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Hindustan Times

Sun, 04 Oct 2020

India successfully tests nuclear-capable Shaurya missile

The surface-to-surface medium range Shaurya missile can reach speeds of 7.5 Mach - seven and half times the speed of sound

By Debabrata Mohanty, Rahul Sing, Edited by Sparshita Saxena

Bhubaneshwar/New Delhi: India on Saturday successfully test-fired a new version of the nuclear-capable hypersonic Shaurya missile with a range of 750 kilometres from a defence facility off the Odisha coast on Saturday, officials said. The launch is the latest in a string of recent weapons tests amid military tensions with China in the Ladakh sector.

The launch came three days after India test-fired an extended-range BrahMos surface-to-surface supersonic cruise missile from the Integrated Test Range at Balasore in Odisha. The cruise missile can hit targets 400 kilometres away - its range increased from the existing 290 kilometres.

The cruise missile can hit targets 400 kilometres away - its range increased from the existing 290 kilometres. (Mint)

The surface-to-surface medium range Shaurya missile, that can reach speeds of 7.5 Mach (seven and half times the speed of sound), blasted off from a canister from the Abdul Kalam Island test range off Dhamra at about 12.10 pm, the officials said, speaking on the condition of anonymity. There was no official word from the government on the successful launch.

The missile, equipped with multiple advanced computing technology and high accuracy navigation, efficient propulsion, sophisticated control and guidance systems, successfully followed its target in the Bay of Bengal, Defence Research and Development Organisation (DRDO) officials said.

"This kind of demonstration of capability/power is extremely important to give a loud message to another nuclear-powered country that they should not take us for granted. This will bring in inherent dissuasion that will further discourage our adversaries from using nuclear weapons (against us)," said former Northern Army commander Lieutenant General BS Jaswal (retd).

The indigenously-developed missile was tracked and monitored through an integrated system of sophisticated radars, electro-optical tracking instruments and a chain of telemetry stations positioned in different points, they said. It performed a manoeuvre in the terminal phase and hit the impact point. It was the first user-specific trial of the missile that is a land variant of submarine-launched ballistic missile K-15, the officials said.

The two-stage missile that uses solid propellants can deceive enemy radars after launch, the officials said. The 10 metre-long missile - weighing 6.2 tonne - can carry both nuclear and conventional warheads weighing up to 1,000 kilograms.

The DRDO officials said once launched, Shaurya would be difficult to track by radars as the window for detection, tracking and interception is only 400 seconds. Like the BrahMos supersonic cruise missile, Shaurya can be stored in a composite canister, making it easier to handle and transport.

Like a ballistic missile, it is powered by solid fuel, but can guide itself up to the target like a cruise missile, the officials added.

On September 7, India took the first steps towards developing a new class of ultra-modern weapons that can travel six times faster than the speed of sound (Mach 6) and penetrate any missile defence, with the DRDO carrying out a successful flight test of the hypersonic technology demonstrator vehicle (HSTDV) for the first time from a launch facility off the Odisha coast.

Only the United States, Russia and China have developed technologies to field fast-manoeuvring hypersonic missiles that fly at lower altitudes and are extremely hard to track and intercept.

India could develop hypersonic cruise missiles powered by air-breathing scramjet engines in about four years.

https://www.hindustantimes.com/india-news/india-successfully-tests-nuclear-capable-shaurya-missile/story-fkYlozVJ5oq1MWO26GOwNN.html

ZEENEWS

Sun, 04 Oct 2020

After laser-guided anti-tank missile, India successfully tests new version of Shaurya Missile

Amid the ongoing border dispute with China, India successfully tested a new version of the nuclear-capable Shaurya missile off the coast of Odisha on Saturday (October 03, 2020)

Edited By Namrata Agrawal

Highlights

1. ***The new version of the missile will be inducted in the strategic forces to complement one of the existing missiles in the same class, top government sources said.***
2. ***The missile would be lighter and easier to operate in comparison with the existing missile and can strike targets at around 800 kms.***
3. ***In the last phase while moving close to its target, the missile moves at hypersonic speeds.***

New Delhi: Amid the ongoing border dispute with China, India successfully tested a new version of the nuclear-capable Shaurya missile off the coast of Odisha on Saturday (October 03, 2020).

The new version of the missile will be inducted in the strategic forces to complement one of the existing missiles in the same class, top government sources told ANI.

The missile would be lighter and easier to operate in comparison with the existing missile and can strike targets at around 800 kms. In the last phase while moving close to its target, the missile moves at hypersonic speeds.

File photo

This comes just days after India successfully tested an indigenously developed laser-guided anti-tank guided missile in Maharashtra's Ahmednagar on Tuesday. It was the second such successful test firing of the missile in the last 10 days. The missile has a range of up to 5 kms.

The missile was fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar.

"The ATGM employs a tandem heat warhead to defeat explosive reactive armour (ERA) protected armoured vehicles in ranges from 1.5-5 km," the Defence Ministry said in a statement.

Recently, India also successfully testfired the BrahMos supersonic cruise missile which can hit targets at over 400 km strike range which is at least more than 100 kms from the previous capability of the missile.

The Defence Research and Development Organisation (DRDO) has been working towards completing total self-reliance in the field of strategic missiles and has enhanced its efforts further under the Aatmanirbhar Bharat call by Prime Minister Narendra Modi earlier this year.

https://zeenews.india.com/india/after-laser-guided-anti-tank-missile-india-successfully-tests-new-version-of-shaurya-missile-2314253.html

FINANCIAL EXPRESS
Read to Lead

Sun, 04 Oct 2020

India successfully test-fires nuclear-payload capable Shaurya missile

On Saturday, an advanced version of the `Shaurya' surface-to-surface nuclear-capable ballistic the missile was successfully test-fired on Saturday, in Odisha

By Huma Siddiqui

In the face of the ongoing tensions between India and China along the Line of Actual Control (LAC) in eastern Ladakh, India has been carrying out tests of several missiles and other platforms. On Saturday, an advanced version of the `Shaurya' surface-to-surface nuclear-capable ballistic the missile was successfully test-fired on Saturday, in Odisha.

More about Shaurya Missile

When fired, the missile in the final phase of its course moves at hypersonic speeds before reaching a height of 40 km as it gets closer to its target.

- It has the capability to strike at targets which are in a range of about 800 km.
- It can carry nuclear payload.
- It is easier to use as it is lighter.
- When fired, the missile in the final phase of its course moves at hypersonic speeds before reaching a height of 40 km as it gets closer to its target.
- It is a two-stage rocket missile.
- This missile operates from solid fuel but can guide itself towards the target towards the cruise missile.
- Once inducted these missiles are expected to complement the existing class of missile systems.
- It has been tested by the Defence Research and Development Organisation (DRDO).
- It is a ground version of a ballistic missile launched from a submarine.
- The missile is so fast that the enemy's radar across the border will get less than 400 seconds to detect, track, and intercept it.
- It can be stored in a composite canister, which can be easily hidden.

Update on various missile tests

Last month, DRDO had successfully tested the indigenous laser-guided anti-tank guided missile (AGTM) from MBT Arjun tank. The missile has a range of up to 5 km.

Pinaka Missile

According to an official release of the Ministry of Defence (MoD) contracts have been signed with public sector entity Bharat Earth Movers Ltd and private sector companies including Tata Power Company Ltd (TPCL) and Larsen & Toubro (L&T). This is for the supply of six Pinaka Regiments to the Regiment of Artillery of the Indian Army at an approximate cost of Rs 2,580 crore.

More about Pinaka

It is primarily a multi-barrel rocket system (MBRL) system, and has the capability to fire a salvo of 12 rockets over a period of 44 seconds.

One battery of Pinaka system consists of six launch vehicles which come with loader systems, radar and links with network-based systems and a command post and is linked with the Indian Regional Navigation Satellite System.

The six regiments which will come to the Indian army will have 114 launchers with Automated Gun Aiming and Positioning System (AGAPS) and 45 Command Posts – these will be from TPCL and L&T and DPSU BEML will supply 330 vehicles.

Induction of the six Pinaka regiments are planned for 2024 and will be deployed along the Northern and Eastern Borders of our country.

https://www.financialexpress.com/defence/india-successfully-test-fires-nuclear-payload-capable-shaurya-missile/2097197/

जागरण

Sun, 04 Oct 2020

शौर्य मिसाइल से बढ़ेगी चीन-पाक की टेंशन, भारत ने किया परमाणु क्षमता वाली बैलिस्टिक मिसाइल का सफल परीक्षण

भारत ने आज सतह से सतह पर मार करने वाली परमाणु क्षमता वाली बैलिस्टिक मिसाइल शौर्य के नए संस्करण का सफल परीक्षण किया है। यह मिसाइस लगभग 800 किलोमीटर की दूरी तक लक्ष्य को मारने में सक्षम है।

By Manish Pandey

बालासोर: पड़ोसी देश चीन के साथ बॉर्डर पर तनाव के बीच भारत अपनी रक्षा ताकत को और मजबूत करने में लगा है। इसी के तहत भारत विगत कई दिनों से विभिन्न प्रकार के तथा नए नए किस्म के मिसाइलों का सफलतापूर्वक परीक्षण करता चला आ रहा है। आने वाले दिनों में भारत और कई नई किस्म की और ताकतवर मिसाइलों का परीक्षण करने की संभावना भी व्यक्त की जा रही है। शनिवार की सुबह करीबन 12:10 पर अब्दुल कलाम द्वीप से एलसी4 से भारत ने शौर्य नामक मिसाइल का सफलतापूर्वक परीक्षण किया है। यह नई मिसाइल हल्की है और आसानी से ऑपरेट की जा सकती है।

सूत्रों की माने तो यह मिसाइल 800 किलोमीटर दूर तक किसी भी लक्ष्य को मार गिराने में पूरी तरह सक्षम है। जमीन से जमीन पर मार करने वाली यह मिसाइल काफी ताकतवर मानी जा रही है। यह मिसाइल पनडुब्बी से लांच किए जाने वाली बैलिस्टिक मिसाइल का जमीनी रूप है। टू स्टेज राकेट वाली यह मिसाइल 40 किलोमीटर की ऊंचाई तक पहुंचने से पहले आवाज की 6 गुना रफ्तार से चलती है। उसके बाद यह टारगेट

की ओर लगातार बढ़ती चली जाती है। यह मिसाइल सॉलिड फ्यूल से चलती है लेकिन क्रूज मिसाइल की तरह खुद को टारगेट तक गाइड कर सकती है। मिसाइल की रफ्तार इतनी तेज है कि सीमा पर बैठे दुश्मन के रडार को इसे डिटेक्ट ट्रैक करने और इंटरसेप्ट करने के लिए 400 सेकेंड से भी कम का वक्त मिलेगा। इस मिसाइल को कंपोजिट कैनस्टर मे स्टोर किया जा सकता है यानी आसानी से छिपाकर ले जाया जा सकता है।

इसके परीक्षण के मौके पर रक्षा अनुसंधान एवं विकास संगठन डीआरडीओ तथा अंतरिम परीक्षण परिषद आइटीआर से जुड़े वरिष्ठ अधिकारियों और वैज्ञानिकों का दल मौके पर मौजूद था। सूत्रों का कहना है कि रक्षा अनुसंधान और विकास संगठन रणनीतिक मिसाइलों के क्षेत्र में कुल आत्मनिर्भरता को पूरा करने की दिशा में काम कर रहा है और इस वर्ष के शुरू में रक्षा क्षेत्र में प्रधानमंत्री नरेंद्र मोदी द्वारा आत्मानिर्भर भारत के आह्वान के बाद अपने प्रयासों को और बढ़ाया है।

यहां आपको बता दें पिछले कुछ हफ्तों में भारत ने रक्षा क्षेत्र में कई अहम फैसले किए हैं। पिछले महीने एमबीटी अर्जुन टैंक से लेजर गाइडेड एंटी टैंक गाइडेड मिसाइल एजीटीएम का टेस्ट किया गया था। यह टेस्ट पूरी तरह सफल रहा था इससे पहले अभ्यास हाई स्पीड एक्सपेंडेबल एरियल टारगेट का बालासोर से सफलतापूर्वक टेस्ट किया जा चुका है। सूत्रों की माने तो इस महीने के शुरुआत से आने वाले कई महीनों तक भारत ओडिशा के बालासोर के चांदीपुर अब्दुल कलाम द्वीप से कई नए किस्म और कई ताकतवर मिसाइलों का परीक्षण करने वाला है।

https://www.jagran.com/news/national-india-successfully-test-fired-nuclear-capable-ballistic-missile-shaurya-20828581.html

दिप्रिंट

Sun, 04 Oct 2020

ब्रह्मोस के बाद DRDO ने किया 'शौर्य' मिसाइल का सफल परीक्षण, 1000 किमी तक है मारक क्षमता

भारत ने देश में विकसित, परमाणु हथियार ले जाने में सक्षम और आवाज की गति से भी तेज चलने वाली 'शौर्य' मिसाइल का ओडिशा के परीक्षण रेंज से शनिवार को सफल परीक्षण किया गया

बालेश्वर (ओडिशा): भारत ने देश में विकसित, परमाणु हथियार ले जाने में सक्षम और आवाज की गति से भी तेज चलने वाली 'शौर्य' मिसाइल का ओडिशा के परीक्षण रेंज से शनिवार को सफल परीक्षण किया।

रक्षा सूत्रों ने बताया कि इस मिसाइल की मारक क्षमता 700 किलोमीटर से 1,000 किलोमीटर के बीच है और यह 200 किलोग्राम से 1,000 किलोग्राम भार ले जाने में सक्षम है। यह मिसाइल भारत की के-15 मिसाइल का भूमि संस्करण है।

प्रतीकात्मक तस्वीर: जमीन से हवा में मार करने वाली क्विक रिएक्शन सरफेस मिसाइल' का सफल परीक्षण किया

उन्होंने बताया कि सतह से सतह पर मार करने वाली इस सामरिक मिसाइल को अपराह्न 12 बजकर 10 मिनट पर एपीजे अब्दुल कलाम द्वीप में एकीकृत परीक्षण रेंज (आईटीआर) के प्रक्षेपण परिसर चार से प्रक्षेपित किया गया।

यह मिसाइल 10 मीटर लंबी है और इसका व्यास 74 सेमी और वजन 6.2 टन है। इसके दो चरण ठोस प्रणोदक का इस्तेमाल करते हैं।

सूत्रों ने इस परीक्षण को सफल बताया।

उन्होंने कहा कि अत्याधुनिक मिसाइल पूरी सटीकता के साथ बंगाल की खाड़ी में अपने तय बिंदु पर पहुंची।

सूत्रों ने बताया कि इस परीक्षण के दौरान मिसाइल पर विभिन्न दूरमापी स्टेशनों और रडार से नजर रखी गई और उसने अच्छा प्रदर्शन किया।

सूत्रों ने कहा, 'डीआरडीओ अधिकारियों ने शौर्य को उच्च प्रदर्शन वाली नेविगेशन और मार्गदर्शन प्रणालियों, कुशल प्रणोदन प्रणालियों, अत्याधुनिक नियंत्रण प्रौद्योगिकियों और कनस्तर प्रक्षेपण प्रणाली के साथ दुनिया की शीर्ष 10 मिसाइलों में से एक बताया है।'

उन्होंने बताया कि इस मिसाइल को लाना-ले जाना आसान है। इसे ट्रक पर रखे कनस्तरों से भी दागा जा सकता है। ट्रक को प्रक्षेपण स्थल बनाया जा सकता है।

सूत्रों ने बताया कि 'शौर्य' मिसाइल को ऐसे स्थानों पर रखा जा सकता है, जहां इस पर दुश्मन की नजर नहीं पड़ सके। उपग्रह से ली गई तस्वीरों की मदद से भी इसका पता नहीं लगाया जा सकता।

https://hindi.theprint.in/defence/drdo-successfully-test-fires-shaurya-missile-after-brahmostra-has-a-firepower-up-to-1000-km/174522/

THE ECONOMIC TIMES

Sat, 03 Oct 2020

India likely to produce next generation fighter jets in a private sector-led joint venture

By Manu Pubby

Synopsis

India's leading aero manufacturer, state-owned Hindustan Aeronautics Ltd (HAL) is currently working out the costs involved and the structure of the planned JV for the production of the fifth generation Advanced Multirole Combat Aircraft (AMCA), with an ambitious target for 2028.

New Delhi: India is likely to produce its next generation of fighter jets in a private sector-led joint venture, which could require investments of over Rs 2,500 crore from the selected company but would catapult it into a select league capable of manufacturing cutting edge aeronautical systems.

A scale model of AMCA, the fifth generation fighter aircraft displayed at Aero India 2019 held at Yelahanka Airforce Station

India's leading aero manufacturer, state-owned Hindustan Aeronautics Ltd (HAL) is currently working out the costs involved and the structure of the planned JV for the production of the fifth generation Advanced Multirole Combat Aircraft (AMCA), with an ambitious target for 2028.

HAL Chairperson R Madhavan told ET that the preferential model is to give the private sector a controlling stake in the joint venture and the option to take existing manufacturing infrastructure on lease to keep capital investment at a minimal.

"We will be forming a JV between DRDO, HAL and a private party. HAL will provide the infrastructure wherever possible so that the total capital cost is reduced for the private partners. Preferably, we want to keep our share below 50% so that it becomes a private entity," the top official said.

Costs are currently being worked out and would depend on the model planned and whether the prototype of the next generation fighters will be made by the JV or fabricated by HAL before the serial production starts.

"The expectations are that the private sector will have to invest Rs 2,500-3,000 crore but the number could vary. We are suggesting that the prototype manufacturing be kept outside the JV so that the capital requirement can be reduced," Madhavan said.

While the investment is high, the possibility of manufacturing next generation fighter jets is a huge opportunity for the private sector, which has still to produce any major aviation platform. All major western defence manufacturers are privately held and are supported by government-funded labs and institutions whenever required.

In the new defence acquisition procedure, a new category of procurement has been added to cater for technology transfer from DRDO and PSUs to the private sector for manufacturing of weapon systems.

Details are being worked out but HAL is likely to offer its existing facilities in Nasik to the private sector partner for manufacturing the AMCA in the future. "Most likely the prototypes will be made in Bangalore and the production could take place in Nasik. We are looking around 2028 to start production and we want that the private sector gets the capacity of investing and creating a new ecosystem and HAL does not remain to be the only production partner," Madhavan said.

While talks with potential industry partners have not yet started, the plan has generated interest in major players that have ventured into the defence sector. Only a handful of Indian companies have the capacity to invest into such a venture but on the plus side, there is set to be a defined and assured order book, besides the business opportunity of maintaining the aircraft that would stay in service for over three decades.

DRDO Chief G Satheesh Reddy and Air Chief Marshal RKS Bhadauria spoke on the AMCA at a seminar conducted by the Society of Indian Defence Manufacturers and the Centre for Air Power Studies:

G Satheesh Reddy: When we started the LCA programme, we had only a handful of private companies available. Today, we have over 18,000 companies and we can get the complete airframe and avionics done by the industry. The AMCA will be a 5.5 Gen aircraft and we are trying to work out models so that more and more of the industry partners with us.

Air Chief Marshal RKS Bhadauria: The air force strongly supports the development of a fifth generation AMCA that will have sixth generation characteristics.

https://economictimes.indiatimes.com/news/defence/india-likely-to-produce-next-generation-fighter-jets-in-a-pvt-sector-led-jv/articleshow/78439692.cms?UTM_Source=Google_Newsstand&UTM_Campaign=RSS_Feed&UTM_Medium=Referral

The EurAsian Times

Sat, 03 Oct 2020

India's fifth-gen fighter aircraft gets a 'massive boost' as New Delhi finally adopts western model

Indian state-owned defence agencies have reportedly confirmed that the ambitious AMCA 5th-generation fighter jet program will involve the DRDO (Defence Research & Development Organization), the HAL (Hindustan Aeronautics Limited), and a private company.

According to the Economic Times, the primary manufacturer Hindustan Aeronautics Limited is working out the exact costs and structure involved regarding the joint venture and could require approximately INR 2,500 crore investments from the selected company.

Earlier, India had collaborated with Russia on joint development of a Fifth Generation Fighter Aircraft (FGFA). However, this plan was abandoned as India was also not happy with the progress of FGFA. The UK has also invited India to develop the 6th-Gen Fighter Program called the 'Tempest'

HAL Chief R Madhavan in a statement said that the preferential model is to give the private sector a controlling stake in the joint venture and the option to take existing manufacturing infrastructure on lease to keep capital investment at a minimal.

"We will be forming a JV between DRDO, HAL and a private party. HAL will provide the infrastructure wherever possible so that the total capital cost is reduced for the private partners. Preferably, we want to keep our share below 50% so that it becomes a private entity," the top official said.

With the new defence policies introduced by the government, efforts are being made to let go of the old model of reliance on state-held companies that was highly criticised by many analysts. The new policies aim to adopt the western model, where most defence manufacturing hubs are privately held and are provided technological and innovational support with state-owned laboratories and establishments.

HAL is likely to offer its existing facilities in Nasik to the private partners for manufacturing the AMCA in the future.

"Most likely the prototypes will be made in Bangalore and the production could take place in Nasik. We are looking around 2028 to start production and we want that the private sector gets the capacity of investing and creating a new ecosystem and HAL does not remain to be the only production partner," the HAL supremo said, reported ET.

Currently, the DRDO and the HAL along with engineering institutes are working on several high-profile aviation projects for the Indian forces, which include the Rustom-II (TAPAS-BH), LCA Tejas Mk-1A, Tejas Mk-2 twin-engine multirole fighter, the Advanced Medium Combat Aircraft (AMCA), and the Ghatak stealth UCAV. Out of these, the AMCA and Ghatak are 5th-generation aircraft projects.

For the Indian Air Force, the AMCA is literally the most important project undertaken by the industry. With the experience gained by the LCA Tejas and (prospectively) Tejas Mk-2 projects, the Indian aircraft manufacturing is taking its first steps in the modern aviation industry.

In October 2019, the Indian Air Force Chief CAS Rakesh Bhaduria said that the DRDO "must" make the AMCA project happen.

However, the expected timeframe of the first flight of AMCA is stated to take place in 2025 or 2026, which seems a bit over-ambitious considering that the ADA (Aeronautical Development Agency) and HAL first have to work on the increased production capacity for the LCA-Tejas Mk-1 and Mk-1A, and then they have to develop and manufacture credible numbers of the Tejas Mk-2, before coming onto the fifth-generation plane.

https://eurasiantimes.com/indias-fifth-gen-fighter-aircraft-gets-a-massive-boost-as-new-delhi-finally-adopts-western-model/

The Indian EXPRESS

Sat, 03 Oct 2020

Explained: How Indian Army's new Multi-Mode Hand Grenades are different

A look at the features of the Multi-Mode Hand Grenades (MMHG), and why they are considered an improvement over those currently in use by the Indian Army

By Sushant Kulkarni

The Ministry of Defence on Thursday announced it had signed a contract with a Nagpur-based private entity for supply of 10 lakh of units indigenously designed and developed Multi-Mode Hand Grenades (MMHG) to the Indian Army at a cost of over Rs 400 crore. These grenades will be replacing the World War-II vintage 'Mills Bomb' type 36M hand grenades now used by the Army.

A look at the features of the MMGH, and why they are considered an improvement over those currently in use.

The Acquisition Wing of the MoD has signed a contract with Economic Explosive Ltd for the supply of 10 lakh MMHG to the Indian Army at an approximate cost of Rs 409 crore.

The No 36 grenades currently in use

In the early 20th century, militaries across the world started using fragmentation grenades, whose casings are structured for it to break into small fragments which can cause further harm following the explosion. The peculiar pineapple-like look was given because the outside segments and grooves aid the fragmentation of the casing. In the further improved designs, the grooves and segments were put from the inside and pineapple like outer structure was also retained for better grip.

For several years now, the Indian Army has been using the World War vintage 36M hand grenade. The number refers to a variant of the 'Mills Bomb' which are British origin grenades and these grenades also have the pineapple shape. These grenades can be fired from the rifle too. The 36M have been manufactured by the facilities of the Ordnance Factory Board (OFB) for the Armed forces.

The Multi-Mode Hand Grenade

"Grenades of natural fragmentation type have been in use by the infantry world over for a long time. Indian Army still uses the 36M, a grenade which also has severe reliability problems and uneven fragmenting pattern making it unsafe even to the thrower. The multi-mode grenade has been developed to overcome these defects. It uses preformed cylindrical mild steel pre-fragments to achieve uniform distribution," says the official page of the DRDO's facility Terminal Ballistic Research Laboratory (TBRL) which has developed the MMHG.

The MMHG can be used in two different structures resulting in two different modes — defensive and offensive. The grenades being used by the forces in India till now have been mainly the defensive mode grenades, which means that they are to be hurled when the thrower is in a shelter or has a cover and the target is in an open area and can be harmed by fragmentation.

On the other hand, the offensive grenades do not fragment, and the adversary is harmed by the blast or is stunned while the thrower is safe.

For the MMHG's defensive mode, the grenade has a fragamenting sleeve and a lethal radius of 10 metres. In the offensive mode, the grenade is without a sleeve and mainly used for blast and stun effect. In the offensive, it has a lethal radius of 5 meters from point of burst.

The supply of MMHG

The Acquisition Wing of the MoD on Thursday signed a contract with Economic Explosive Ltd — EEL is a subsidiary of Nagpur-headquartered Solar Group — for the supply of 10 lakh MMHG to the Indian Army at an approximate cost of Rs 409 crore. For conducting field tests of the grenade, the DRDO had transferred the technology to the company four years ago. The grenade has been tested in various types of conditions and is said to have achieved 99 per cent safety and reliability.

The MoD press statement in this regard said, "This is a flagship project showcasing public-private partnership under the aegis of Government of India (DRDO and MoD) enabling 'AtmaNirbharta' in cutting edge ammunition technologies and accomplishes 100 per cent indigenous content."

Officials said the development of the grenade had begun around 15 years ago and along with the DRDO facility, establishments of Army and OFB have also played a role in the development.

According to the company website, the product has a shelf life of 15 years from the date of manufacturing if stored under normal circumstances. The website also states that the product has twin delay tubes for additional safety and 3800 uniform fragments for higher lethality.

https://indianexpress.com/article/explained/indian-army-multi-mode-hand-grenades-features-explained-6664662/

WION

Sun, 04 Oct 2020

India-China standoff: How US drones along LAC can tilt the balance in India's favour against China

Amid tensions along the LAC with China, reports say India has also requested for six MQ-9 drones from the US at the cost of $600 million

India's Rustom drones

India has been a late starter in using drones as an attack strategy in modern warfare, in fact, the Rustom series is not a new phenomenon. It was initiated in the 80s by the DRDO by late Rustom Damania as part of operational requirement for the three services – Army, Navy and Air Force.

India's Rustom-1 drones were first tested in 2009, although it failed in its first attempt, crashing to the ground. In successive flights thereafter, Rustom-1 flew uninterrupted and is now part of Army's arsenal but in 2020 with Chinese troops lurking along the Line of Actual Control (LAC), India's defence establishment has felt the need to not only just upgrade its drone technology but "upgrade" its attack capability as well looking out for US technology in the form of MQ-9 Reaper drones.

India's Rustom-2 drone

A few years ago, India had test-launched the Rustom-2 drone at Chalakere in Karnataka's Chitradurga district. It was primarily meant for surveillance built on the US predator model. The Rustom -2 series was initiated keeping in mind India's defence needs.

The "test-flight" was significant considering it was the first flight in "user configuration with higher power engine" which generally means it has an enhanced surveillance capability, some observers feel upto 24 hours.

India would need upto 5,000 UAVs

However, India still hasn't entered the "big game" of attack drones which is dominated by Israel and the US. China on the other hand has a large, consistent integrated UAV project in place.

Reports say India would need upto 5,000 UAVs over the next 10 years – an extraordinary number given the fact the numbers at present with India's defence forces is nowhere near it.

China's Rainbow military drones

China on the other hand is not only ramping up its drone programme but has even started exporting them. China's much touted Rainbow military drones were eyed by several countries including Saudi Arabia, Iraq and "10 other" nations.

A few years ago, the Iraqi defence ministry had released a video showing a Chinese made drone - CH-4B - carrying out a missile attack on an Islamic State target.

US legislation leans towards India

Earlier in the year, the Trump administration has pressed ahead with its revamp of drone export policy under pressure from American manufacturers, Reuters had reported.

The MTCR classifies large drones as cruise missiles - and therefore subject to high export restrictions - making approvals rare, according to newswire Reuters.

Drones outside MTCR bar

Under the reinterpretation, the United States says it will treat drones that fly under 800 kilometres per hour, including Reapers made by General Atomics Aeronautical Systems Inc and Global Hawks made by Northrop Grumman Corp, as if they belong in a lower category that falls outside MTCR jurisdiction. No longer subject to the MTCR's high bar.

The move was made looking into the demands of several countries including India which now has a consistent defence policy with the United States.

US defence strategy

The Trump administration's arms policy is based on broad basing its defence strategy and allow countries like India which deal directly with China on all fronts to arm them with resources consistent with their demand. Reinterpreting the MTCR is part of a broader Trump administration effort to sell more weapons overseas, according to a report by Reuter.

India seeks to buy US drones

The US government has further overhauled its broad range of arms export regulations and removed the US from international arms treaties including the Intermediate-Range Nuclear Forces Treaty and the Open Skies Treaty, the Reuters report said.

US-Made Reaper Drones

India has reasons to worry as China started commercial production of the deadly CH-5 Rainbow it says is better than the US-made Reaper Drones. The CH-5 is also available at half the cost, a

dangerous precedent for India given its geopolitical scenario. The US, on the other hand, has been on collision course with China on various fronts with the South China Sea being the most open area where the two superpowers have been battling to show there upper hand, although no shots have been fired and there are other nations at play as well trying to protect their interests from the ambitions of the Dragon, the US nevertheless has employed its most lethal third eye in the sky - the MQ-9 Reaper drone.

MQ-9 Reaper

The sophisticated hunter-killer MQ-9 Reaper with its deadly hellfire missiles, GBU-12 Paveway II and GBU-38 JDAMs is an all out modern weapon built for the kill. The US had used the MQ-9 missile strike at Baghdad International Airport earlier this year which killed Iran's Quds Force commander Qasem Soleimani and Abu Mahdi al-Muhandis, the commander of Iraqi Forces.

India has also requested for six MQ-9 drones

According to reports, India has placed an order for 30 Reaper drones for its forces at the cost of $3 billion to the national exchequer. Reports say India has also requested for six MQ-9 drones from the US at the cost of $600 million. A report earlier in the year had stated that India had listed 22 MQ-9 Reaper (Predator B) drones as a requirement for its forces. Now, with the volatile situation along the LAC, Indian defence authorities view the drones as a "gamechanger".

https://www.wionews.com/photos/india-china-standoff-how-us-drones-along-lac-can-tilt-the-balance-in-indias-favour-against-china-332261#us-legislation-leans-towards-india-272868

Defence News

Defence Strategic: National/International

TIMESNOWNEWS.COM

Sun, 04 Oct 2020

Atal Tunnel bridges gap between LAC and mainland, security forces to have 365-day access to China border

The 9.02-km long tunnel makes Leh accessible throughout the year, which earlier was cut off for at least six months due to heavy snowfall

Key Highlights

- ***Prime Minister Narendra Modi, accompanied by Defence Minister Rajnath Singh, will inaugurate the tunnel at 10 am in Rohtang***
- ***The tunnel has been designed for traffic density of 3,000 cars per day and 1,500 trucks per day with max speed of 80 kms/hour***
- ***The foundation stone for the access road to the south portal of the tunnel was laid on 26 May 2002 when Atal Bihari Vajpayee was the prime minister***

Shimla: When Prime Minister Narendra Modi inaugurates and throws open the Atal Tunnel for the general public on Saturday, he will have not only provided a means to make travel closer for the masses, but also strategically brought the Line of Actual Control closer.

The all-weather Atal Tunnel reduces the distance between Manali in Himachal Pradesh and Leh by 46 kilometres, bringing the travel time down to 4-5 hours

Modi, accompanied by Defence Minister Rajnath Singh, will inaugurate the tunnel at Rohtang and later attend public gatherings at Sissu in Lahaul Spiti and at Solang Valley.

In these times of heightened tensions along the border with China, and the treacherous winter season fast approaching, it is extremely important to fix the logistical lacuna for our security forces and the Atal Tunnel would do just that, and much more.

The tunnel reduces the distance between Manali and Leh by 46 kms, and time by 4-5 hours.

The 9.02-km long tunnel, the longest highway tunnel in the world, connects Manali and the Lahaul-Spiti valley throughout the year, which earlier was cut off for nearly six months every year due to heavy snowfall.

The Atal Tunnel has been designed for traffic density of 3,000 cars per day and 1,500 trucks per day with max speed of 80 kms/hour, a critical factor especially if the situation worsens along the border and additional troops need to be sent to LAC.

It has been built with ultra-modern specifications in the Pir Panjal range of Himalayas at an altitude of 3,000 metres (10,000 feet) from the mean sea level (MSL).

The South Portal of the Atal Tunnel is located at a distance of 25 kilometres from Manali at an altitude of 3,060 metres, while the North Portal of the tunnel is located near village Teling, Sissu, in Lahaul Valley at an altitude of 3,071 metres.

It is horseshoe-shaped, single-tube double lane tunnel with a roadway of 8 metres, and has an overhead clearance of 5.525 metres. The tunnel is 10.5-metres wide and has a 3.6 x 2.25 metres fire proof emergency egress tunnel built into the main tunnel itself.

Former prime minister Atal Bihari Vajpayee and his government had taken the decision to construct the strategic tunnel below the Rohtang Pass on 3 June 2000, and the foundation stone for the access road to the south portal was laid on 26 May 2002.

“The Border Roads Organisation (BRO) worked relentlessly to overcome major geological, terrain and weather challenges that included the most difficult stretch of the 587-metre Seri Nalah Fault Zone. The breakthrough from both ends was achieved on October 15, 2017,” the Prime Minister said in a statement.

After the prime minister arrives at the Centre for Snow and Avalanche Study Establishment (SASE) in Kullu, he will make a pit stop at a BRO guesthouse before proceeding to the venue.

https://www.timesnownews.com/india/article/atal-tunnel-bridges-gap-between-lac-and-mainland-security-forces-to-have-365-day-access-to-china-border/661585

livemint

Sat, 03 Oct 2020

Rajnath Singh visits Atal Tunnel to review preparations for inaugural function

- ***Singh, who is on a two-day visit to Himachal Pradesh, also visited DRDO's Snow and Avalanche Study Establishment (SASE) in Manali***

Shimla: Defence Minister Rajnath Singh on Friday visited the Atal Tunnel in Rohtang to review preparations for inaugural function on Saturday in which Prime Minister Narendra Modi will inaugurate the 9.02 km-long strategically important tunnel.

Defence Minister Rajnath Singh visited the 'Atal Tunnel' and reviewed preparations for tomorrow's inaugural function, in Rohtang on Friday. (ANI Photo)

The Defence Minister was accompanied by Himachal Pradesh Chief Minister Jairam Thakur and Minister of State of Finance and Corporate Affairs Anurag Thakur.

"Visited the 'Atal Tunnel, Rohtang' to review the preparations for the inaugural ceremony to be held tomorrow. Prime Minister Narendra Modi will dedicate the tunnel to the nation. This 9.02 km long 'Engineering Marvel' will connect Manali to Lahaul-Spiti valley throughout the year," Singh said in a tweet.

Singh, who is on a two-day visit to Himachal Pradesh, also visited DRDO's Snow and Avalanche Study Establishment (SASE) in Manali.

The Atal Tunnel has been built with ultra-modern specifications in the Pir Panjal range of Himalayas at an altitude of 3000 m (10,000 feet) from the Mean Sea Level (MSL).

It reduces the road distance between Manali and Leh by 46 km and the time by about 4 to 5 hours.

The South Portal (SP) of the tunnel is located at a distance of 25 km from Manali at an altitude of 3060 metres while North Portal (NP) of the tunnel is located near village Teling, Sissu, in Lahaul Valley at an altitude of 3,071 metres.

It is horseshoe-shaped, single tube double lane tunnel with a roadway of eight metres and an overhead clearance of 5.525 metres.

The tunnel has been designed for traffic density of 3000 cars per day and 1500 trucks per day with a maximum speed of 80 km/hr.

The decision to construct a strategic tunnel below the Rohtang Pass was taken on June 3, 2000 when late Atal Bihari Vajpayee was the Prime Minister. The foundation stone for the Access Road to the South Portal of the tunnel was laid on May 26, 2002.

The Union Cabinet decided in 2019 to name the Rohtang Tunnel as Atal Tunnel to honour the contribution made by the former Prime Minister.

The Border Roads Organisation (BRO) overcame major geological, terrain and weather challenges in the construction of the tunnel. (ANI)

(This story has been published from a wire agency feed without modifications to the text.)

https://www.livemint.com/news/india/rajnath-singh-visits-atal-tunnel-to-review-preparations-for-inaugural-function-11601648278753.html

THE WIRE

Sun, 04 Oct 2020

India's technology acquisition patterns belie frequent claims of military modernisation

While the government frequently advertises approvals made at Defence Acquisition Council meetings, that is just the start of a complex, 11-step process

By Rahul Bedi

Chandigarh: The Ministry of Defence (MoD) is adept at resorting to the fabled Indian rope trick by frequently announcing approvals for the acquisition of new military equipment and force modernisation, via its periodic Defence Acquisition Council or DAC meetings, cleverly blurring the chasm between perception and reality.

But, little beknown to most, all that the DAC, headed presently by defence minister Rajnath Singh, does is to merely accord Acceptance of Necessity (AoN) to materiel procurements and defence-related projects; simply translated, it means that the concerned acquisition or programme has 'in principal' been accepted. Nothing more.

Defence Minister Rajnath Singh with the troops who participated in the para dropping and other military exercise at Stakna, in Leh, Ladakh, Friday, July 17, 2020. Photo: PTI

"The AoN is a mere formality, albeit one mandated by the MoD," says Amit Cowshish, former defence ministry financial advisor on acquisitions. The real accident-prone adventurous journey begins thereafter, as the acquisition or project tender can fall through thereafter for innumerable reasons, he adds.

In late 2019, the MoD informed Parliamentary Standing Committee on Defence (SCoD) that it had approved 218 AoNs worth Rs 4 trillion over the previous five years to promote domestic manufacturing, but did not provide further details. In response, industry officials said that over the years almost all these AoN approvals had lapsed, since no requests for approval (RfPs) or tender were subsequently issued for many.

Most people, however, assume on the basis of AoNs that the concerned equipment has either been acquired, or the project concluded, or at least nearing fruition, and the services modernising at a furious pace. But nothing could be further from reality, as it is only afterwards that the heavy lifting, spread over 11 complex stages begins, to complete the acquisition process, each one of which has the potential to interminably delay or derail the entire project.

A long and convoluted process of acquisition

Consequently, the entire procurement process can, and often does, take twice, or at times even three times, as long as 74 – 118 weeks mandated in the successive Defence Procurement manuals to complete after the AoN is granted. "A large proportion of AoNs routinely fade into oblivion, with just a handful being subsequently revived," say a two-star Indian Army officer, declining to be identified. Securing AoNs, he adds, is no more than a "bureaucratic manoeuvre" by the MoD to show its intent. An AoNs validity is 6 – 12 months, depending on the category of procurement, and is subject to renewal if a request for proposal or RfP or tender has not been issued in the intervening period.

The MoD, for its part, too is disingenuous, doing little or nothing to dispel this myth of instant gratification with regard to AoNs. In fact, by its purposeful silence it appears to perpetuate the fable of military modernisation, when in reality the AoNs continue meandering through numerous military and civil departments, tangled in complex bureaucratic procedures. Over years, these

processes have earned exasperating and legendary notoriety in the global arms bazaar for their convolution, rigidity and above all, inexplicability.

Even the run up to the AoN is not without hurdles and time-consuming obstacles, fabricated collectively over decades by the three services themselves. The services kickstart the acquisition processes by issuing either a domestic or global request for information (RfI) to elicit information required for formulating the eventual qualitative requirements (QRs) or specs for the concerned equipment or project. Though seemingly straightforward, this too takes an age, as in their bid to demonstrate diligence, service officers collate all available literature and information on the proposed kit, with the aim of including as many features as possible, irrespective of either their practicality or, at times, even their necessity in India's operational environment.

The draft then travels up the chain of military command, gathering supplementary parameters; each officer concerned feels compelled to suggest additional accompaniments in an endeavour at displaying industry. The ball remains in play till the QRs are approved by the service-specific equipment policy committees, headed by the respective deputy or vice chiefs of staff after an inordinate amount of time.

A retired two-star army officer associated with such activity and also responsible for fashioning the MoD's now diluted offset guidelines in 2005 say rarely were deletions ever made to QR specifications. In many instances, he avers, what eventually emerged was a 'well-complied wish list of utopian dimensions'. The officer also confesses that poorly conceived, formulated, and drafted QRs have ended up creating confusion, resulting in the entire acquisition being either delayed or aborted, or in some cases even both.

Implausible quality controls delay the procurement

Several reports by successive parliamentary committees and the Comptroller and Auditor General too had castigated the withdrawal or termination of diverse tenders due to implausible QRs. Even late Defence Minister Manohar Parrikar had mocked the services at a public function in Delhi in 2015 for fashioning fanciful and implausible QRs which he claimed were based on 'Marvel comic books'.

Once the QRs are finalised and the RfP based on them issued, technical evaluation of the responses by vendors follow by the concerned service. This is succeeded by field evaluation trials of the equipment on a 'no cost no commitment basis' in which rival sellers invariably end up spending vast sums to transport their equipment and personnel accompanying it to and within India, often to different locations, where the trials are executed by a multi-disciplinary team.

The six competitors, for instance, who fielded their platforms for the Indian Air Force's (IAFs) requirement for 126 medium multi-role combat aircraft (MMRCA) in 2007-8 are believed to have spent upwards of $300 million each for trials across varied terrain lasting almost two years, during which the platforms were tested on some 600-odd operational parameters.

All equipment trials by the Indian military are lengthy, at times taking several years. This is especially so for the army that tests most of its kit like small arms and howitzers in assorted terrain and environments like the northern Punjab plains, western Rajasthan desert regions and in Himalayan heights in Kashmir and Ladakh.

Staff evaluation by the respective services comes next, after which, in select cases, the technical oversight committee presents its report to ensure that all equipment parameters are in consonance with the stipulated QRs. This too is arduous and can take long, as the scope for 'subjective' evaluation is vast, said industry officials. It also elicits a flurry of objections from rival contenders with complaints over 'unduly favouring' rival systems.

Once the equipment has cleared all these hurdles, a Contract Negotiation Committee or CNC is constituted to discuss the cost and delivery schedules, after which the proposal has to be approved by the 'competent financial authority', or CFA which, depending on its value could either be the respective service deputy or vice chiefs, the defence minister or the finance minister. All purchases exceeding Rs 3,000 crore, however, have to be cleared by the Cabinet Committee on Security or CCS headed by the prime minister. It's only then that the contract is finally inked.

Nascent steps towards an overhaul

Meanwhile, the 681-page DAP-2020 magnum opus does in no manner simplify or render less cumbersome these arduous processes. It also completely ignores one of its own committees that submitted its report in early 2016 on fast-tracking procurements. This report had recommended the establishment of a semi-independent body to streamline and accelerate material procurements away from New Delhi's security zone, where access to officials is tightly controlled.

It had advocated the establishment of a Defence Capability Acquisition Authority (DCAA) to manage all aspects of defence equipment procurement with around 900-members to work outside the MoD- but under its overarching control—in order to mitigate cumbersome and time-consuming procurement procedures, internecine rivalries and corruption scandals. Headed by Dr Pritam Singh, formerly of the Indian Institute of Management in Lucknow, the eight-member committee included serving and retired two and three-star service officers, financial and technical experts.

Over seven months the committee interacted with defence procurement officials from France, South Korea, the United Kingdom, and the US as well as the Indian military, the Headquarters Integrated Defence Staff and the Indian Coast Guard. Specialists from local think tanks, industry associations and the state-run Defence Research and Development Organisation (DRDO) too were consulted.

Its eventual and practical suggestions included dividing the DCAA into seven 'vertical' units dealing with land, air, maritime, science and technology, industrial collaborations, and commercial and legal issues. It has further stressed the importance of instituting integrated project management teams (IPMTs) for assorted programmes with strict financial and completion deadlines, in order to reduce dependency on imported materiel and to augment self-reliance or Atamnirbhar.

In short, the Authority was conceived as an independent body manned by a cadre of technical and military professionals with domain knowledge, as well as accountability and flexibility in augmenting India's military capabilities. Most importantly, the DCAA was also projected to have overarching responsibility for formulating equipment QRs, issuing RfIs and RfPs overseeing trials, conducting price negotiations, and even managing offset obligations, but to no avail.

The MoD, it seems, remains determined to grossly underestimate its ignorance and to perpetuate its existing inefficiencies.

https://thewire.in/security/india-military-modernisation-technology-acquisition

Hindustan Times

Sun, 04 Oct 2020

Foreign secretary and Army Chief to make first joint visit to Myanmar

The visit will also come four days after the India-Myanmar foreign office consultations

By Rezaul H Laskar and Rahul Singh

New Delhi: Foreign secretary Harsh Shringla and Indian Army chief Gen MM Naravane are set to visit Myanmar on Monday, the first time an Indian delegation to the neighbouring country has included both officials, for discussions to take forward ties in areas ranging from security to connectivity.

This will be the foreign secretary's second foreign visit, after a trip to Bangladesh in August, since the Covid-19 outbreak and the army chief's first such visit amid the restrictions related to the pandemic, people familiar with developments said on condition of anonymity.

The visit comes against the backdrop of India's five-month border standoff with China. New Delhi has been working steadily to boost ties with all countries in the neighbourhood barring Pakistan, and has announced a slew of initiatives ranging from currency swaps, budgetary support

and connectivity projects to help other states in the region to overcome the economic impact of Covid-19.

The visit will also come four days after the India-Myanmar foreign office consultations, which were conducted virtually by Shringla and permanent secretary U Soe Han on Thursday.

During that meeting, Shringla announced that the two sides are working to operationalise Sittwe port by the first quarter of 2021 while the tendering process for 69 bridges for the trilateral highway, also involving Thailand, will begin soon.

India's assistance to Myanmar currently stands at $1.4 billion, and New Delhi will provide debt service relief under the G20 debt service suspension initiative to Myanmar from May to December to mitigate the impact of the Covid-19 pandemic.

"Despite the challenges caused by the Covid pandemic, we are working towards operationalising the Sittwe port by the first quarter of next year. With respect to the 69 bridges on the trilateral highway, I am happy to inform you that we will soon be moving forward with the tendering process," Shringla said.

Sittwe port is part of the Kaladan multi-modal transit transport project, which is crucial to India's plans for the landlocked northeastern states to access the Bay of Bengal through Mizoram and to provide alternative connectivity to Kolkata without having to use the circuitous Siliguri corridor.

The India-Myanmar-Thailand trilateral highway has been held up due to problems associated with the stretch in Myanmar and the construction of the bridges is expected to speed up work on the project.

Security cooperation between India and Myanmar also figured in Thursday's meeting, with Shringla describing it as robust. Both sides are sensitive to each other's security concerns, he added.

Myanmar's handing over of 22 Indian insurgents was "deeply appreciated" by India as it sent a "strong message of deterrence to inimical elements on both sides", he added. Shringla requested Myanmar for the early conclusion of an extradition treaty, a mutual legal assistance treaty on civil and commercial matters, and an agreement on the transfer of sentenced persons.

As part of defence cooperation, an Indian team for deployment of meteorological squadrons will travel to Myanmar this month, and India will receive Myanmar's representative at its maritime Information Fusion Centre for the Indian Ocean.

The situation in Rakhine state also figured in the meeting. India recently entered into trilateral cooperation with Japan in Rakhine, under which it will create infrastructure for 15 schools. "Our efforts towards ensuring an early, safe and sustainable repatriation of internally displaced persons to Myanmar will continue," Shringla said.

This issue assumes importance as Bangladesh had raised the issue of one million Rohingya refugees it is hosting during the virtual meeting of the Joint Consultative Commission (JCC), which was co-chaired by external affairs minister S Jaishankar and his Bangladeshi counterpart AK Abdul Momen on September 29.

Momen had expressed the hope that India, as a non-permanent member of the UN Security Council during 2021-22, will play a "more meaningful role for a lasting solution to the Rohingya crisis, including their early repatriation to Myanmar in a safe and sustainable manner", according to a statement from Bangladesh's foreign ministry.

https://www.hindustantimes.com/india-news/foreign-secretary-and-army-chief-to-make-first-joint-visit-to-myanmar/story-eKCZX01cnVXsDmLByesvzM.html

Hindustan Times

Sun, 04 Oct 2020

In a first, Rafale fighter jet to feature in Air Force Day parade

The IAF is operating its newly-inducted Rafale fighter jets in the Ladakh theatre where the military is on its highest state of alert

Edited By Arpan Rai

New Delhi: Marking its first public appearance since arrival on Indian land, the Rafale fighter jet will be taking part in the Air Force Day parade on October 8, the Indian Air Force said on Saturday.

"Rafale is a 4.5 generation, twin-engine omnirole, air supremacy, interdiction, aerial reconnaissance, ground support, in-depth strike, anti-ship and nuclear deterrence fighter aircraft, equipped with a wide range of weapons," the IAF tweeted on Saturday.

An Indian Air Force officer wearing a protective face mask walks in front of a Rafale fighter jet during its induction ceremony at an air force station in Ambala, India, September 10, 2020. (REUTERS)

The IAF is operating its newly inducted Rafale fighter jets in the Ladakh theatre where the military is on its highest state of alert. The IAF's current fleet of five Rafale fighters is fully operational and ready to undertake any mission. India ordered 36 Rafale jets from France in a deal worth Rs 59,000 crore in September 2016.

The air force formally inducted the planes at the Ambala air base on September 10 though they landed at their home base on July 29. At the induction, IAF chief RKS Bhadauria made it clear that the warplanes were mission-ready and the ceremony marked their "full operational induction" into the air force.

The Rafale jets are part of the IAF's No. 17 Squadron, which is also known as the "Golden Arrows."

The IAF has been projecting its capability to carry out day-and-night, all-weather combat missions in the Ladakh sector, with front-line fighter jets, attack helicopters and multi-mission choppers getting airborne for demanding night-time missions from forward airbases.

https://www.hindustantimes.com/india-news/in-a-first-rafale-fighter-jet-to-feature-in-air-force-day-parade/story-1jO9RbTpnO9g7NSevKGEPI.html

जागरण

Sat, 03 Oct 2020

भारतीय वायुसेना इस साल मनाएगी अपनी 88वीं वर्षगांठ, शुरु किया अभ्यास

भारतीय वायु सेना इस साल 8 अक्टूबर 2020 को अपनी 88 वीं वर्षगांठ मनाने जा रही है। इस मौके पर वायु सेना के अलग-अलग विमान हवा में प्रदर्शन दिखाएंगे। इस कार्यक्रम के लिए एक अक्टूबर से अभ्यास शुरु कर दिया गया है।

By Ayushi Tyagi

नई दिल्ली: भारतीय वायु सेना इस साल 8 अक्टूबर 2020 को अपनी 88 वीं वर्षगांठ मनाने जा रही है। इस मौके पर वायु सेना के अलग-अलग विमान हवा में प्रदर्शन दिखाएंगे। इस दौरान गाजियाबाद के हिंडन एयरफोर्स स्टेशन में विशेष समारोह का आयोजन किया जाएगा। बता दें कि एयर डिस्प्ले के लिए पूर्वाभ्यास 1 अक्टूबर 2020 से शुरू हो गया है।

इन जगहों पर उड़ान भरेंगे भारतीय वायुसेना के विमान

भारत सरकार द्वारा जी गई जानकारी के अनुसार, वज़ीरपुर पुल, करवलनगर, अफ़जलपुर, हिंडन, शामली, जिवाना, चंदीनगर, हिंडन, हापुड़, फिलकुआ, गाजियाबाद हिंडन पर वायु सेना के विमान उड़ान भरेंगे।

राफेल इस साल वायुसेना दिवस के मौके पर एयरशो दिखाएगा करतब

वहीं, दूसरी तरफ भारतीय वायुसेना के बेडे में शामिल हुआ राफेल इस साल वायुसेना दिवस के मौके पर एयरशो में आसमान में दहाड़ता हुआ दिखाई देगा। राफेल पहली बार आठ अक्टूबर को इस आयोजन में शामिल होगा। राफेल तेजस के साथ एयर शो में करतब दिखाता नजर आएगा।

क्यों मनाया जाता है भारतीय वायुसेना दिवस

जानकारी के लिए बता दें कि देश में हर साल बड़ी धूमधाम के साथ भारतीय वायु सेना दिवस मनाया जाता है। गौरतलब है कि 8 अक्टूबर 1932 को वायुसेना की स्थापना की गई थी। इसलिए हर साल 8 अक्टूबर को वायुसेना स्थापना दिवस मनाया जाता है। भारतीय वायुसेना इस दिन परेड़ और एयर शो का आयोजन करती है। देश में आजादी से पहले वायुसेना को रॉयल इंडियन एयर फोर्स कहा जाता था।

वर्ष 1933 में किया गया था वायुसेना के पहले दस्ते का गठन

इसके बाद एक अप्रैल वर्ष 1933 को वायुसेना के पहले दस्ते का गठन किया गया था। बात करें भारतीय वायुसेना के ध्वज की तो वायुसेना ध्वज, वायु सेना निशान से पृथक, नीले रंग का है। जिसके प्रथम एक चौथाई भाग में राष्ट्रियध्वज बना हुआ है।

https://www.jagran.com/news/national-indian-air-force-celebrates-its-88th-anniversary-on-8th-oct2020-20823729.html

THE WEEK

Sat, 03 Oct 2020

France gives IAF demo of new targeting system on Rafale

Thales claims the TALIOS employs artificial intelligence technology

The French defence ministry has revealed that an Indian Air Force pilot was given a demonstration of a new target acquisition system meant for the Rafale fighter.

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

Targeting acquisition systems are sensors fitted on an pod mounted externally on the aircraft. They typically have laser seekers, infra-red and electro-optical sensors to acquire enemy targets on the surface and guide bombs or missiles onto them.

The TALIOS (which stands for Targeting Long-Range Identification Optronic System) was developed by French company Thales and deliveries to the French Navy and Air Force began in late 2018. It is scheduled to reach 'first operational capability' this month, the French defence ministry said.

The French defence ministry said the purpose of the flight with the Indian pilot was "to demonstrate the capabilities of the TALIOS in the air-to-air, air-to-ground and air-to-sea domains. For this first, the Indian pilot was able to note the added value provided by the TALIOS compared to the Rafale sensors. Regarding the air-to-ground capability, the effectiveness of the pod TALIOS both in its use during deep-strike missions and in the detection and engagement of small mobile targets was apprehended. In the air-sea sector, the TALIOS has proven itself in the tracking of boats."

Thales claims the TALIOS employs artificial intelligence technology for automatic detection of targets and can undertake both target acquisition and reconnaissance missions, in addition to providing colour imagery. Prior to the development of the TALIOS, the absence of a modern target acquisition system was perceived to be a disadvantage for the Rafale previously. Qatar ordered a US-developed target acquisition pod for its Rafale jets.

The TALIOS has not been sold to the Indian Air Force yet. The Indian Air Force has been using variants of the Litening target acquisition system from Israel's Rafael for several years now. In 2016, Rafael revealed it would supply 164 Litening pods to the Indian Air Force. The Litening has been integrated to several aircraft of the Indian Air Force, including the Mirage-2000, Jaguar and Su-30MKI. In 2017, Rafael expressed interest in supplying the Litening for the Indian Air Force's Rafale fleet.

https://www.theweek.in/news/india/2020/10/02/france-gives-iaf-demo-of-new-targeting-system-on-rafale.html

oneindia®

Sat, 03 Oct 2020

India-China standoff: Why the secure communication system will be a boost for the Indian Army

By Vickey Nanjappa

New Delhi: The creation of a secure communication system for the Army at a cost of Rs 7,800 crore was cleared by the Cabinet Committee on Security (CCS).

This move significant as it would enhance network coverage in the forward areas, which also includes the contested Line of Actual Control (LAC). The Defence Ministry said that this move is important keeping in view the current operational situation at the LAC.

The CCS cleared the proposal for establishing the Army Static Switched Communication Network (ASCON) Phase IV, with the project to to be implemented by the Indian Telephone Industries Limited under a Rs 7,796 crore contract. The same would be functional in the next three years.

"The project will provide better survivability, responsiveness and high bandwidth in any operational scenario and enhance the communication coverage of network closer to the International Border, Line of Control and Line of Actual Control," a statement by the Defence Ministry said.

The network would extend the high bandwidth communication to remote operational areas in the central and eastern sectors. It would further enhance communication reach to the forward locations in the western borders also.

According to the statement, the project would augment the Army's communication network in sensitive operational areas and also provide a major boost to its operational preparedness. This is also crucial keeping in mind the current situation along the LAC, where India and China are locked in a border row for over five months now.

"The project is a strategic and theatre area communication network which will upgrade the existing Asynchronous Transfer Mode Technology to Internet Protocol (IP)/Multi Protocol Label Switching (MPLS) Technology. Optical fibre cable, microwave radio and satellite will be used as the communication media," the Ministry's statement also said.

It will involve several activities including execution of civil works, laying of optical fibre cable and tower construction, and generate employment in remote border areas. The project is also a big opportunity for the public sector to showcase its capability and provide impetus to the Indian economy and will be a step in the direction of achieving the goal of Atmanirbhar Bharat," the statement also said.

In another statement, the ministry said that in another move expected to provide thrust to the goal of Atmanirbhar Bharat {Self-Reliant India), the defence ministry signed a contract with Nagpur-based private firm Economic Explosives Ltd (EEL) for supplying 1 million multi-mode hand grenades to the army. These will replace a World War-II vintage hand grenade design being used by the Army.

This is a flagship project showcasing public-private partnership, enabling 'AtmaNirbharta' in cutting edge ammunition technologies and accomplishes 100% indigenous content, the Defence Ministry also said.

.*https://www.oneindia.com/india/india-china-standoff-why-the-secure-communication-system-will-be-a-boost-for-the-indian-army-3157735.html*

DefenceNews

Sat, 03 Oct 2020

India Russia partnership in nuclear energy

Although the first prime minister of India Jawahar Lal Nehru was a self-proclaimed socialist-inspired during the days of the country's freedom struggle by the transformation of the Soviet Union under a Marxist government, this did not ensure a close and cordial relationship with the USSR after independence.

Stalin continued to view Nehru as a leader under the influence of the British and, the policy of non-alignment pursued by India also caused apprehensions in his mind. It was only after his death that there was a thaw in bilateral relations and a period of multi-dimensional economic and technical cooperation began when Khrushchev became the supreme leader.

The USSR stepped in when the Western countries refused or were reluctant to help India with its economic development. The first steel plants (Bhilai), chemical fertiliser factories (Sindri), Heavy Engineering establishment (Haridwar and Bhopal) and units to produce life-saving drugs and vaccines (IDPL in Rishikesh) were set up with Russian assistance.

Cooperation covered the strategic needs of India. Not only the USSR became the largest supplier of military hardware to India it happily agreed to transfer technology for the gradual indigenisation of these products. HAL (Bangalore) bears testimony to this mutually beneficial partnership in progress.

The Indian Space Programme has literally taken off with unstinted Russian assistance. It is in this larger perspective that Indo-USSR nuclear collaboration must be analysed.

The beginnings were small. The first nuclear reactor was set up in India with Canadian assistance and Indian nuclear scientists trained in universities in the UK and the US were inclined to look at the western countries for collaboration in high tech. The Russian accomplishment in the field of nuclear science and rocketry matched the prowess of the USA and Indians were constrained to relook at prospects of adding this topic to their agenda of bilateral cooperation with the USSR. The Heavy Water Plant at Kota was set up with Russian assistance and has worked satisfactorily.

More recently, the Kudankulam nuclear power plant (KKNPP) in Tamil Nadu has been described as a 'flagship joint project' that envisions building as many as 12 nuclear plants over the next 20 years. The indigenous content in the KKNPP unit 1 and 2 was minimal, the Rosatom has repeatedly reaffirmed its commitment to progressively enhance domestic value addition in the remaining units.

India expects that that nuclear cooperation with Moscow would significantly enhance India's industrial manufacturing capacity in the realm of sophisticated technology. It mentions "Localization of Manufacturing in India for the Russian-Designed Nuclear Reactor Units" which provided for indigenous manufacturing of equipment and fuel assemblies for Russian-engineered nuclear plants in India. While critical components like reactor pressure vessels, coolant pumps, steam generators, etc., will be supplied by Russian companies, the share of Indian industry in manufacturing equipment in Turbine Island and the Balance of Plant (BoP) is expected to increase to over 50 percent in addition to prospective local production of nuclear fuel rods for KKNPP and future units.

Kudankulam Nuclear Plant has been consistently targeted by environmental activists as posing a fragile already imperiled ecosystem and livelihood of marginal farmers. It has also been suggested that such protests have been engineered by NGOs spawned and funded Western Nations to obstruct Indo-Russian Nuclear cooperation. There have been other hiccups in the past. Chernobyl meltdown raised fear about the hazards of a nuclear accident. Also, the change in political regimes and the ideological climate in India and Russia has retarded the growth of nuclear ties.

The civil nuclear energy cooperation, traditionally important in Indo-Russian relations, became even more significant in the context of the non-proliferation sanctions imposed by the western countries in the wake of Pokharan II. Russia was constrained to supply nuclear fuel to India during this period as it is a founder of the NSG group but circumstances have changed since and India can look forward to unhindered cooperation in this field in the future.

It may be noted in passing that Russia is also collaborating with India in the manufacture of a nuclear-powered submarine.

The Indo-Russian partnership in nuclear energy is constantly expanding in scope. Both sides are equally enthusiastic about extending its benefits to third parties. An interesting illustration is Bangladesh where the Rooppur Nuclear Power Project is being set up with Russian technology and Indian experts. The cooperation is wide-ranging from construction to installation of safety measures, training of personnel and handholding during the initial stages. The successful execution of this ambitious tripartite joint venture is likely to be followed with similar projects in other countries also.

https://www.defencenews.in/article/India-Russia-partnership-in-nuclear-energy-972437

Sat, 03 Oct 2020

Indian Coast Guard has commissioned its new Fast Patrol Vessel Kanaklata Barua

According to a Tweet released by the Indian Coast Guard on September 30, 2020, the Fast Patrol Vessel (FPV) Kanaklata Barua was commissioned by the Indian Coast Guard on September 30, 2020, at Kolkata by Shri Jiwesh Nandan, IAS, Additional Secretary, MoD Ministry of Defense

The Kanaklata Barua is one of the five FPVs (Fast Patrol Boat) built by GRSE (Garden Reach Shipbuilders & Engineers Ltd.), which is one of India's leading shipyards, located in Kolkata, West Bengal.

The entire design of the FPVs has been developed locally by the Indian shipbuilder GRSE according to specific requirements of the Indian Coast Guard.

GRSE has designed and built a number of warships and patrol vessels for the Indian Navy and the Coast Guard. Vessels built at GRSE include guided-missile frigates, corvettes, fleet tankers, fast patrol vessels, amphibious warfare vessels, and hovercraft.

Indian Coast Guard Fast Patrol Vessel Kanaklata Barua. (Picture source Indian Coast Guard)

The Kanaklata Barua is a Fast Patrol Boat with a length of 50 meters, a width of 7.5 meters, and a displacement of around 308 tones, according to information provided by GRSE. "This powerful, fuel-efficient vessel is designed to perform multipurpose operations like patrolling, anti-smuggling, anti-poaching, and rescue operations," added GRSE.

The Kanaklata Barua FPV can reach a maximum speed of 34 knots with an endurance of more than 1,500 nautical miles. It is motorized with three main engines.

https://www.navyrecognition.com/index.php/news/defence-news/2020/october/9064-indian-coast-guard-has-commissioned-its-new-fast-patrol-vessel-kanaklata-barua.html

DECCAN HERALD

Sat, 03 Oct 2020

Navies of India, Bangladesh to hold 3-day mega military exercise from October 3

The Indian and Bangladeshi navies will hold a mega military exercise in the Bay of Bengal on Saturday which will be followed by a two-day joint maritime patrolling in the region to further expand operational coordination between the two forces, officials said.

A wide spectrum of maritime drills and operations will be conducted as part of the annual 'Bongosagar' exercise whose first edition was held in October last year, they said.

Credit: iStock Photo

"It is aimed at developing inter-operability and joint operational skills through conduct of a wide spectrum of maritime exercises and operations. Ships from both navies will participate in surface warfare drills, seamanship evolutions and helicopter operations," an Indian Navy spokesperson said.

He said the exercise will be followed by the third edition of Coordinated Patrol (CORPAT) in Northern Bay of Bengal on October 4 and 5 under which both navies will undertake joint patrolling in the region.

"Conduct of CORPAT has strengthened understanding between both the navies and instituted measures to stop conduct of unlawful activities," he said.

The Indian Navy will deploy anti-submarine warfare corvette Kiltan and guided-missile corvette Khukri in the 'Bongosagar' exercise. The Bangladeshi navy will be represented by guided-missile frigate Abu Bakr and guided-missile corvette Prottoy, the officials said.

In addition to ships, maritime patrol aircraft as well as a number of helicopters from both navies would also be participating in the exercise, they said.

"India and Bangladesh have a close, long-standing relationship covering a wide spectrum of activities and interactions, which has strengthened over the years," the Indian Navy spokesperson said.

The Indian Navy has participated in a number of joint maritime exercises in the last few weeks including a three-day drill with Japanese navy from September 26-28.

Last month, Indian Navy also carried out a two-day mega exercise in the Indian Ocean Region with the Australian Navy that featured a range of complex naval manoeuvres, anti-aircraft drills and helicopter operations.

In July, the Indian Navy carried out a military exercise with a US Navy carrier strike group led by the nuclear-powered aircraft carrier USS Nimitz off the coast of Andaman and Nicobar Islands. The USS Nimitz is the world's largest warship.

India has significantly expanded its deployment in the Indian Ocean Region with a plethora of warships and submarines following its border row with China in eastern Ladakh, ostensibly to send across a message to Beijing.

https://www.deccanherald.com/national/navies-of-india-bangladesh-to-hold-3-day-mega-military-exercise-from-october-3-896367.html

ThePrint

Sat, 03 Oct 2020

US military aircraft refuels at Indian base for first time under defence pact

The aircraft landed over a week ago at an airstrip in the Andaman and Nicobar Islands for refuelling under an agreement signed between India and US in 2016

By Snehesh Alex Philip

New Delhi: Amid tensions between India and China, the US Navy's long-range anti-submarine warfare and maritime surveillance aircraft, P-8 Poseidon, carried out its maiden refuelling from India's strategic base in Andaman and Nicobar Islands.

Sources said the refuelling happened towards the end of last month and was carried out under the Logistics Exchange Memorandum of Agreement (LEMOA), signed between India and the US in 2016.

While the LEMOA was operationalised in 2017 with the US Navy tanker refuelling an Indian Navy ship in the Sea of Japan, this is the first time an American aircraft had done so.

File image of US maritime surveillance aircraft P-8 Poseidon | Commons

In September, an Indian ship had been refuelled through a US tanker.

A defence source said, "The flight landed over a week back at an airstrip in the Andaman and Nicobar Islands for refuelling under the LEMOA. The aircraft was present at the base for a few hours before resuming its journey."

While it was a simple refuelling, the message of a US anti-submarine and surveillance aircraft refuelling from the strategic airbase of India is hard to miss.

The development assumes more significance because it comes at a time when India and China are locked in a tense stand-off in Ladakh.

Both India and China have been signalling each other on their capabilities in the Indian Ocean Region.

India has put its entire military on operational alert and almost the entire fleet of the Western and the Eastern Naval Command are at sea.

What is LEMOA?

Asked if such refuelling had been done earlier by the P-8 Poseidon, the source said this was the first time for the aircraft.

Under LEMOA, both countries have access to each other's military facilities for refuelling and replenishment.

This include food, water, billeting, transportation, petroleum, oil, lubricants, clothing, medical services, spare parts and components, repair and maintenance services, training services, and other logistical items and services.

The LEMOA provides India access to Diego Garcia, the biggest American base in the Indian Ocean, besides Guam, on the edge of the Pacific Ocean.

While both countries hold a large number of joint exercises during which refuelling and replenishment are done, payment is a tedious process.

The LEMO is actually a tweaked version of the Logistics Support Agreement that the US had been pushing for several years.

The UPA government was stonewalling the signing of this agreement, which is part of the Foundation Agreements that the US refers to for deeper cooperation with India.

The others agreements under the Foundation Agreements are the Basic Exchange and Cooperation Agreement, which is yet to be signed, and the Communications, Compatibility and Security Agreement, signed in 2018.

https://theprint.in/defence/us-maritime-surveillance-aircraft-refuels-in-andamans-amid-tensions-with-china/515631/

Science & Technology News

Press Information Bureau
Government of India

Ministry of Defence

Sat, 02 Oct 2020 8:33PM

Prime Minister delivers inaugural address at VAIBHAV 2020 Summit

Over 3000 Academicians & Scientists of Indian Origin and over 10,000 Indian Scientists participating in the Summit

More youngsters should develop interest in Science: PM

Pioneering space reforms in India will create opportunities for Industry and academia: PM

India aiming to eliminate Tuberculosis from the country by 2025: PM

"The need of the hour is to ensure more youngsters develop interest in Science. For that we must get well-versed with science of history and history of science", said Prime Minister Sh Narendra Modi today while inaugurating the Vaishvik Bhartiya Vaigyanik (VAIBHAV) Summit, a global virtual summit of overseas and resident Indian Researchers and Academicians.

"VAIBHAV Summit 2020 celebrates Science and Innovation from India and World. I would call it a true sangam or confluence of great minds, through this gathering we sit to form our long lasting association for empowering India and our planet", he said.

Shri Narendra Modi said, Government of India has taken numerous measures to boost scientific research and innovation as science is at the core of its efforts towards socio-economic change.

Prime Minister referred to India's immense efforts towards development of vaccines and executing the vaccination programme.

He said, the long break in vaccine production is broken. In 2014 four new vaccines were introduced into our immunization programme. This includes indegineously developed rota vaccine.

He mentioned about ambitious mission to eliminate tuberculosis in India by 2025, which is five years before the global target.

Shri Narendra Modi referred to the National Education Policy 2020 which was brought in after three decades and after nation-wide detailed consultations and deliberations. The policy aims to boost curiosity towards science and gives much needed boost to Scientific Research. It provides open and broadbased environment to nurture young talent.

Prime Minister mentioned about the pioneering space reforms of India which will create opportunities for industry and academia.

Mentioning about Indian partnership in Laser Interferometer Gravitational-wave Observatory, CERN and International Thermonuclear Experimental Reactor (ITER), he highlighted the importance of scientific research and development efforts at global level.

He also referred to India's major missions on supercomputing and cyber physical systems. Talking about fundamental research and applications in areas of artificial intelligence, robotics,

sensors, and big data analysis, he said that this will boost the startup sectors and manufacturing in India.

He mentioned about the 25 innovation technological hubs already launched in India and how it would further boost the startup ecosystem.

He said , India wants top quality research to help its farmers. He praised Indian scientists for increasing the production of pulses and food grains.

Prime Minister said when India progresses the World progresses.

Prime Minister said that VAIBHAV presents a great opportunity to connect and contribute; when India prospers, the world also takes a lead. Calling VAIBHAV as a confluence of great minds, he said that these efforts will help create an ideal research ecosystem, merging tradition with modernity to create prosperity. These exchanges will certainly be useful and will also lead to useful collaborations in teaching and research. These efforts of the scientists and researchers will help create an ideal research ecosystem.

Prime Minister mentioned that Indian diaspora are the excellent ambassadors of India at the world stage. The summit should look forward to realising the dream of building a secure and prosperous future for the coming generations. India wants top-class scientific research to help our farmers. This summit will lead to useful collaborations in teaching and research. The efforts of the Indian diaspora will help create ideal research ecosystem.

In VAIBHAV summit, more than 3000 overseas Indian origin academicians and scientists from 55 countries and about 10,000 from India are taking part and it is being organized by 200 Indian academic institutes and S&T departments, led by Principal Scientific Advisor, Government of India. Around 700 overseas panelists from 40 countries and 629 resident panelists from eminent Indian academia and S&T departments will deliberate on 18 different verticals with 80 sub-topics in 213 sessions.

The deliberations will be held from 3rd October to 25th October 2020, with consolidation of outcomes on 28th October. The summit will conclude on the occasion of Sardar Vallabh Bhai Patel Jayanti i.e. 31st October 2020. The initiative involves multiple levels of interactions among the overseas experts and Indian counterparts over a month-long series of webinars and video conferences.

The broad S&T areas that will be discussed during the summit includes computational sciences, electronics & communication, quantum technologies, photonics, aerospace technologies, medical sciences, biotechnology, agriculture, material & processing technologies, advanced manufacturing, earth sciences, energy, environmental sciences, and management.

The aim of the summit is to bring out a comprehensive roadmap leveraging the expertise and knowledge of global Indian researchers for addressing emerging challenges for universal development. The summit will reflect on the collaboration and cooperation instruments with academia and scientists in India and abroad. The goal is to create an ecosystem of Knowledge and Innovation in the country through global outreach.

Principal Scientific Advisor Prof K. Vijayaraghavan and 16 overseas panelists from different countries viz. USA, Japan, Australia, UK, France, Singapore, Republic of Korea, Brazil and Switzerland, working in different domains such as computing & communication, sono-chemistry, high energy physics, manufacturing technologies, management, geo-science, climate changes, microbiology, IT security, nano-materials, smart villages, and mathematical sciences interacted with the Prime Minister during the inaugural session.

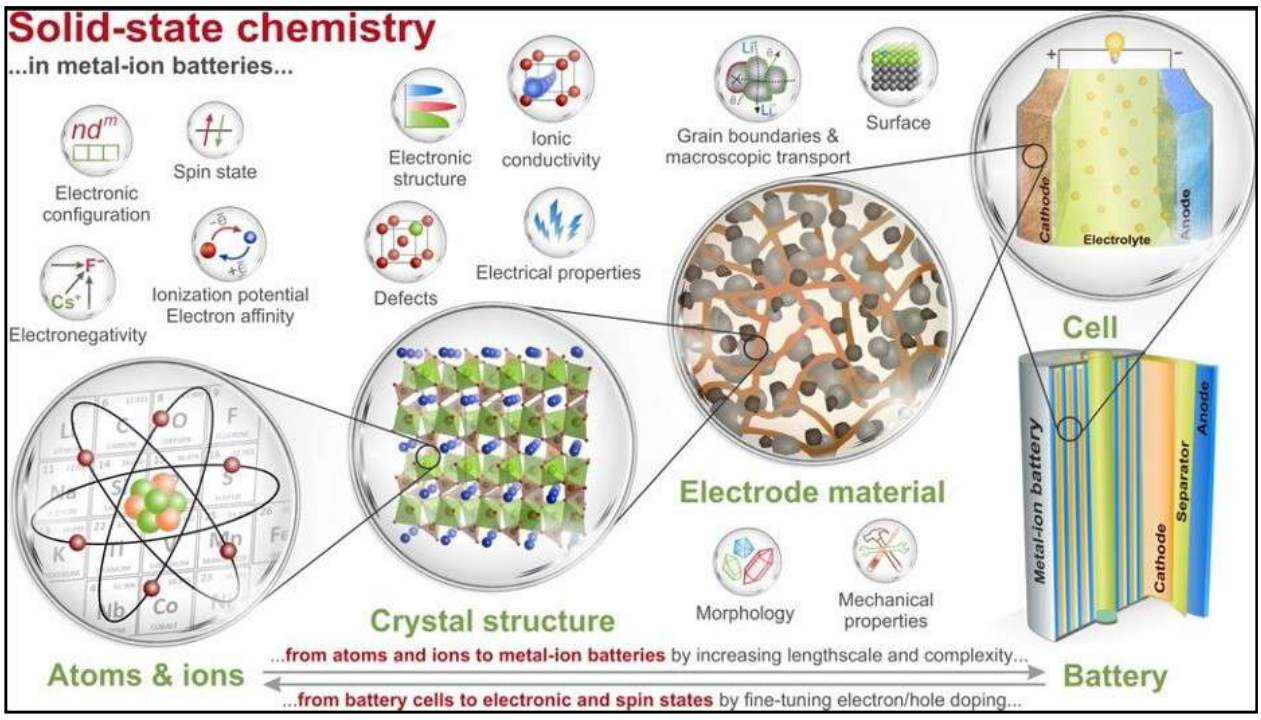
https://pib.gov.in/PressReleseDetailm.aspx?PRID=1661131

PHYS.ORG

Sat, 03 Oct 2020

The role of solid state chemistry in the development of metal-ion batteries

Professors from the Skoltech Center for Energy Science and Technology (CEST), Lomonosov Moscow State University and College de France shared their vision on the importance of solid state chemistry in advancements currently awaited from contemporary and prospective metal-ion batteries. The opinion was contributed as an invited review to *Nature Communications*.



Credit: Skolkovo Institute of Science and Technology

Metal-ion batteries are the main drivers enabling a smooth transfer to renewables and green energy for a sustainable planet. The artfully designed electrode materials have greatly contributed to the development of high-performance Li-ion batteries that was eventually hallmarked by the 2019 Nobel Prize, which had signified the role solid state chemistry. Targeted design of novel metal-ion battery materials to bring the technology to the next level clearly stands as a great challenge for today's chemistry community.

The individual properties of atoms and ions encoded in the Periodic Table along with the fundamental trends and principles multiplied by further levels of complexity constitute multitude of possible combinations for scientists to find new battery electrodes. Obviously, the researchers need solid guidelines while searching through this huge parameter space for the best chemical combinations and structures.

The review published in *Nature Communications* summarizes and explains the fundamental chemical principles and recipes and discusses the recent achievements made in the design of electrode materials and solid electrolytes by manifesting the interplay between chemical composition, crystal and electronic structure and electrochemical properties. The authors emphasized the crucial role of advanced methods: diffraction, imaging and spectroscopic characterization techniques coupled with solid state chemistry approaches for improving battery materials opening emergent directions for further studies.

Professor Stanislav Fedotov says, "In the near prospect, we foresee more essential discoveries of functional materials enabled by solid state chemistry. All students and researchers who are eager to contribute to the development of current and upcoming technologies to make a better world are welcome to enroll in our materials chemistry courses delivered within the materials science Master and Ph.D. programs at Skoltech."

Professor Artem Abakumov, director of CEST, says, "With this brief review, we demonstrated that behind seemingly applied research targeting the specific product—metal-ion batteries—a wealth of fundamental science is hidden. Rational design of advanced electroactive materials and solid electrolytes for the future batteries calls for deep understanding of crystal chemistry, chemical bonding and electronic structure of solids, ionic transport, electrochemistry and up-to-date characterization techniques coupled with the broad vision stemming from the adjacent branches of solid state chemistry. Powerful computational methods material design and discovery will empower researchers in the near future, but they must act hand-in-hand with the scientific wisdom brought by a multifaceted solid state chemistry approach."

More information: Artem M. Abakumov et al. Solid state chemistry for developing better metal-ion batteries, *Nature Communications* (2020). DOI: 10.1038/s41467-020-18736-7

Journal information: *Nature Communications*

https://phys.org/news/2020-10-role-solid-state-chemistry-metal-ion.html

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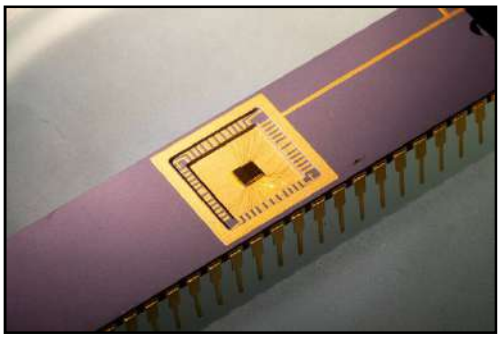
Sat, 03 Oct 2020

Physicists build circuit that generates clean, limitless power from graphene

A team of University of Arkansas physicists has successfully developed a circuit capable of capturing graphene's thermal motion and converting it into an electrical current.

"An energy-harvesting circuit based on graphene could be incorporated into a chip to provide clean, limitless, low-voltage power for small devices or sensors," said Paul Thibado, professor of physics and lead researcher in the discovery.



Credit: University of Arkansas

The findings, published in the journal *Physical Review E*, are proof of a theory the physicists developed at the U of A three years ago that freestanding graphene—a single layer of carbon atoms—ripples and buckles in a way that holds promise for energy harvesting.

The idea of harvesting energy from graphene is controversial because it refutes physicist Richard Feynman's well-known assertion that the thermal motion of atoms, known as Brownian motion, cannot do work. Thibado's team found that at room temperature the thermal motion of graphene does in fact induce an alternating current (AC) in a circuit, an achievement thought to be impossible.

In the 1950s, physicist Léon Brillouin published a landmark paper refuting the idea that adding a single diode, a one-way electrical gate, to a circuit is the solution to harvesting energy from Brownian motion. Knowing this, Thibado's group built their circuit with two diodes for converting AC into a direct current (DC). With the diodes in opposition allowing the current to flow both ways, they provide separate paths through the circuit, producing a pulsing DC current that performs work on a load resistor.

Additionally, they discovered that their design increased the amount of power delivered. "We also found that the on-off, switch-like behavior of the diodes actually amplifies the power delivered, rather than reducing it, as previously thought," said Thibado. "The rate of change in resistance provided by the diodes adds an extra factor to the power."

The team used a relatively new field of physics to prove the diodes increased the circuit's power. "In proving this power enhancement, we drew from the emergent field of stochastic thermodynamics and extended the nearly century-old, celebrated theory of Nyquist," said coauthor Pradeep Kumar, associate professor of physics and coauthor.

According to Kumar, the graphene and circuit share a symbiotic relationship. Though the thermal environment is performing work on the load resistor, the graphene and circuit are at the same temperature and heat does not flow between the two.

That's an important distinction, said Thibado, because a temperature difference between the graphene and circuit, in a circuit producing power, would contradict the second law of thermodynamics. "This means that the second law of thermodynamics is not violated, nor is there any need to argue that 'Maxwell's Demon' is separating hot and cold electrons," Thibado said.

The team also discovered that the relatively slow motion of graphene induces current in the circuit at low frequencies, which is important from a technological perspective because electronics function more efficiently at lower frequencies.

"People may think that current flowing in a resistor causes it to heat up, but the Brownian current does not. In fact, if no current was flowing, the resistor would cool down," Thibado explained. "What we did was reroute the current in the circuit and transform it into something useful."

The team's next objective is to determine if the DC current can be stored in a capacitor for later use, a goal that requires miniaturizing the circuit and patterning it on a silicon wafer, or chip. If millions of these tiny circuits could be built on a 1-millimeter by 1-millimeter chip, they could serve as a low-power battery replacement.

Journal information: *Physical Review E*

https://phys.org/news/2020-10-physicists-circuit-limitless-power-graphene.html

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Sat, 03 Oct 2020

Study sets limits on the flux of heavy compact objects using data from the Pi of the Sky project

By Ingrid Fadelli

Strangelets, and specifically nuclearites, their heavy species, are very dense, compact and potentially fast objects made of large and roughly equal numbers of up, down and strange quarks, which may inhabit the universe. Their existence was first hypothesized by Edward Witten back in 1984. These objects have never been detected before and have so far attracted less attention than meteors, perhaps due to their lack of relevance in particle physics.

Four of the Pi of the Sky Detector's cameras. Credit: Marcin Sokolowski.

At the end of 1984, theoretical physicists Alvaro De Rujula and Sheldon Lee Glashow introduced the idea that, when crossing the Earth's atmosphere, nuclearites produce light in a similar way to meteors, losing very little of their energy in the process. If their prediction is right, teams working at meteor observatories should be able to confirm

whether these objects exist or not. So far, however, very few researchers have conducted studies investigating this possibility.

A different cosmic phenomenon rooted in particle physics, known as ultra-high energy cosmic rays, shares some of the same theorized characteristics of nuclearites. These cosmic rays, in fact, also produce trails of light in the atmosphere, although they do this via a different physical process. In addition, they move much faster than nuclearities and are usually observed in the ultraviolet (UV) band.

Unlike nuclearities, ultra-high energy cosmic rays have been detected before. Nonetheless, they are a very rare phenomenon, with fluxes lower than 1 particle per square kilometer per 100 years for the highest energies. To detect them, scientists thus need to monitor large volumes of the atmosphere using big detectors, which could eventually also lead to the detection of nuclearities.

Researchers at RIKEN in Japan, the National Center for Nuclear Research in Poland, Aix Marseille University-CNRS, the Polish Academy of Sciences and University of Warsaw have recently carried out a search for nuclearities and other heavy compact objects based on photographic data collected by the "Pi of the Sky" detectors at the INTA El Arenosillo test center in Mazagaon near Huelva, Spain and at Las Campanas Observatory in Chile. Their paper, journals.aps.org/prl/abstract/ … ysRevLett.125.091101">published in *Physical Review Letters*, introduces a set of limits that could guide future searches for heavy compact objects in the universe.

"I came across the idea of observing nuclearites with a camera when I joined the JEM-EUSO collaboration, which intends to build an orbital UV telescope monitoring the Earth's atmosphere, looking mainly for cosmic rays, but also nuclearites, meteors and other phenomena," Lech Wiktor Piotrowski, one of the researchers who carried out the study, told Phys.org. "A much bigger volume of the atmosphere is visible from the orbit compared to the on-ground observatories, thus the chances of detection are increased by an order of magnitude."

The key objective of the recent study by Piotrowski and his colleagues was to discover nuclearities or other heavy compact objects crossing the atmosphere in photographs taken by the Pi of the Sky detectors, or to at least set limits on their flux, if their search yielded no positive results.

While the final UV telescope developed by the JEM-EUSO collaboration could aid the study of numerous cosmological phenomena, the researchers have not yet started using it to collect observations (although the data from smaller precursor experiments is currently being analyzed). In their recent study, they thus decided to use available ground data collected as part of the Pi of the Sky experiment.

The prediction that nuclearities produce light as they cross the atmosphere is based on estimations of their density and potential speed. This characteristic could thus be shared by other cosmological objects of different natures.

Since De Rujula and Glashow introduced their theory back in 1984, the list of objects that are hypothesized to leave light traces in the Earth's atmosphere has grown substantially, also including objects that are not directly relevant to the field of particle physics, such as small primordial black holes. While their search for nuclearities was fruitless, it allowed Piotrowski and his colleagues to set a series of limits that could narrow down future searches for both nuclearities and other heavy compact objects in the universe.

"In high school, reading a popular article about hypothetical 'strangelets' and how they may destroy the world, convinced me that I should become a particle physicist," Piotrowski said. "I have become one, but in the process, I started to think that I will never have anything to do with those strangelets. Then, a few years later, thanks to the work I conducted as part of the JEM-EUSO collaboration, I found out that with archival data of my old sky-gazing experiment Pi of the Sky, I could make some substantial contribution to the topic of strangelets. This is how this paper was born."

The core idea behind the study carried out by Piotrowski and his colleagues is fairly simple. When one looks up at the sky at night, he/she should theoretically be able to see the tracks of nuclearites and other heavy compact objects, just like he/she sees those left by meteors or satellites.

The tracks left by nuclearites and other heavy compact objects, however, should be slightly different. A nuclearite should be able to pass through the whole atmosphere, thus the light trail it leaves would be very long and give off a constant brightness that only changes based on the physical distance with an observer. The researchers searched for these long trails in photographs taken as part of the Pi of the Sky experiment.

"Seeing such a track would give us a candidate, while a lack of any detections would allow us to set a limit on the flux of nuclearites and other heavy compact objects," Piotrowski explained. "This involves calculating the overall time of sky observations and an effective surface of the volume of the sky observed, which depends on the detector pointing, as well as on the assumption that the objects were coming from all possible directions, from a single direction or from some specific direction configurations. Finally, the limit needs to include the detection efficiency of the detector (which can be obtained through simulations), and information about how well we can distinguish between the objects of interest and other tracks, such as those coming from meteors and satellites."

The Pi of the Sky detector takes images of the sky using CCD cameras with commercial photographic lenses mounted on them, without any filters. It can therefore collect images that roughly reflect what a human observer would see when looking up at the sky.

The detector's exposures last approximately 10 seconds and its cameras follow the movement of the stars. It can thus also be used to gather information about how the volume of the atmosphere changed during the course of the night.

"During the Pi of the Sky experiment, we did not foresee any research related to tracks, and performed an automatic analysis of stars and star-like transients, after which most of the raw data was discarded," Piotrowski said. "The luckily remaining raw data, spanning through several years and cameras, was used for the analysis presented in our paper."

The researchers analyzed all the raw frames collected by the Pi of the Sky detector, discarding approximately 50% of them due to their poor quality. Subsequently, they searched for images of tracks in the remaining good quality frames, which included 1766.05 h of observations gathered by a single, 20x20 degree camera equivalent. Their search was conducted using a Hough-transform based algorithm specifically designed to identify tracks in images.

"We have identified almost 36,000 tracks in the data, most of which were automatically classified as meteors or satellites based mainly on the variability of their brightness (the brightness of a nuclearite should be almost constant), the remaining were filtered out manually, leaving 29 candidates," Piotrowski said. "Nine of those were found in a catalog of satellites, leaving 20 candidates. In future dedicated experiments, those candidates could be further classified based on their speed, which cannot be derived from the analyzed 10 second exposures."

As the data used by the researchers did not include any information related to speed, they were unable to determine whether the 20 candidates that they could not identify are in fact nuclearities or heavy compact objects. However, based on the data available to them, they think that the possibility of them being heavy compact objects is highly unlikely.

"Almost all of the 20 remaining tracks are shorter than 500 pixels (our CCD is roughly 2000x2000 pixels), while for the nuclearites, we expect an almost flat distribution through all possible track lengths, limited almost only by the point of entry into the atmosphere and the edge of the field of view," Piotrowski explained. "The candidates are thus most likely satellites or meteors, with a portion of a track in our cameras too short to show the characteristic variability of brightness."

Based on the results they gathered so far, Piotrowski and his colleagues assume that the images they analyzed contain no traces of nuclearites or other heavy compact objects, thus they set out to place a limit on their flux based on the data available to them. To do this, they calculated the effective surface of the atmosphere's volume contained in each frame, which depended on the

direction a camera pointed in, the hypothetical mass of nuclearites and the estimated efficiency of nuclearite detection using the camera's specific configuration.

The efficiency of nuclearite detection was calculated by superimposing representations of nuclearite tracks on real images of the sky and running the Hough-transform based track detection algorithm on this artificial/simulated data. As nuclearites have never been observed before, simulation tools are particularly useful for studying them and showing what they would look like.

Ultimately, the researchers changed the flux limit based on the "separation efficiency" (i.e., an estimated value that describes how well they would be able to tell nuclearite tracks apart from light trails produced by meteors, satellites and other commonly observed objects). This value was derived from the length distribution of the 20 tracks that they were unable to identify during their search.

"The curvature of our limit line comes from two factors," Piotrowski explained. "First, the lower the nuclearite mass, the dimmer it is and the lower the sensitivity of our detector. This effect dominates the lower masses, where the detection efficiency is very small. Second, the heavier the nuclearite, the higher in the atmosphere it can start emitting light. Thus, the volume of the atmosphere observed is bigger for heavier nuclearites, allowing for setting a better limit on the flux. This dominates the highest masses, where the detection efficiency becomes mass-independent."

Exotic states of matter that cannot be directly observed from Earth have been the focus of numerous past research studies. Unveiling new forms of matters that cross the atmosphere would have important implications for the study of physics, astrophysics, astronomy and potentially other scientific fields as well.

The limits on the flux of heavy compact objects set by Piotrowski and his colleagues could be an important step towards better understanding the nature of heavy compact objects. For instance, they could guide future studies investigating the existence of stable quark matter in the universe.

"We now also have an experimental confirmation that heavy compact objects in the given mass range cannot cross the atmosphere in large numbers," Piotrowski said. "This is a starting point for the verification of the specific models for each heavy compact object type and its possible source in the universe. But there is also a more mundane reason for the performed study. Up to now, it seems that no one had searched for heavy compact objects in the analyzed mass range; as scientists, we should explore such terra incognita, because often, something new lurks there. It didn't this time, not with our current sensitivity, but this was a first step."

The recent study carried out by this team of researchers also proves that purely astrophysical experiments could be of great value for the study of particle physics. While astrophysics and particle physics are closely related, in fact, the ideas introduced by Witten, Rujula and Glashow in 1984 have remained largely untested or addressed by particle physicists for several decades.

In the future, the paper authored by Piotrowski and his colleagues could inspire other teams worldwide to search for nuclearities or other heavy compact objects. Meanwhile, the researchers plan to continue exploring this topic as well, in order to further narrow down the search for elusive cosmological objects.

"The obtained limits could now be used and modified to put constraints on specific types of heavy compact objects and their distribution in the galaxy/universe," Piotrowski said. "Second, it is also important to improve on the limits. This will be done in future experiments: on-ground ones dedicated to the purpose of detecting heavy compact objects, and orbital ones observing huge volumes of the atmosphere."

More information: Lech Wiktor Piotrowski et al. Limits on the Flux of Nuclearites and Other Heavy Compact Objects from the Pi of the Sky Project, *Physical Review Letters* (2020). DOI: 10.1103/PhysRevLett.125.091101

Journal information: *Physical Review Letters*

https://phys.org/news/2020-10-limits-flux-heavy-compact-pi.html

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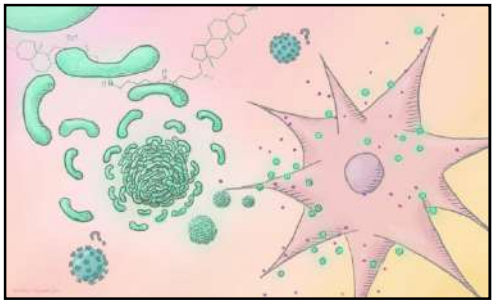
Sat, 03 Oct 2020

Vaccine ingredients could be hiding in small molecule libraries

Many vaccines include ingredients called adjuvants that help make them more effective by eliciting a stronger immune response. Identifying potential adjuvants just got easier, thanks to an approach described by scientists at Kyoto University's Institute for Integrated Cell-Material Sciences (iCeMS) and colleagues in the journal *Angewandte Chemie*.

The team of chemists and biologists in Japan report they found a molecule that, when added to a vaccine, strengthens the immune response just as well as a commonly used adjuvant. Vaccine adjuvants are an essential part of clinically used antigen vaccines, such as influenza, hepatitis and cervical cancer vaccines.



The researchers found a molecule that can be used as vaccine adjuvant and strengthens the immune response when added to a vaccine. Credit: Mindy Takamiya/Kyoto University iCeMS

"Adjuvants generate a robust and long-lasting immune response, but the ones currently in use, like aluminum salts and oil-in-water emulsions, were developed in the 1920s and we don't precisely understand how they work, which is why they are often called immunologists' dirty little secret," says iCeMS chemical biologist Motonari Uesugi, who led the study.

The new adjuvant was discovered by screening a library of 8,000 small molecules for their ability to self-assemble. Molecular self-assembly is the spontaneous self-organization of molecules through non-electron-sharing bonds. This is a well-known concept in materials science that is also employed by living organisms to perform complex biological functions.

"We hypothesized that structures that come together through molecular self-assembly might mimic structures in pathogens, like viruses, stimulating a similar immune response," says Uesugi.

The team found 116 molecules that can self-assemble and then screened them for the ability to increase interleukin-6 expression by macrophages. Macrophages are immune cells that detect and "eat up" pathogens circulating in the body. They also release proteins, such as interleukin-6, that activate other immune cells.

The research led to the discovery of a molecule called cholicamide. This molecule self-assembled to form a virus-mimicking structure that is engulfed by macrophages and similar immune cells. The structures are transported into specialized vacuoles to combine with a specific receptor called toll-like receptor 7, which sparks a heightened immune response. Specifically, it leads to the release of immune-stimulating cues like interleukin-6.

Further investigations and comparisons demonstrated that cholicamide was just as potent in inducing an immune response as the adjuvant Alum when added to an influenza vaccine given to mice.

"Our study, to the best of our knowledge, is the first report of using a small molecule library for vaccine adjuvant discovery," says Uesugi. "We hope the new approach paves the way for discovering and designing self-assembling small molecule adjuvants against pathogens, including emerging viruses."

Further studies are needed to determine how cholicamide mimics the single RNA strands of viruses to activate toll-like receptor 7. The researchers also want to understand how cholicamide binds to the receptor to elucidate the effects of this interaction.

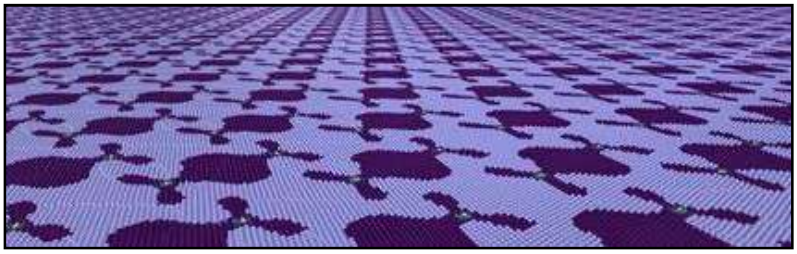
More information: Shuyu Jin et al, Discovery of Self-Assembling Small Molecules as Vaccine Adjuvants, *Angewandte Chemie International Edition* (2020). DOI: 10.1002/anie.202011604

Journal information: *Angewandte Chemie* , *Angewandte Chemie International Edition*
https://phys.org/news/2020-10-vaccine-ingredients-small-molecule-libraries.html

Sat, 03 Oct 2020

Process for visualizing defects in crystal solids enhanced by artificial intelligence

Crystals are ubiquitous: most metals, for example, are crystalline. Known for the almost perfect organization of their atoms, crystals nonetheless always contain imperfections, which are called defects. The concentration and morphology of defects in a crystalline solid have a direct influence on the properties of the material. Improving the understanding of crystal defects and their evolution will therefore make it easier to predict changes in how materials change over time. Understanding such changes is especially crucial for ensuring the optimal design of facilities subject to severe environmental conditions such as irradiation.



In modern materials science, researchers simulate the onset and evolution of defects in crystalline solids using very large-scale computer simulations. However, the immense stream of data generated makes analyzing numerical simulation experiments an extremely complex process. Researchers at the CEA, the results of whose work have recently been published in *Nature Communications*, propose a novel approach that can be applied universally to overcome this difficulty. This new approach is the first method that can be applied to all materials with a crystalline structure. Providing a continuous visualization of a defect and its atomic environment, this facilitates the description of complex physical processes such as the migration of defects under irradiation.

The researchers, from the Nuclear Energy Division and the Military Applications Division of the CEA, have drawn on artificial intelligence methods to develop an algorithm that describes distortions in the local atomic environment caused by defects in the material. This distortion score facilitates automatic defect localization and enables a "stratified" description of defects that can be used to distinguish zones with different levels of distortion within the crystalline structure.

The results of this study open up many exciting possibilities for future development across the entire materials science community. These simulation tools can be used to automate analysis of huge datasets, such as those generated as a result of experimental techniques like atom probe tomography, transmission electron microscopy and synchrotron radiation, methods already being used to probe the mysteries of matter. These developments may also be applied in other fields, including chemistry, biology and medicine, for example, to detect cellular defects characteristic of cancer.

More information: Alexandra M. Goryaeva et al. Reinforcing materials modelling by encoding the structures of defects in crystalline solids into distortion scores, *Nature Communications* (2020). DOI: 10.1038/s41467-020-18282-2

Journal information: *Nature Communications*
https://phys.org/news/2020-10-visualizing-defects-crystal-solids-artificial.html

The Indian EXPRESS

Sat, 03 Oct 2020

New research: The role of ventilation systems in spreading Covid-19

Why are researchers interested in studying the role of airflow in the spread of COVID-19? What does the recent study say about ventilation systems? Why does poor ventilation increase the risk of disease transmission?

A team of researchers from the University of Cambridge has found that the ventilation systems used in modern office spaces, designed to keep conditions uniform in all parts of the room, disperse airborne contaminants evenly throughout the space. Their findings were published in the Journal of Fluid Mechanics.

A team of researchers from the University of Cambridge has found that the ventilation systems used in modern office spaces, designed to keep conditions uniform in all parts of the room, disperse airborne contaminants evenly throughout the space. (Represe

Why are researchers interested in studying the role of airflow in the spread of COVID-19?

Researchers are studying the role of airflow in disease transmission in the case of COVID-19 since it is considered important to estimate the risk of contracting the virus. By now it is well known that poorly ventilated spaces make it easier for virus transmission to take place. It is also believed that virus transmission is easier indoors rather than outdoors. Last week, scientists from the UK began their research to determine how long the coronavirus can survive in tiny aerosol particles.

What does the recent study say about ventilation systems?

The study illustrates that the virus is spreading primarily through large droplets and smaller aerosols, which are expelled when people cough, laugh, talk, breathe or sneeze. The authors note that the data so far indicates that, "indoor transmission of the virus far outstrips outdoor transmission, possibly due to longer exposure times and the decreased turbulence levels (and therefore dispersion) found indoors".

Professor Paul Linden from Cambridge's Department of Applied Mathematics and Theoretical Physics (DAMTP), who led the research, said in a press release that inside closed spaces, when people exhale carbon dioxide, the virus is carried along with it and can be spread around the room through ventilation flows.

Why does poor ventilation increase the risk of disease transmission?

Insufficiently ventilated spaces can lead to higher concentrations of carbon dioxide, thereby increasing the risk of exposure to the virus.

So, what is the role of airflow in disease transmission?

Airflow in a room depends on the placement of vents, doors, windows and the convective flows generated by heat that is emitted by people and the placement of equipment in a building. The authors note that other variables such as people moving or talking, doors opening and closing and changes in outdoor conditions for naturally ventilated buildings also affect the airflow and consequently the risk of transmission.

The study also talks about two methods of ventilation, one being mixing ventilation, which is the most common and involves the placement of vents in a way such that the air in a space is well

mixed in order to keep the temperatures uniform throughout the space. But this also means that the contaminants are also spread evenly throughout the room.

The second method is called displacement ventilation and involves the placement of vents at the bottom and top of the room. This creates a cooler lower zone and a warmer upper zone. This warm air is extracted by the vents placed on the top of the room. Since the exhaled air is also warm, using this method of ventilation means that most of the exhaled air also gets mixed up with the warm air and is hence extracted by the upper vents than breathed in by another person.

So, what does this mean?

The results show that room flows are turbulent and can change dramatically depending on the movement of the occupants, the type of ventilation, the opening and closing of doors and, for naturally ventilated spaces, changes in outdoor conditions. The researchers also found that masks are effective at reducing the spread of exhaled breath, and therefore droplets. Significantly, they note that while every mask type has a certain amount of leakage through the tops and the sides, it doesn't matter much because what is important is to slow the momentum of the exhaled contaminants, which essentially reduces the chances of direct exchange of aerosols and droplets.

Breaking the momentum of the exhaled breath means that the air is carried upwards towards the ceiling. They also found that laughing, in particular, creates a large disturbance, suggesting that if an infected person without a mask was laughing indoors, it would greatly increase the risk of transmission.

https://indianexpress.com/article/explained/explained-new-research-on-role-of-ventilation-systems-in-spreading-covid-19-6668957/

Business Today

Sat, 03 Oct 2020

COVID-19 silences body's pain-signalling pathways, spreads stealthily, claims study

In a research paper published in the journal PAIN, the scientists raised the possibility that pain, as an early symptom of COVID-19, may be reduced by the coronavirus spike protein as it silences the "body's pain signaling pathways"

Given the rising number of coronavirus cases, scientists across the world are working round the clock to find a vaccine against the virus which has killed over 1 million people across the globe. According to a latest study, the novel coronavirus which causes COVID-19 blocks body's pain signalling pathways, which could explain why nearly 50 per cent of the infected people experience few or no symptoms, even though they spread the disease.

As per the scientists, including Rajesh Khanna from the University of Arizona in the US, nearly half of coronavirus transmission occurs prior to the onset of symptoms, and 40 per cent of COVID-19 infections are asymptomatic.

"It made a lot of sense to me that perhaps the reason for the unrelenting spread of COVID-19 is that in the early stages, you're walking around all fine as if nothing is wrong because your pain has been suppressed," Khanna said.

In a research paper published in the journal PAIN, the scientists raised the possibility that pain, as an early symptom of COVID-19, may be reduced by the coronavirus spike protein as it silences the "body's pain signalling pathways."

Earlier scientists had established that the novel coronavirus SARS-CoV-2 spike protein uses the human cells' angiotensin-converting enzyme 2 (ACE2) receptor to enter the body. Later in June, two studies pointed to neuropilin-1 as a second receptor for SARS-CoV-2, the researchers said.

"That caught our eye because for the last 15 years my lab has been studying a complex of proteins and pathways that relate to pain processing that are downstream of neuropilin," said Khanna.

"So we stepped back and realised this could mean that maybe the spike protein is involved in some sort of pain processing," he added.

One of the biological pathways signal through which the body feels pain is via a protein named vascular endothelial growth factor-A (VEGF-A) that plays an essential role in blood vessel growth but also has been linked to diseases such as cancer, and rheumatoid arthritis, the scientists said.

They added that most recently this protein has been linked to COVID-19.

Like a key in a lock, when VEGF-A binds to the receptor neuropilin, it initiates a cascade of events resulting in the hyperexcitability of neurons, which leads to pain, the study noted.

Khanna and his research team found that the SARS-CoV-2 spike protein binds to neuropilin in exactly the same location as VEGF-A.

Although several attempts have been made to develop vaccines against human coronavirus infections, there is no vaccine available as of now. Many pharma companies are working on protein-based vaccines for COVID-19 and the most advanced one is from Novavax, based on the entire Sars-CoV-2 spike protein plus an immune system-activating adjuvant. *With PTI inputs*

https://www.businesstoday.in/latest/trends/can-pain-relief-caused-by-coronavirus-help-explain-covid-19-spread-what-scientists-think/story/417651.html

INDIA TODAY

Sat, 03 Oct 2020

Covid vaccine may be available in India by January 2021, but with challenges: AIIMS Director Randeep Guleria

If all things go as planned, the vaccine could be available in the market by early next year, said AIIMS Director Randeep Guleria. However, he said the initial availability of doses will not be enough for the entire population in the country

New Delhi: All India Institute of Medical Sciences (AIIMS) Director Dr Randeep Guleria said an effective Covid-19 vaccine can be expected in India by January 2021 if everything goes as planned.

Speaking during a session of the India Today Healthgiri Awards 2020, Guleria admitted that it is hard to say when a vaccine will be available in the country and that it depends on a lot of factors - from the ongoing trials to the effectiveness of the vaccine against Covid-19 infections.

If all things go as planned, the vaccine could be available in the market by early next year, said the AIIMS director. However, Guleria made it clear that the initial availability of doses will not be enough for the entire population in the country.

"If everything goes as planned, it can be hoped that a vaccine will be available in the market by early next year (January 2021) to some extent," Guleria said.

Highlighting the next big challenge after the vaccine is ready, Guleria said, "The second challenge after the vaccine is deemed effective is production and distribution on such a large scale."

Priority model

When asked how the Covid vaccine will be distributed among Indians considering the shortfall, the AIIMS director said discussions on the matter have already started and indicated that "vaccine prioritisation" model will be followed.

Explaining the model, Guleria said those groups with the highest risks will be prioritised over others.

"There are two groups that will be prioritised. Those who have a higher risk of infection including healthcare workers and other corona warriors. And those who have higher chances of mortality," Guleria said.

"If we prepare a priority list and follow it effectively, then the vaccine distribution can be done equitably."

Dr Guleria reminded people that it is a global pandemic and strict prioritisation guidelines need to be followed to effectively eradicate the virus. If the prioritisation model is not followed, it will lead to more deaths and the pandemic will keep spreading, Guleria said.

"The priority list will have to be sincerely followed as it will lead to a drop in cases and deaths."

On long-term vaccine side-effects

Since the Covid-19 vaccines around the globe have been created in record pace, many experts have raised questions about the long-term vaccine side-effect, which will be impossible to determine in such a short time.

When asked how doctors will determine the long-term effects of the vaccine, Dr Guleria said that the phase 1, 2 and 3 human trials of the vaccine are being conducted parallelly to "compress" the time need to study it.

In this process, the long-term side effects can also be studied over a comparatively shorter period of time, said the AIIMS director. "And people who receive the vaccine after it is available will also be closely monitored to determine if they are facing any long-term side-effects," he said.

He also emphasised on the need for collecting data as people start getting the Covid-19 vaccine doses.

Has India reached its peak?

When asked if India is yet to reach its Covid-19 peak or past it, Guleria said cases have stabilised marginally over the past few days and if the trend continues for the next two weeks, it could be an indication that the country is past its peak.

While India has already registered over 63 lakh Covid-19 cases so far, the AIIMs director said awareness should be created among all Indians, especially in rural areas, to limit the infection in future. He said people should be given a fresh reminder about the Covid-19 protocols.

He advised people to maintain all Covid-19 protocols like wearing masks, follow social distancing rules and added that people have a major role to play in reducing the impact of the virus.

"People need to understand their role in the fight against Covid-19," he said.

Is herd immunity possible in India?

Dr Randeep Guleria said attaining herd immunity should not be the goal for a country with a massive population like India.

Explaining that herd immunity requires at least 60-70 per cent of the population to get infected, Guleria said that it could sharply increase India's mortality rate.

He said the policy that has been laid out - testing, tracking, treating - is clear and it should be followed to effectively deal with the virus.

"Herd immunity will come with the vaccine. When we will be able to vaccinate a large number of people and they will become immune, then we can talk about attaining herd immunity," he said, adding that natural herd immunity in India will take a lot of time and is not a viable solution.

https://www.indiatoday.in/india/story/covid-vaccine-may-be-available-in-india-by-january-2021-but-with-challenges-aiims-director-randeep-guleria-1727674-2020-10-02