assess that risk against the benefit on a population basis."

Saxinger said that while testing steps can't be missed, there are other parts of the process that can be expedited. For example, the U.S. government has already ordered 300 million doses of the Oxford University/AstraZeneca vaccine candidate even before phase 3 trials are complete, at a cost of up to US\$1.2 billion.

"If it turns out they work the way you need them to, they'll be ahead of the game," Saxinger said. "I hope they bet on the right horse."

"I see real efforts to try and shorten the time it will take to get a vaccine to the public and a real willingness to invest in that."

4. Some healthy people may have to take a risk before the rest of us get protected

The testing phases of vaccine development can't be rushed because there is so much potential harm if things go awry. Hobman recounted how researchers for a dengue virus vaccine uncovered a frightening phenomenon in which some vaccinated people actually experienced more severe illness than non-vaccinated individuals when they became infected with dengue virus. This is the exact opposite of what COVID-19 vaccine researchers hope to achieve, but the only way to find out whether their vaccines induce this response is to test them out ... on a lot of people.

This summer, 30,000 healthy American volunteers will be recruited for that U.S. phase 3 trial as part of the government's "Operation Warp Speed" on vaccine development, while 9,000 Brazilian health-care workers will be asked to try a different vaccine being developed by Sinovac. Medicago of Quebec City began phase 1 testing in 180 volunteers earlier this month, while CanSino's vaccine candidate has been approved for human trials in Canada and is enrolling 696 people for phase 1 and 2 trials at Dalhousie University. The Dalhousie researchers report being overwhelmed by volunteers who want to take part in the trials.

In all the trials announced so far, participants are given either a dose of the prospective vaccine or a placebo and then are monitored for at least two months and up to four years, depending on the phase. The volunteers may or may not encounter the SARS-CoV-2 virus while going about their normal lives. If the vaccine works, the people who received it would develop fewer, or at least less severe, illnesses than the control group and the general population in the region.

Meanwhile, a movement in the U.S. known as "1 Day Sooner" is promoting so-called "challenge trials," which would purposely expose the volunteers to the active virus, effectively speeding up the time it takes to get results. The pressure to go this route is so intense that the World Health Organization has come out with key ethics criteria for challenge trials during COVID-19.

"We need to encourage public dialogue around challenge studies and who would be first to receive vaccines," said Michael van Manen, a pediatrician who is the Endowed Chair of Health Ethics and the director of the John Dossetor Health Ethics Centre at the U of A.

Whether people sign up for a challenge trial or a regular trial, van Manen noted that ethics boards and governments oversee trials, so it's never "just anything goes."

"Vaccine research receives significant ethical oversight," he said. "This is particularly important in our current situation where there is a great deal of public and political pressure to develop treatments and vaccines. Still, we need to pause to reflect.

"Yes, people who choose to engage in such risks (by signing up for a clinical trial) should be able to decide for themselves, especially if it's something they believe in."

However, the problem is that the risks of intentionally exposing healthy individuals to SARS-CoV-2 are really unknown. With no sure, effective treatment, there is no guarantee you will fully recover if you become severely ill. Not enough time has passed since the illness first appeared for the long-term side-effects of COVID-19—including brain, lung or kidney damage—to be fully understood. And because you can be contagious before you even develop symptoms, you could unwittingly share the disease with family or friends who did not sign up for the trial.

5. We'll be able to manufacture the vaccines we need right here at home

It will take more than four million doses to immunize every Albertan once a successful drug or drugs are found. Whether the winning formulae are developed in Canada or internationally, those doses for Albertans will likely be prepared at the Alberta Cell Therapy Manufacturing (ACTM) facility on the U of A campus, one of just six publicly funded Good Manufacturing Process (GMP) facilities in Canada.

Built with clean rooms to ensure no bacterial contamination, it was opened by surgery professor and scientific director Greg Korbitt in 2015 thanks to a total of \$26 million from the Canada Foundation for Innovation, the Government of Alberta and the U of A. The ACTM is already working on a number of boundary-pushing projects, including preparing a hepatitis C vaccine for human trials led by virologist Michael Houghton and CAR-T immunotherapy cells for oncologist Michael Chu, and hopes to soon begin making islet stem cells for surgeon James Shapiro.

"They're unable to do that type of research without our facility," said Korbutt.

Until now, the ACTM has produced cell therapy products for phase 1 clinical trials, but Korbutt said the facility has the capacity to make enough vaccine doses for all Albertans. ACTM has the equipment to put doses of vaccine in vials so they can be stored properly, distributed to clinics, drawn up in syringes and injected. Having that start-to-finish production capability allows the facility to charge for future commercial projects and become financially self-sustaining.

"We would be able to make thousands of vials in a day," Korbutt said, which would allow the facility to supply Alberta and beyond.

6. Once we have a vaccine, who will get it, and when?

The global Vaccine Alliance, Gavi, has been spearheading the conversation about what it will take to vaccinate the world against COVID-19. State governments, philanthropists and pharmaceutical companies came through with billions of dollars for vaccine research, manufacturing and distribution at a global pledging summit last month. One of the biggest concerns is for lower-income countries that won't be able to make or buy their own supply of vaccines. "If particular individuals—for example, the taxpayers of a particular country—bore certain burdens to develop a vaccine, then it could potentially be argued that they should get it first," said Michael van Manen. "But we must also look at who is most vulnerable or who is most likely to transmit the virus should they become infected.

"There are so many considerations with the ethics of limited resources and large population needs. We need to ensure we deploy the vaccine to save the most lives across the globe while making necessary and fair choices and recognizing that some individuals live with more hardships than others."

In Canada, Saxinger said modelling would likely be done to determine who gets the vaccine first to ensure the most benefit for the entire population.

"You may be looking at where outbreaks are the most active so you can try to cool those areas down, and also who is most at risk of severe disease so you can protect them first," she said.

"Another thing to look at is if there's a particular group that is responsible for a lot of the transmission, because you might focus on that group early.

"There are different factors but it would not just be, 'Hey, everybody line up,' it would be a matter of triaging as supply of the vaccine comes in," Saxinger said.

7. You may be "strongly encouraged" to get the shot once it's your turn

Saxinger indicated that most experts feel around 70 percent of us will need to get the shot to stop the march of COVID-19 based on the R-naught factor (R0), which is the average number of other cases caused by each infected person. In Canada, without public health interventions in place, it is believed to be between 2.0 and 3.0. By comparison, influenza's R0 factor is around 1.3. Saxinger explained that the coronavirus is so much more dangerous than the flu in part because we have absolutely no background or residual immunity to the brand-new disease.

"There's no archived immunity in the population, which is why it's been so devastating," Saxinger said. "The stakes are much, much higher to get good uptake of the COVID vaccine."

Last year, 1.4 million doses of influenza vaccine were administered to Alberta's population of 4.3 million people over the course of a six-month campaign. Saxinger said the campaign to get everyone vaccinated against COVID-19 would be bigger and more sustained, with lots of promotion and education. She suggested "encouragement programs" and outreach for those who are reluctant to get vaccinated, such as linking vaccination to child benefit payments, as had been done elsewhere.

"I would be in line with my sleeve up pretty darn quick, but I worry the situation could be ripe for an increase in anti-vaxx sentiment," she said. "That kind of thinking seems to be contagious to a certain part of the population."

Though Saxinger supports education over coercion, she said she would support making inoculation mandatory if not enough people were willing to step up voluntarily. Van Manen said

such a public policy discussion would have to balance the principle of minimizing government intrusion into people's lives and respecting what could be legitimate safety concerns against the risk to the community. He noted that, for example, people in Canada can be forced to take treatment for tuberculosis because it is highly contagious, although most people opt to take treatment to benefit themselves, so it is uncommon to need to turn to the law.

"Individuals can't just walk around the streets with active TB, but that's in part because they are placing other individuals at risk," he said.

"What should be considered in the case of a vaccine is, by requiring vaccination, to what extent are you really decreasing the risk of spread? Generally, we allow people to make risky choices for themselves, such as going bungee jumping, smoking or other risky activities."

Van Manen hopes we can get to 70 percent of the population vaccinated without having to infringe on the liberties of those who choose not to get the shot.

8. While we all wait for a vaccine, this is what you can do to protect yourself and others

Estimates suggest between five and 10 percent of Canadians have already been exposed to the SARS-CoV-2 virus. While that number will continue to rise until a vaccine is found, it's a long way from what's needed to reach so-called herd immunity, which means virtually everyone is protected (at least for a while) whether they have been inoculated or not, because the disease can't circulate through the population effectively. While there are numerous promising antivirals and other treatments in the works, Saxinger pointed out that most are aimed at shortening the illness or keeping those with severe illness alive.

"All this stuff will help people once they get sick, but the improvement will be modest, and it won't affect the march through the community," she said. "I think of COVID-19 as being like a bonfire that's spitting sparks. We're all just walking around as pieces of tinder, and there's still lots of tinder."

Like Hobman, Saxinger argues against letting the virus rip through the community and just trying to protect the most vulnerable.

"People are attracted to this seemingly easy idea of just keeping the frail people safe, but no one has succeeded in doing that," she said. "Sweden tried and failed."

"Also, many young healthy people have gotten devastatingly ill or died. They have lower risk, not no risk."

Until a vaccine is widely available, Saxinger said it's on all of us to strictly adhere to public health practices—such as social distancing, reducing contacts, frequent handwashing, staying home when you're sick and wearing a mask in public indoor spaces—to "keep a lid" on the virus. It's essential, she said, for saving lives and protecting the health-care system.

Saxinger suggests keeping a log of all of the people you come into contact with on a daily basis.

"I usually can't remember what I had for breakfast," she commiserated. "But if you turn out to get sick or if you come into contact with someone who is sick, you need to be able to give a good accounting for who you've been around."

Saxinger said our best hope to avoid another peak in cases and another potential shutdown of the economy is to watch vigilantly for localized outbreaks, then quickly trace anyone who might have been exposed, isolate them and contain the spread.

"People are frustrated because it seems like we don't know everything about this virus, but we know a heck of a lot given that it's only been around for six months," she said. "It's kind of remarkable how much we do know and how much we're continuing to learn."

<https://medicalxpress.com/news/2020-07-worldwide-covid-vaccine.html>

