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समाचार पत्रों से चयित अंश
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DRDO News

DRDO Technology News

Tue, 29 Dec 2020

अब नहीं बचेंगे देश के दुश्मन: CRPF योद्धा करेंगे खात्मा, आतंकियों की मौत निश्चित

दुश्मनों का खात्मा करने के लिए सबसे बड़ा केंद्रीय अर्धसैनिक बल (CRPF) अब खुद की टेक्नोलॉजी से परिपक्कव योद्धाओं की सबसे अद्भुत टीम तैयार करेगा। भारत के ये जाबांज टीम जो तकनीक उपकरण तैयार करेगी, उसे परास्त भी नहीं किया जा सकेगा।

नई दिल्ली: दुश्मनों के थर-थर कांपने का समय अब आ गया है। नापाक साजिश रचते हुए देश के लिए साजिश करते दुश्मनों का खात्मा करने के लिए सबसे बड़ा केंद्रीय अर्धसैनिक बल(CRPF) अब खुद की टेक्नोलॉजी से परिपक्कव योद्धाओं की सबसे अद्भुत टीम तैयार करेगा। भारत के ये जाबांज टीम जो तकनीक उपकरण तैयार करेगी, उसे परास्त भी नहीं किया जा सकेगा और वो इसी तर्ज पर रहेंगे। इसे तैयार करने के लिए रिसर्च पर बहुत ज्यादा ध्यान दिया जाएगा।

फोटो-सोशल मीडिया

इस तकनीक से आतंकियों और नक्सलियों का आतंक पूरी तरह से खत्म किया जा सकेगा। और तो और सबसे खास बात तो ये है कि सीआरपीएफ(CRPF) के टॉप इंजीनियर योद्धाओं को डीआरडीओ की लैब में काम करने का मौका भी मिलेगा।

आपको बता दें कि सीआरपीएफ में जो युवा अफसर भर्ती हो रहे हैं, उनमें से अधिकतर की क्वालिफिकेशन बीटेक और एमटेक हैं। साथ ही इस बल में सामान्य ड्यूटी के अलावा अनेक ऐसे पद हैं, जहां पर टेक्नीकल जानकारी वाला अधिकारी कहीं ज्यादा अच्छे तरीके से काम कर सकता है।

सेना के टेक्नीकल पदों में ट्रांसपोर्ट विंग, जिसके तहत माइनिंग प्रोटेक्टिक्ड व्हीकल भी शामिल हैं। साथ ही ड्रोन तकनीक, आईआईडी को निष्क्रिय करना, जंगल वॉरफेयर में काम आने वाले उपकरण व संचार के साधन आदि तकनीक प्रमुख हैं।

तकनीकी योद्धा तैयार करने की योजना

ऐसे में सीआरपीएफ के एक शीर्ष अधिकारी के अनुसार, इन सबके चलते अब खुद के तकनीकी योद्धा तैयार करने की योजना बनाई गई है। इसके लिए डीआरडीओ और आईआईटी के साथ अनुबंध किया गया है।

साथ ही शीर्ष अधिकारी के अनुसार, चूंकि प्रधानमंत्री नरेंद्र मोदी मेक इन इंडिया प्रोग्राम पर ज्यादा फोकस कर रहे हैं, इसलिए अब सीआरपीएफ भी इसी नीति पर चल कर तकनीकी योद्धा तैयार करेगी।

वहीं सिर्फ रिसर्च एंड डेवेलपमेंट पर ज्यादा खर्च होता है, इसलिए डीआरडीओ और आईआईटी के साथ मिलकर सीआरपीएफ काम करेगी। इन संगठनों से प्रशिक्षित विशेषज्ञ अफसर सीआरपीएफ को हर क्षेत्र में तकनीकी मदद मुहैया कराएंगे। देश के दुश्मनों का खात्मा करके दिखाएंगें।

https://newstrack.com/india/largest-central-paramilitary-force-most-amazing-team-matured-warriors-technology-eliminate-terrorists-defeated-drdo-iit-develop-740301.html

Army Technology

Tue, 29 Dec 2020

Indian Army to procure 118 Arjun Mk-1A tanks

The Indian Army has initiated the process to procure 118 Arjun Mk-1A Main Battle Tanks (MBT) for nearly Rs89.57bn ($1.22bn)

The Indian Army has initiated the process to procure 118 Arjun Mk-1A Main Battle Tanks (MBT) for nearly Rs89.57bn ($1.22bn).

The Deputy Chief of Army Staff will soon forward the file for procurement to the Integrated Defence Staff (IDS) to put up the case, The Hindu reported quoting sources familiar with the development.

The case is expected to be placed before the Defence Procurement Board (DPB) and the Defence Acquisition Council (DAC) next month, the report further added.

Arjun MBT. Credit: Prem Singh Kanwar for Ministry of Defence, Government of India.

The Arjun Mk-1A features 14 major upgrades over the earlier Mk1 variant. Limited user validation trials were conducted to test all the upgrades.

Additionally, the Defence Research and Development Organisation (DRDO) has established an Arjun hub in Jaisalmer to provide spare parts and associated support services.

The DRDO is also working to set up an obsolescence management of Arjun tanks for replacing antiquated electronics on existing vehicles. The move will also address indigenisation of assemblies and sub-assemblies.

Notably, the Indian Army inducted two regiments of Arjun Mk1 tanks between 2005 and 2010.

After DAC approves the case, the Indian Army will proceed to place the order with the Heavy Vehicles Factory (HVF), Avadi.

Subsequently, HVF will manufacture five tanks, which will undergo General Service Quality Requirement (GSQR) evaluation. If the Arjun Mk-1A variant secures the Bulk Production Clearance (BPC), the general production of the tanks will begin.

Recently, the DRDO handed over the Border Surveillance System (BOSS), an all-weather electronic surveillance system, to the Indian Army.

https://www.army-technology.com/news/indian-army-arjun-mk-1a-tanks/

Tue, 29 Dec 2020

सेना के इस खतरनाक हथियार से दुश्मन होंगे ध्वस्त, ट्रायल हुआ सफल

पुणे के सेंटर और ऑर्डिनेंस फैक्ट्री बोर्ड (OFB) ने साथ में मिलकर तैयार किया था, उसने सेना की ओर से हुए फाइनल ट्रायल को पूरा कर लिया है। रक्षा अनुसंधान एवं विकास संगठन (DRDO) की ओर से कहा गया है कि अब यह कार्बाइन सेना के प्रयोग के लिए पूरी तरह से रेडी है।

नई दिल्ली: भारत के रक्षा अनुसंधान एवं विकास संगठन(DRDO) की तरफ से बीते दिनों बताया गया है कि एक कार्बाइन जिसे पुणे के सेंटर और ऑर्डिनेंस फैक्ट्री बोर्ड (OFB) ने साथ में मिलकर तैयार किया था, उसने सेना की ओर से हुए फाइनल ट्रायल को पूरा कर लिया है। रक्षा अनुसंधान एवं विकास संगठन(DRDO) की ओर से कहा गया है कि अब यह कार्बाइन सेना के प्रयोग के लिए पूरी तरह से रेडी है। ऐसे में इस कार्बाइन को ज्वॉइन्ट वेंचर प्रोटेक्टिव कार्बाइन (JVPC) के तहत तैयार किया गया है। जबकि इस कार्बाइन के तैयार होने के बाद पुरानी पड़ चुकी कार्बाइन को हटाया जा सकेगा।

नए हथियार का उद्देश्य

बता दें, सेनाओं में 9 एमएम की कार्बाइन का प्रयोग होता है। रक्षा अनुसंधान एवं विकास संगठन (DRDO) की ओर से तैयार नई कार्बाइन को सेंट्रल आर्म्ड पुलिस फोर्सेज (CAPF) जैसे सीआरपीएफ(CRPF) और बीएसएफ(BSF) के साथ ही राज्यों की पुलिसबल भी प्रयोग कर सकेंगी। साथ ही इस नए हथियार का उद्देश्य लक्ष्य को बस चोट पहुंचाना या फिर उसकी क्षमताओं को खत्म करना होगा।

ऐसे में इसके प्रयोग के बाद लक्ष्य गंभीर रूप से घायल होगा लेकिन उसकी मौत नहीं होगी। जेवीपीवीएस(JVPVS) एक गैस ऑपरेटेड ऑटोमैटिक 5.56 x 30 एमएम की क्षमता वाला हथियार है। ये एक कार्बाइन का बैरल राइफल से छोटा है। इसे भारतीय सेना की जनरल स्टाफ क्वालिटेटिव रिक्वॉयारमेंट्स (जीएसक्यूआर) के हिसाब से ही तैयार किया गया है।

आर्म्स फैक्ट्री की तरफ से तैयार

जेवीपीसी(JVPC) की तरफ से इसे कभी-कभी मॉर्डन सब मशीन कार्बाइन (एमएसएमसी) भी कहते हैं। ये कार्बाइन एक मिनट में 700 राउंड फायरिंग कर सकती है। इस ज्वॉइन्ट डेवलपमेंट को अर्मामेंट रिसर्च एंड डेवलपमेंट एस्टैब्लिशमेंट (एआरडीई) और ऑर्डिनेंस फैक्ट्री बोर्ड के तहत आने वाली कानपुर स्थित स्माल आर्म्स फैक्ट्री की तरफ से तैयार किया गया है।

वहीं एआरडीई(ARDI) रक्षा अनुसंधान एवं विकास संगठन(DRDO) का ही हिस्सा है। इस हथियार को एसएएफ और इसका हथियार पुणे के खड़की स्थित अम्युनिशिन फैक्ट्री में तैयार किया गया है। सन् 1980 के प्रोजेक्ट पर काम करना शुरू किया था।

https://newstrack.com/india/ordnance-factory-board-pune-final-trials-army-drdo-ready-for-use-carbine-army-enemies-destroyed-dangerous-weapons-739716.html

THE NEW INDIAN EXPRESS

Tue, 29 Dec 2020

Indian Navy goes for 'prioritisation of acquisitions' to make up for the budget constraints

A senior Navy officer told The New Indian Express that finance is the biggest challenge for any state and more so when there are increasing commitment and decreasing budget

By Mayank Singh

New Delhi: Reeling under the heat of budget constraints, the Indian Navy has decided to rationalise its platforms, systems, and equipment to fulfil the imminent security requirements.

A senior Navy officer told *The New Indian Express* that finance is the biggest challenge for any state and more so when there are increasing commitment and decreasing budget.

"Navy has prioritised its force acquisition and induction plan and apart from push to induct indigenously manufactured platforms, Navy is going for collaborative maritime security approach to optimise own operational capability and that of the member countries," the officer said.

The Navy has curtailed the numbers of platforms to be inducted amid the economic challenges brought about by the COVID-19 pandemic. "We will be inducting 34 fighters for aircraft carriers in place of 57. We wanted 10 P8i maritime surveillance aircraft, we are accepting 6. Navy will now induct 8 Minesweepers and two Landing Platform Docks (LPD). There is the assurance of getting them more when the economy is stronger and there is a requirement," he said.

For representational purposes. (File | EPS)

The Navy had initially planned to get 24 Mine Sweepers, which was decreased to 12 and now 8 in numbers. Similarly, four LPDs were to be inducted.

"To get the same Maritime Domain Awareness we would have to send out more aircraft, more ships. We get that info, fuse it, and create a comprehensive picture. Many countries from the Indo-Pacific are cooperating," he said.

India inaugurated the International Fusion Centre (IFC) for the Indian Ocean Region (IOR) in 2018 and it now has the international Liaison Officers.

"Due to the IFC-IOR, we have information available from various sources, to develop a comprehensive picture. The sea is open to all, whether your friends or your enemies."

As reported earlier by *The New Indian Express*, India has the go-ahead for White Shipping Agreement with 36 countries and 3 multi-national constructs. The Navy is also pushing for indigenously manufactured platforms, aircraft, and systems. "Navy is fully committed to supporting the HAL for the Twin Engine Deck Based Aircraft. We are committed to the budget, as well as the idea," he said.

Navy Chief Admiral Karambir Singh speaking on the eve of the Navy Day had said that "We are working with DRDO on the twin-engine deck-based fighter offered to us. A lot of lessons have been learned from the Light Combat Aircraft (LCA) program and my hope is that the twin-engine jet can enter service by the early 2030s".

The Defence Research and Development Organisation (DRDO) is working on its Twin engine deck-based fighter aircraft and if that is successful, it can be the choice of the maritime force.

Leasing is the other solution opted by the Navy. "We have got a certain number of HALE on lease and we can go for other platforms in the future, as per our need," the officer said. There was a demand for 30 HALEs.

https://www.newindianexpress.com/nation/2020/dec/28/indian-navy-goes-for-prioritisation-of-acquisitions-to-make-up-for-the-budget-constraints-2242339.html

Defence News

Defence Strategic: National/International

Hindustan Times

Tue, 29 Dec 2020

Army Chief Gen Naravane leaves for South Korea on a three-day visit

The army chief will hold talks with South Korea's senior military and civilian leadership during the visit (December 28-30)

Edited By Zara Khan

New Delhi: Army Chief General Manoj Mukund Naravane on Monday kicked off a three-day visit to South Korea to bolster military cooperation with the east Asian country, the army said in a statement.

This is Naravane's fifth visit to a foreign country during the Covid-19 pandemic after Myanmar, Nepal, United Arab Emirates and Saudi Arabia. The army chief will hold talks with South Korea's senior military and civilian leadership during the visit (December 28-30).

Army Chief General Manoj Mukund Naravane.(ANI)

Apart from laying a wreath at the National Cemetery and War Memorial at Seoul, Naravane's itinerary will see him call on the Korean defence minister, army chief, chairman of joint chiefs of staff, and minister of defence acquisition planning administration (DAPA) where he will discuss avenues for enhancing India-South Korea defence ties, the statement said.

He will also visit the Korea Combat Training Centre in Inje County in Gangwon and the Agency for Defence Development (ADD) at Daejeon.

The K9 Vajra-T guns in the army's inventory represent the collaboration between private sector defence major Larsen & Toubro (L&T) and South Korea's Hanwha Techwin (HTW). In April 2017, the two firms signed a $720-million contract for the Indian Army's artillery gun programme. L&T has assembled the guns at a facility at Talegaon near Pune in Maharashtra. An improved version of HTW's K9 Thunder, the K9 Vajra-T has been designed to meet Indian requirements, including those of its desert formations.

A Korean firm was also pursuing a programme to build minesweepers in the country under the Make in India initiative but the plan has failed to take off. Another Korean defence firm is looking at the possibility of supplying the Biho self-propelled anti-aircraft defence system to the Indian military.

https://www.hindustantimes.com/india-news/army-chief-kicks-off-3-day-south-korea-visit-to-bolster-military-ties/story-1Wu1oj57EDHWU3Vgq8Tq6I.html

FINANCIAL EXPRESS
Read to Lead

Tue, 29 Dec 2020

Army Chief visits South Korea; SPADGMS, minesweepers and other possible joint ventures on agenda

In line with the government's `Act East Policy' and to explore avenues for further expansion of the military ties, the Indian Army Chief Naravane has left on a three-day visit to South Korea on Monday (December 28, 2020)

By Huma Siddiqui

The $ 3 billion Self Propelled Air Defence Gun Missile System (SPAD-GMS) deal is expected to be part of discussions between the Indian Army Chief Gen MM Naravane and the top brass of South Korea. In the SPAD-GMS, South Korea's Hanhwa Defense had emerged as the lowest bidder beating the Russian competitor. In line with the government's `Act East Policy' and to explore avenues for further expansion of the military ties, the Indian Army Chief Naravane has left on a three-day visit to South Korea on Monday (December 28, 2020). He will be holding talks with his counterpart – the army chief and chairman of Joint Chiefs of Staff as well as the minister of defence. He will also meet with South Korea's minister of Defence Acquisition Planning Administration (DAPA). The army chief's visit to South Korea's capital Seoul comes close on the heels of his recently concluded visit to the UAE and the Kingdom of Saudi Arabia.

While in South Korea, the Indian Army chief will go to the Korea Combat Training Centre in Gangwon province and Advance Defence Development (ADD) facility which are located at Daejeon.

The South Korean company is willing to transfer technology to Indian company either L&T or any other Indian company for the manufacturing of this missile system.

India-South Korea Military Cooperation

Both countries have elevated their bilateral relations to Special Strategic Partnership in 2015.

India and South Korea have been in discussions for several military platforms and weapons, especially naval shipbuilding.

Financial Express Online had reported in 2019, the South Korean company Daewoo Shipbuilding & Marine Engineering had responded to Indian Navy's Expression of Interest (EoI) for six advanced conventional submarines under Project-75I (India). And KSS-3 submarine for the Rs 45,000 crore proposal of the Indian Navy.

The Project 75I is expected to be processed under the Strategic Partnership Model (SP), and the submarines will be built in India through technology transfer. As reported earlier, the OEM will have to tie up with an Indian company for manufacturing under the Make in India initiative.

South Korea considers India as a serious power and a key partner within the region and India looks at South Korea a major partner under the `Act East Policy'.

Both countries have last year inked a logistics agreement, which is going to help the Indian Navy while operating in the Indo-Pacific Region and in interoperability.

What was the army looking for in the Self Propelled Air Defence Gun Missile System?

In 2013, the Indian Army had floated a requirement for five regiments of a self-propelled air defence gun-missile system. The 104 units were budgeted at approximately $2.5 billion. Each unit having twin 30 mm cannons. There are four short-range missiles fitted on a tracked chassis.

Why are they needed?

Because they can help in protecting critical installations and areas which can be hit by drones, helicopters or low-flying aircraft.

And, as has been reported by Financial Express Online, the South Korean Company Hanwha Defense had emerged as the lowest bidder by beating two Russian contenders. The decision to scrap the whole deal was taken by the Ministry of Defence on the grounds that the specifications mentioned are now dated.

The South Korean company is willing to transfer technology to Indian company either L&T or any other Indian company for the manufacturing of this missile system.

What is the Indian Army looking for?

These SPAD-GMS are expected to replace 1360 obsolete Bofors L 70 40mm single barrel and Soviet-era ZU-23-2 towed 23 mm twin-barrel weapon systems of the Indian Army. And the Indian Army needs almost five regiments of the guns. These guns can be deployed with the forces and be relocated based on the threat perception.

Mine-counter measure vessels (MCMVs) for the Indian Navy

When the Army chief talks with the military brass and the minister, there could be some forward movement in the negotiations for 12 mine-counter measure vessels (MCMVs) for the Indian Navy. These are to be built at the Indian Goa Shipyard through Transfer of Technology (ToT), under the `Make in India' initiative.

South Korean Company Kangnam Corporation and Italian shipbuilder M/s Intermarine had responded to the MoD RFI (Request for Information) for the MCMVs.

These MCMVs are required on an urgent basis to fill gaps in the navy's mine warfare capability.

The discussions with the South Korean Company Kangnam Corporation was stalled due to certain issues related to the indigenous content as well as the terms and conditions of ToT.

Why do navies need minesweepers?

These are deployed to help secure the harbours by locating and destroying underwater mines and are considered vital for keeping critical sea lanes safe.

India's Act East Policy

The Chief of Army Staff had accompanied Foreign Secretary Harsh Vardhan Shringla to a visit to Myanmar. During that visit in October, the Indian side announced its decision to supply an attack submarine to the Myanmar Navy and to further enhance military cooperation between the two countries.

This was followed by Army Chief's three-day visit in November to Nepal. The visit to the Himalayan neighbour had significant diplomatic overtones.

During his visit to South Korea in 2019, the defence minister Rajnath Singh had invited the top defence majors to participate in various defence projects in India. The companies which specialize in military platforms in South Korea are allowed to Transfer Technology as there are no laws to stop the transfer. They are keen to work with the Indian private sector companies under a joint venture.

https://www.financialexpress.com/defence/army-chief-visits-south-korea-spadgms-minesweepers-and-other-possible-joint-ventures-on-agenda/2159014/lite/

DefenceNews

Tue, 29 Dec 2020

BSF to be equipped with latest technology to counter drones

India's border guarding force BSF will soon be equipped with a latest technology to counter rogue drones being used to smuggle arms and drugs in the western sector of the country by Pakistan-based suspected group of smugglers and militants to destabilise the law and order situation in the country. Findings regarding "counter drone solutions" are under the process to get rid of the illegal activity that Intelligence agencies warned has potential to harm internal and external security.

An anti-radio frequency (RF) transmission system is being developed to help the Border Security Force (BSF) in controlling the ongoing menace by breaking the link of drones flown by their handlers sitting somewhere in Pakistan, a source privy to the development told IANS. "Live trials have been started and the second pilot run has just got over. We are in the process of finalising our reports which we will submit to the Ministry of Home Affairs soon.

From solution testing to drone detection and target system, all the aspects are being covered," the source said requesting anonymity. Explaining the system, another source said: "In order to control a drone remotely, you must be able to communicate with it wirelessly. Radio frequency wave is an invisible wave form on the electromagnetic spectrum to control these drones remotely.

A system to break the radio frequency is being developed. "Like all things on the electromagnetic spectrum, radio is measured in hertz (Hz). Extremely low frequency is anywhere from 3Hz to 30Hz and tremendously high frequency is from 300 GHz to 3,000 GHz. For radio to work, you must have a transmitter to send the messages and a receiver to receive the messages. At a rudimentary level, this is how remotely controlling an aircraft is accomplished. More precisely, your transmitter and receiver need to be tuned to the same frequency.

All points will be measured to control the frequency or break it." The "radio frequency identification" system will help capture the frequency and control it from here or break its connection from other side, said the source. An official in the Home Ministry told IANS that drone technology has immense potential and, as per NITI Aayog, the sector is likely to reach $50 billion in the next 15 years. "As the technology is being used to smuggle arms and narcotics into India, an early solution is the need of the hour in view of internal security and other aspects," he said. The BSF, which is guarding 3,323 km India-Pakistan borders which are being used to smuggle arms and drugs, has been working in this direction with the help of various private drone manufacturing firms and other stakeholders dealing with such manufacturing and counter drone solution firms to get the solution.

As local manufacturing of drones has come into light from the evidences recovered from the drones seized so far, intelligence agencies have warned of potential internal and external threats to the country. As the work to develop an anti-drone system is already in progress for the past one year, the BSF stressed on the sector in view of some recent incidents. Earlier this month, the Punjab Police had recovered an AK-47 rifle and a magazine with 30 cartridges, evidently part of the same consignment of 11 Arges and 84 hand grenades which were dropped by a Pakistani drone in the border district of Gurdaspur.

The seizure came amid concerns raised by Punjab Chief Minister Amarinder Singh of fresh spurt of efforts by Pakistan-based militants to disturb the border state's peace. According to Punjab Director General of Police Dinkar Gupta, the recovered assault rifle and the magazine with 30

cartridges had been attached to a wooden frame and lowered from the drone with a nylon rope like the hand grenades which were recovered from Salach village.

Alert security forces deployed along the international border with Pakistan had spotted a drone in Jammu district in November end and had opened fire to force it to return to the neighbouring country. The police said the drone was spotted on the Indian side of the international border in Arnia sector in RS Pura. The BSF troops fired at the drone after which it withdrew to the Pakistan side. Drones have been used in recent times by militants and their handlers to drop weapons etc. on the Indian side of the international border. The BSF under the guidance of the Ministry of Home Affairs is now trying to find a permanent solution to this menace.

https://www.defencenews.in/article/BSF-to-be-equipped-with-latest-technology-to-counter-drones-1033248

The EurAsian Times

Tue, 29 Dec 2020

Indian Air Force deploys Israeli Heron Drone to keep an eye on Chinese build-up near Ladakh

The Heron drone was spotted at the Indian Air Forces' Trishul airbase in Bareilly in the latest satellite imagery shared by an open-source intelligence Twitter handle

By Aakriti Sharma

The Indian Air Force (IAF) has reportedly deployed the Israeli-made Heron drones (UAV) to keep a watch on the China border amid the ongoing standoff between the two militaries in the Ladakh area.

Indian and Chinese troops at the border.

The UAV was spotted at the Indian Air Forces' Trishul airbase in Bareilly in the latest satellite imagery shared by an open-source intelligence Twitter handle. The development indicates that India has beefed up vigil along the LAC after it rejected the Chinese military's proposal to disengage from eight critical border points in Eastern Ladakh.

The UAV is "possibly part of ISR (intelligence, surveillance, and reconnaissance) missions" along India's borders with China and Nepal, the open-source intelligence Twitter handle d-atis @detresfa_ said.

The Indian Army, the Air Force, and the Navy use the medium-altitude, long-endurance Heron UAVs for surveillance and target acquisition purposes.

The drones have been in service with the Indian armed forces for several years. In order to strengthen border-monitoring capabilities and firepower, India is likely to order an armed version of the UAV and upgrade the existing fleet of unarmed UAVs under the Indian Air Force's 'Project Cheetah' for Rs 3,500 crore.

The Project Cheetah aims to upgrade the 90 Heron drones with laser-guided bombs, air-to-ground, and air-launched anti-tank guided missiles. It will enable the forces to carry out offensive operations against the enemy.

The fully-automated versions are capable of flying up to 45 hours and at an altitude of up to 35,000 feet. It can establish satellite communication (SATCOM) connectivity during Beyond Line-Of-Sight (BLOS) flights and has the ability to operate in extreme weather conditions.

Last month, there were reports saying India's deal for acquiring combat UAVs was in the final stages. The procurement of the combat version of Heron has been on the cards for many years now. India has also leased a pair of "MQ-9B SeaGuardian" UAVs from the US recently.

In view of the border stand-off with China, the Indian military was allowed to make emergency purchases to enhance the capability of the forces.

India and China have been standing eye to eye along the LAC in Ladakh for over seven months now. Tensions have been escalating after the troops from both sides got into a brutal clash in June that resulted in 20 Indian casualties and an unconfirmed number of deaths on the other side.

https://eurasiantimes.com/indian-air-force-deploys-israeli-heron-drone-to-keep-an-eye-on-chinese-build-up-near-ladakh/

Business Standard

Tue, 29 Dec 2020

Israel's sales pitch to India: Our artillery gun to support 'Make in India'

Business Standard has reviewed the letter, which was signed last Tuesday by Brigadier General Yair Kulas, director of Sibat - the Israeli defence ministry agency in charge of defence exports

By Ajai Shukla

New Delhi: Highlighting how important Tel Aviv regards an Indian order for 1,580 artillery guns, worth about Rs 20,000 crore, Israel's ministry of defence (MoD) has written to Defence Minister Rajnath Singh, pushing the award of a contract to Elbit Systems – the Israeli firm that bid lowest in an Indian global tender for towed guns.

Business Standard has reviewed the letter, which was signed last Tuesday by Brigadier General Yair Kulas, director of Sibat – the Israeli defence ministry agency in charge of defence exports. It expresses concern that no contract has been signed, even though Elbit Systems was declared the lowest bidder in March 2019 in the tender for 155 millimetre, 52 calibre guns. In July 2019, Elbit successfully concluded price negotiations with India's MoD.

"(W)e would kindly request your guidance regarding the status of the approval process and the anticipated/planned timeline for the conclusion of the approval process", writes Sibat.

As Business Standard earlier reported (December 10, *Israeli firm Elbit offers to build 70% of artillery gun in India*) Elbit priced its Autonomous Towed Howitzer Ordnance System (ATHOS) gun 40 per cent cheaper than the rival offering from French firm, Nexter.

Elbit quoted €477 million for 400 fully-built ATHOS guns, while Nexter quoted €776 million, say Indian MoD sources. That puts the cost of each ATHOS gun at €1.2 million (~10.7 crore), significantly cheaper than the €1.94 million (~17.3 crore) price of each Nexter gun.

However, Elbit's main sales pitch is not low cost, but a high degree of indigenisation. The Indian tender requires the first 400 guns to be supplied fully built or in kits, with no indigenisation requirements. The remaining 1,180 guns are required to be built by the Ordnance Factory Board (OFB), with at least 50 per cent indigenous content.

On October 14, Elbit provided a written commitment that it would indigenise production to the extent of 70 per cent, including the first 400 guns.

Sibat's letter indicates that the Israeli government will not restrict technology transfer or impose controls that might prevent Elbit from meeting its indigenisation commitment. "On behalf of the Israeli Ministry of Defence, I would like to take this opportunity… to convey our strong support in Elbit Systems undertaking to contribute to the Make in India initiative", the letter says.

For meeting this tough 70 per cent indigenisation target, Elbit will take the unprecedented step of setting up two production lines in India. It will partner the Pune-based Kalyani Group and its flagship, Bharat Forge, for building the first 400 guns. After that, in accordance with the tender requirements, Elbit will transfer technology to the OFB to build the next 1,180 guns.

When production shifts to the OFB, the Kalani Group line will not be idle. Elbit and the Kalyani Group will keep that line alive, building ATHOS guns for the global market.

"According to our understanding, the project will quickly provide highly advanced capabilities to the Indian artillery forces, as well as create numerous new job opportunities and prospects for export to third countries", wrote Sibat.

According to Elbit, it will succeed in indigenising 70 per cent of the first 400 guns, having already taken "very decisive, firm and committed steps" to partner Indian companies.

Elbit has a joint venture (JV) with Bharat Forge called BF Elbit Advanced Systems, and a JV with Alpha Design Technologies called Alpha ELSEC. It is also concluding a JV with Aditya Precitech Private Ltd, Hyderabad.

The MoD initially preferred the Defence R&D Organisation's 155 mm, 52 calibre Advanced Towed Artillery Gun System (ATAGS), over Elbit's ATHOS gun. This became clear when the MoD embargoed the import of all 155 mm, 52-calibre towed guns from December 31, 2020.

However, partly because of the ATHOS' low price and also developmental roadblocks, the MoD changed its mind in favour of the ATHOS. As *Business Standard* reported (November 30, *Artillery import embargo put off, doors open for ~23,700 cr Israeli guns*) the MoD reversed course on August 21 and permitted imports for another year, till December 31, 2021.

The question mark that still hangs over the signing of a contract with Elbit Systems is the reduced availability of funds. Given the Covid-19 related economic slowdown, strict spending controls have been imposed on the defence capital budget, leaving little for anything other than "committed liabilities", or annual instalments on large contracts concluded in earlier years.

https://www.business-standard.com/article/economy-policy/israel-s-sale-pitch-to-india-choose-our-artillery-gun-over-france-s-nexter-120122800959_1.html

Tue, 29 Dec 2020

The decade of Mahanian defence — Maritime security trend lines in littoral-Asia

In a post-COVID world — with tasks increasing and budgets shrinking — the challenges at sea are daunting

By Abhijit Singh

- ***This article is part of the series — What to Expect from International Relations in 2021.***

As 2020 draws to a close, it is worth reflecting on some trends that have shaped the maritime security landscape over the past decade. Asia's maritime security environment was always challenging. Faced with a wide array of traditional and non-traditional security issues, maritime agencies always had their task cut out. Yet, developments in recent years have revealed the growing complexity of maritime threats. Despite some success in combating Somali pirates at the turn of the decade, regional navies have struggled to contain other irregular challenges such as drugs and contraband trafficking, armed robbery, human smuggling, and even illegal migration.

What has made the task more onerous is the rise of maritime terrorism. Since the 26/11 attacks in Mumbai, the distinction between traditional and irregular security in the maritime realm has progressively blurred, creating a 'hybrid' category, whereby state and non-state actors have colluded to challenge other nations through a variety of overt and covert activities, targeting key

vulnerabilities. For many, this has also meant a diversion of operational assets away from far-seas missions, into littoral security.

What has made the task more onerous is the rise of maritime terrorism.

The more significant challenge has been the failure of marine governance, in particular the inability of governments to tackle the vexing issue of overfishing. The problem isn't limited to the illegal and excessive exploitation of resources (as is often assumed); lax regulatory implementation and faulty policy, in particular the provision of big subsidies to the fishing community, have helped unsustainable fishing practices thrive. If that weren't enough, ocean acidification and marine pollution has hit unprecedented levels — the recent oil spill in the waters off Mauritius is a testament to the devastation ship-source pollution has wrought over the marine habitat. To add another layer of complexity, maritime forces in the Indo-Pacific region are increasingly being called upon for humanitarian and disaster relief tasks, including non-combatant evacuations and search and rescue missions.

For sure, China's aggressive rise poses the biggest challenge to peace and stability in the Indo-Pacific region. Since 2008, when Beijing first sent its warships to the Gulf of Aden for anti-piracy duties, the Peoples Liberation Army Navy's (PLAN) littoral presence has grown considerably. So have Chinese attempts to assert sovereign territorial claims in contested waters, such as in the South China Sea. Worryingly, Beijing has been reclaiming undersea features, building strategic outposts to aid 'gray-zone' operations. Chinese maritime militia activity in the waters off Malaysia, the Philippines, Indonesia, Vietnam and Japan seem an act of strategic intimidation, aimed at dominating contested spaces. Not surprisingly, regional states have drawn close to the United States, ever more dependent on American security guarantees to balance China. The PLA has also expanded its footprint in the Indian Ocean, deploying submarines, and setting up a military logistics base in Djibouti.

Chinese maritime militia activity in the waters off Malaysia, the Philippines, Indonesia, Vietnam and Japan seem an act of strategic intimidation, aimed at dominating contested spaces.

For New Delhi, the more unsettling development is Beijing's wooing of Indian Ocean island states like the Seychelles and Maldives with economic largesse and infrastructure development. Following incremental advances under its Belt and Road Initiative (BRI) in South Asia, China has sought to exert influence over Bangladesh, Myanmar, Sri Lanka and Pakistan, with offers to export military hardware. Meanwhile, China's non-military presence in the Indian Ocean has substantially grown. Regular deployments of Chinese research vessels, intelligence ships and fishing fleets underscore Beijing's strategic stakes in the region.

To secure their littorals, Indo-Pacific nations have sought an inclusive arrangement. Proponents of a 'rules-based security order' have pushed to collectively implement measures to ensure open sea-lanes, and improve situational awareness (via shore-based radar chains, satellite systems and information fusion centers). As a 'net security provider' and 'first responder', the Indian Navy (IN) has been at the forefront of the endeavour in the Indian Ocean, focusing on inter-agency cooperation. The IN has also sought to build smaller partner capabilities to enable a more robust regional response.

And yet, in a post-COVID world — with tasks increasing and budgets shrinking — the challenges at sea are daunting. It is far from clear if the momentum of security efforts in recent years will carry forth into the future.

The views expressed above belong to the author(s).

https://www.orfonline.org/expert-speak/the-decade-of-mahanian-defence/

Hindustan Times

Tue, 29 Dec 2020

No sign of military talks with China on LAC row

At the virtual meeting of the WMCC on border affairs on December 18, India and China agreed that the next round of meeting between senior commanders should be held at an early date for "early and complete disengagement of troops" along the contested Line of Actual Control (LAC)

By Rahul Singh

New Delhi: There is no indication of when India and China will hold the next round of military talks to defuse border tensions in eastern Ladakh despite both countries agreeing to hold the corps commander-level dialogue at an early date during recent diplomatic talks on the lingering dispute, people familiar with the developments said on Monday.

Experts said talks were deadlocked because of yawning differences between the two sides. (Reuters)

At the virtual meeting of the Working Mechanism for Consultation and Coordination (WMCC) on border affairs on December 18, India and China agreed that the next round of meeting between senior commanders should be held at an early date for "early and complete disengagement of troops" along the contested Line of Actual Control (LAC).

"Neither side has proposed any date for the military dialogue yet. Any breakthrough in resolving the border row is unlikely without political/diplomatic intervention," the people cited above said. The two sides have held eight rounds of military talks so far but failed to make any progress in resolving the row.

During the eighth round of talks, the Indian Army and the Chinese People's Liberation Army (PLA) said they will ensure their front-line soldiers "exercise restraint and avoid misunderstanding and miscalculation" along the LAC.

Experts said talks were deadlocked because of yawning differences between the two sides.

"The basic reason (for talks yielding no results) is that the positions of the two sides on the conditions of disengagement remain too far apart. Unless these conditions are reconciled in diplomatic or political level talks, interaction between the militaries will serve little purpose," said former Northern Army commander Lieutenant General DS Hooda (retd).

Both India and China are prepared for a long haul in the Ladakh sector and are firm about holding forward positions along the LAC through the harsh winter months.

"Prior to the onset of the winter, there was some incentive for both sides to reach an agreement so that troops could be pulled out before the winter. That incentive could also have disappeared now that troops are prepared to hold ground through the winter," said Hooda.

While India has consistently pushed for comprehensive disengagement at all flashpoints and restoration of status quo ante of early April during the military talks, the Chinese side wants the Indian Army to first pull back troops deployed on strategic heights on the southern bank of Pangong Tso.

The Indian Army swiftly moved and occupied a series of key heights to prevent the PLA from grabbing Indian territory on the southern bank in a stealthy midnight move on August 29.

The Indian Army now controls ridgeline positions on the southern bank of Pangong Tso that allow it to completely dominate the sector and keep an eye on Chinese military activity, with the positions scattered across Rezang La, Reqin pass, Gurung Hill and Magar heights.

The Indian Army has also taken control of key heights overlooking the PLA's deployments on the Finger 4 ridge line on the northern bank of Pangong Tso where rival soldiers are deployed barely a few hundred metres from each other. The developments on both banks of Pangong Tso

have increased India's bargaining power during talks with the Chinese side, as previously reported by Hindustan Times.

https://www.hindustantimes.com/india-news/no-sign-of-military-talks-with-china-on-lac-row/story-DDb0JPPhmJQw1CA2FTjkbK.html

Science & Technology News

ONmanorama

Tue, 29 Dec 2020

Skyroot signs off 2020 with successful test-firing of Kalam-5 solid fuel motor

By Anantha Krishnan M

Bengaluru: Scripting a slice of history in the private space domain, Hyderabad-based Skyroot Aerospace successfully test-fired the technology demonstration version of their solid propulsion rocket motor – Kalam-5.

According to Skyroot Aerospace, the test was conducted at the facility of Solar Industries in Nagpur, India's largest explosives manufacturer. With this latest test conducted on December 22 coupled with the Raman Engine test firing done in August this year, Skyroot has successfully demonstrated all propulsion technologies in Vikram-1 launch vehicle.

Test-firing of the technology demonstration version of Skyroot Aerospace's solid propulsion rocket motor – Kalam-5. Photos: Skyroot Aerospace

Pawan Kumar Chandana, co-founder and CEO, Skyroot said that this was for the first time in India a private company has successfully designed, developed and tested a full solid propulsion rocket stage.

Skyroot co-founders Pawan (left) and Naga (right) soon after the successful Kalam-5 test-firing. Skyroot Aerospace

"It's a very significant milestone as we successfully demonstrated all propulsion technologies for Vikram-1. We all excited with the test results," he said.

Currently under development, Vikram-1, is expected to be launched by end of next year in partnership with Indian Space Research Organisation (ISRO).

Carbon Composites

Skyroot says Kalam-5 is built with advanced carbon composite structure in a completely automated process. With this, the first of five Kalam series of solid rocket motors have been unveiled.

Each motor carries a thrust ranging from 5kN to 1000kN (approximately 100 ton).

"Carbon composite case is very challenging to design and manufacture and is five-times lighter than steel.

The remaining 4 motors are in various stages of manufacturing and will be tested in 2021," a Skyroot statement said. Kalam-5 is a demonstrator solid rocket propulsion stage with exactly same propellant, materials and interfaces as the three solid propulsion stages of Vikram-1 launch vehicle.

It gives a peak sea-level thrust of 5.3kN and is designed to take 66 atmospheres and 30000C of combustion pressure and temperature respectively.

Carbon composite case. Photos: Skyroot Aerospace

"This is also 1:4 scale in size of our Vikram-1 3rd stage. Solid motors are high thrust, low-cost rocket engines with propellant in solid form. They are highly reliable as they have very few moving parts," Pawan said.

Major Milestone

He said Kalam-5 uses 15 different advanced materials, nine different manufacturing processes, and has zero moving parts.

"This is a major milestone for Skyroot and for the Indian private space sector. The test results closely matched our predictions and this success gives great confidence for our Vikram-I vehicle development," Pawan added.

Naga Bharath Daka, Skyroot co-founder and COO said the company has named solid propulsion stages as a tribute to former President Dr A P J Abdul Kalam.

"The test-firing of Vikram-1 launch vehicle's 3rd Stage (Kalam-100) is being planned in few months at ISRO facilities," Naga said.

Earlier this month, Prime Minister Narendra Modi had a virtual interaction with both Pawan and Naga to capture their thoughts on the recent space reforms.

The duo promised the PM to that Skyroot would give their best to make India a global space superpower.

Skyroot also had recently won the national start-up award in the category of space/launch vehicles.

Fighting Pandemic

Backed by a bunch of young and experienced rocket engineers, Skyroot Aerospace has been actively developing Vikram series of launch vehicles for the past two years.

Despite the pandemic upsetting their plans in 2020, the team achieved several milestones this year.

"It's been a big blow when the pandemic started. Everything halted almost for four months but picked up post that. However, I should say it put us back by four months which we are trying to compensate in all ways possible. The positive part is, it taught us crisis management. We quickly adapted to new remote ways of working to be more efficient but still be safe," Pawan said.

Commenting on the success of Skyroot's Kalam-5 motor, an ISRO official said that the private sector would now get ample opportunities to exploit the space sector.

"We are happy that players like Skyroot are growing in confidence. As the lead agency, ISRO is ever committed to support any space endeavours in the country. These are definitely exciting times with plenty of opportunities," the official said.

In a soon-to-be-published comprehensive interview, Pawan and Naga shares their inspiring story of friendship as former scientists at ISRO, the idea that launched Skyroot and the thrills of chasing their space dream from Hyderabad, the city of nawabs and kebabs.

(The writer is an independent aerospace and defence journalist, who blogs at Tarmak007 and tweets @writetake.)

https://www.onmanorama.com/news/india/2020/12/28/skyroot-successful-test-firing-kalam-5-solid-fuel-motor.html

ZEENEWS

Tue, 29 Dec 2020

Skyroot Aerospace becomes first Indian company to test-fire solid-fueled rocket engine

The company had tested its liquid-fueled engine in August this year

By Sidharth MP, Edited By Pushkar Tiwari

Highlights

- ***Indian Space startup Skyroot Aerospace has proven crucial propulsion technology of their maiden rocket Vikram-1, with latest test-firing of an engine.***
- ***Vikram-1 rocket is powered by four engines - three solid-fuel stages and one Liquid-fuel stage.***

New Delhi: Indian Space startup, Skyroot Aerospace, has proven the crucial propulsion technology of their maiden rocket Vikram-1, with the latest test-firing of an engine. Vikram-1 rocket is powered by four engines - three solid-fuel stages and one Liquid-fuel stage that the firm has designed and developed.

In August this year, the company had tested its liquid-fueled engine and now has proven the technology of the solid-fueled engine (Kalam-5), by successfully test-firing a miniature version.

Solid motors or solid-fueled engines are high thrust, low-cost rocket engines with propellant in solid form. They are highly reliable as they have very few moving parts. The Engine Testing was done at a private test facility on December 22 in Nagpur owned by Solar Industries, which is India's largest explosives manufacturer and a leading Space and Defence contractor (also partner and investor in Skyroot).

Theoretically, this means that the company is close to realizing their dreams of putting together an orbital-class rocket, as its propulsion technology is the hardest to master.

A typical rocket consists of two or more stages, each of which would have its own engines(either single or packed in a cluster). Simply put, a rocket is a combination of multiple engines(stages) that are vertically stacked.

“This test demonstrates the capability of our technology for the Vikram-1 rocket. Though we have fired a scaled-down engine during this successful demonstration, it must be noted that building a smaller engine is also a complex process. This successful test firing gives us the confidence that the bigger models will succeed,” Pawan K Chandana, CEO, Skyroot Aerospace told Zee Media.

The Engine ‘Kalam-5’, is named so for its peak Sea Level thrust of 5.3kN. It is notable that the engine is built with an advanced carbon composite structure in a completely automated process. While Carbon composite cases are very challenging to design and manufacture, they are five-times lighter than steel, hence improving efficiency.

Kalam is a series of five solid-fueled rocket engines with a thrust ranging from 5kN to 1000kN (approx 100Tons). In terms of technical specifications, Kalam-5 is designed to take 66 atmospheres and 30000C of combustion pressure and temperature respectively.

Team Skyroot had earlier told Zee Media that they were planning a maiden launch by December 2021. They added that the decision to launch a live satellite or a dummy payload would be taken by mid-2021, based on demand.

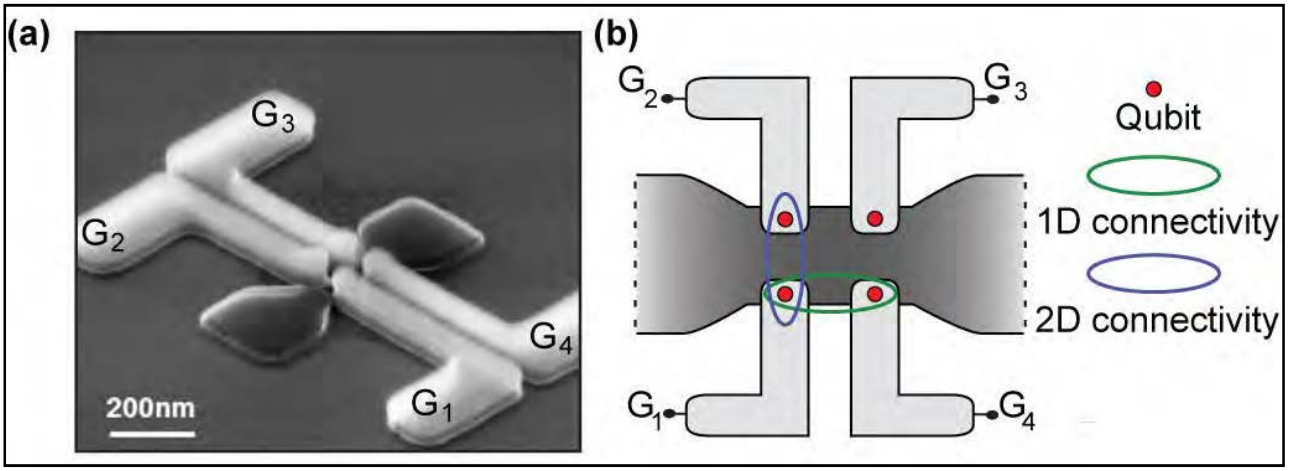
https://zeenews.india.com/india/skyroot-aerospace-becomes-first-indian-company-to-test-fire-solid-fueled-rocket-engine-2333360.html

PHYS.ORG

Tue, 29 Dec 2020

Important milestone in the creation of a quantum computer

Quantum computer: One of the obstacles for progress in the quest for a working quantum computer has been that the working devices that go into a quantum computer and perform the actual calculations, the qubits, have hitherto been made by universities and in small numbers. But in recent years, a pan-European collaboration, in partnership with French microelectronics leader CEA-Leti, has been exploring everyday transistors—that are present in billions in all our mobile phones—for their use as qubits. The French company Leti makes giant wafers full of devices, and, after measuring, researchers at the Niels Bohr Institute, University of Copenhagen, have found these industrially produced devices to be suitable as a qubit platform capable of moving to the second dimension, a significant step for a working quantum computer. The result is now published in *Nature Communications*.



(a) Scanning electron image of one of the Foundry-fabricated quantum dot devices. Four quantum dots can be formed in the silicon (dark grey), using four independent control wires (light grey). These wires are the control knobs that enable the so called quantum gates. (b) Schematic of the two-dimensional array device. Each Qubit (red circle) can interact with its nearest neighbor in the two-dimensional network, and circumvent a Qubit that fails for one reason or other. This setup is what "second dimension" means. Credit: University of Copenhagen

Quantum dots in two dimensional array is a leap ahead

One of the key features of the devices is the two-dimensional array of quantum dots. Or more precisely, a two by two lattice of quantum dots. "What we have shown is that we can realize single electron control in every single one of these quantum dots. This is very important for the development of a qubit, because one of the possible ways of making qubits is to use the spin of a single electron. So reaching this goal of controlling the single electrons and doing it in a 2-D array of quantum dots was very important for us", says Fabio Ansaloni, former Ph.D. student, now postdoc at center for Quantum Devices, NBI.

Using electron spins has proven to be advantageous for the implementation of qubits. In fact, their "quiet" nature makes spins weakly interacting with the noisy environment, an important requirement to obtain highly performing qubits.

Extending quantum computers processors to the second dimension has been proven to be essential for a more efficient implementation of quantum error correction routines. Quantum error correction will enable future quantum computers to be fault tolerant against individual qubit failures during the computations.

The importance of industry scale production

Assistant Professor at Center for Quantum Devices, NBI, Anasua Chatterjee adds: "The original idea was to make an array of spin qubits, get down to single electrons and become able to control them and move them around. In that sense it is really great that Leti was able to deliver the samples we have used, which in turn made it possible for us to attain this result. A lot of credit goes to the pan-European project consortium, and generous funding from the EU, helping us to slowly move from the level of a single quantum dot with a single electron to having two electrons, and now moving on to the two dimensional arrays. Two dimensional arrays is a really big goal, because that's beginning to look like something you absolutely need to build a quantum computer. So Leti has been involved with a series of projects over the years, which have all contributed to this result."

The credit for getting this far belongs to many projects across Europe

The development has been gradual. In 2015, researchers in Grenoble succeeded in making the first spin qubit, but this was based on holes, not electrons. Back then, the performance of the devices made in the "hole regime" were not optimal, and the technology has advanced so that the devices now at NBI can have two dimensional arrays in the single electron regime. The progress is threefold, the researchers explain: "First, producing the devices in an industrial foundry is a necessity. The scalability of a modern, industrial process is essential as we start to make bigger arrays, for example for small quantum simulators. Second, when making a quantum computer, you need an array in two dimensions, and you need a way of connecting the external world to each qubit. If you have 4-5 connections for each qubit, you quickly end up with a unrealistic number of wires going out of the low-temperature setup. But what we have managed to show is that we can have one gate per electron, and you can read and control with the same gate. And lastly, using these tools we were able to move and swap single electrons in a controlled way around the array, a challenge in itself."

Two dimensional arrays can control errors

Controlling errors occurring in the devices is a chapter in itself. The computers we use today produce plenty of errors, but they are corrected through what is called the repetition code. In a conventional computer, you can have information in either a 0 or a 1. In order to be sure that the outcome of a calculation is correct, the computer repeats the calculation and if one transistor makes an error, it is corrected through simple majority. If the majority of the calculations performed in other transistors point to 1 and not 0, then 1 is chosen as the result. This is not possible in a quantum computer since you cannot make an exact copy of a qubit, so quantum error correction works in another way: State-of-the-art physical qubits do not have low error rate yet, but if enough of them are combined in the 2-D array, they can keep each other in check, so to speak. This is another advantage of the now realized 2-D array.

The next step from this milestone

The result realized at the Niels Bohr Institute shows that it is now possible to control single electrons, and perform the experiment in the absence of a magnetic field. So the next step will be to look for spins—spin signatures—in the presence of a magnetic field. This will be essential to implement single and two qubit gates between the single qubits in the array. Theory has shown that a handful of single and two qubit gates, called a complete set of quantum gates, are enough to enable universal quantum computation.

More information: Fabio Ansaloni et al, Single-electron operations in a foundry-fabricated array of quantum dots, *Nature Communications* (2020). DOI: 10.1038/s41467-020-20280-3

Journal information: Nature Communications

https://phys.org/news/2020-12-important-milestone-creation-quantum.html

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Tue, 29 Dec 2020

Faster, greener way of producing carbon spheres

A fast, green and one-step method for producing porous carbon spheres, which are a vital component for carbon capture technology and for new ways of storing renewable energy, has been developed by Swansea University researchers.

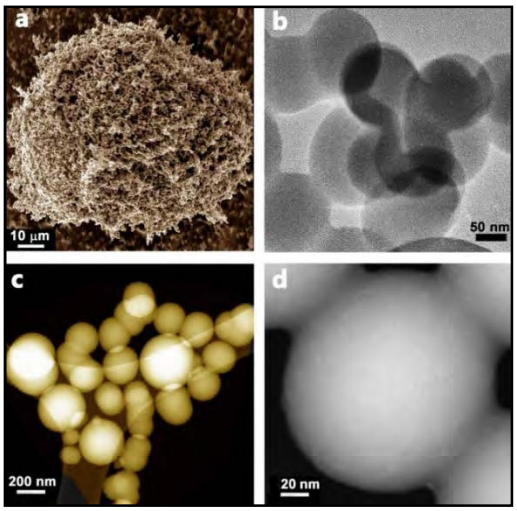
The method produces spheres that have good capacity for carbon capture, and it works effectively at a large scale.

Carbon spheres range in size from nanometers to micrometers. Over the past decade they have begun to play an important role in areas such as energy storage and conversion, catalysis, gas adsorption and storage, drug and enzyme delivery, and water treatment.

They are also at the heart of carbon capture technology, which locks up carbon rather than emitting it into the atmosphere, thereby helping to tackle climate change.

The problem is that existing methods of making carbon spheres have drawbacks. They can be expensive or impractical, or they produce spheres that perform poorly in capturing carbon. Some use biomass, making them more environmentally friendly, but they require a chemical to activate them.

This is where the work of the Swansea team, based in the University's Energy Safety Research Institute, represents a major advance. It points the way towards a better, cleaner and greener way of producing carbon spheres.



Carbon spheres - microscope imagesA fast, green and one-step method for producing porous carbon spheres, which are a vital component for carbon capture technology and for new ways of storing renewable energy, has been developed by Swansea University researchers.Carbon spheres range in size from nanometers to micrometers. storage and conversion, catalysis, gas adsorption and storage, drug and enzyme delivery, and water treatment. Credit: ESRI, Swansea University

The team adapted an existing method known as CVD—chemical vapour deposition. This involves using heat to apply a coating to a material. Using pyromellitic acid as both carbon and oxygen source, they applied the CVD method at different temperatures, from 600-900 °C. They then studied how efficiently the spheres were capturing CO_2 at different pressures and temperatures

They found that:

- 800 °C was the optimum temperature for forming carbon spheres
- The ultramicropores in the spheres that were produced gave them a high carbon capture capacity at both atmospheric and lower pressures
- Specific surface area and total pore volume were influenced by the deposition temperature, leading to an appreciable change in overall carbon dioxide capture capacity
- At atmospheric pressure the highest CO_2 adsorption capacities, measured in millimolars per gram, for the best carbon spheres, were around 4.0 at 0 °C and 2.9 at 25 °C.

This new approach brings several advantages over existing methods of producing carbon spheres. It is alkali-free and it doesn't need a catalyst to trigger the shaping of the spheres. It uses a cheap and safe feedstock which is readily available in the market. There is no need for solvents to purify the material. It is also a rapid and safe procedure.

Dr. Saeid Khodabakhshi of the Energy Safety Research Institute at Swansea University, who led the research, said:

"Carbon spheres are fast becoming vital products for a green and sustainable future. Our research shows a green and sustainable way of making them.

We demonstrated a safe, clean and rapid way of producing the spheres. Crucially, the micropores in our spheres means they perform very well in capturing carbon. Unlike other CVD methods, our procedure can produce spheres at large scale without relying on hazardous gas and liquid feedstocks.

Carbon spheres are also being examined for potential use in batteries and supercapacitors. So in time, they could become essential to renewable energy storage, just as they already are for carbon capture."

More information: Saeed Khodabakhshi et al. Facile and environmentally friendly synthesis of ultramicroporous carbon spheres: A significant improvement in CVD method, *Carbon* (2020). DOI: 10.1016/j.carbon.2020.08.056

Journal information: Carbon

https://phys.org/news/2020-12-faster-greener-carbon-spheres.html

COVID-19 Research News

mint

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Lasting immunity against COVID found after mild or asymptomatic infection: Study

- ***The study found that 89% of healthcare workers analysed carried neutralising antibodies 16-18 weeks after infection***
- ***The new study also provides reassurance for vaccination efforts, suggesting that even following mild infection, individuals carry antibody and T cell immunity to many parts of the virus***

Scientists have found evidence of protective immunity against COVID-19 in people up to four months after mild or asymptomatic coronavirus infection, providing hope for the long-lasting efficacy of vaccines.

The researcher, including those from Queen Mary University of London analysed antibody and T cell responses in 136 healthcare workers in the UK, who had mild or asymptomatic COVID-19 infection dating back to March.

The study, published in the journal Science Immunology, found that 89% of healthcare workers analysed carried neutralising antibodies 16-18 weeks after infection.

The team, also involving researchers Imperial College London and University College London, UK, found most workers also had T cells capable of recognising multiple different parts of the virus.

However, they noted that the two responses did not always persist in harmony, with some individuals showing T cell immunity but no evidence of antibodies, and vice versa.

"Our study of SARS-CoV-2 infection in healthcare workers from London hospitals reveals that four months after infection, around 90% of individuals have antibodies that block the virus," Joseph Gibbons, a Postdoctoral Research Assistant at Queen Mary, said.

"Even more encouragingly, in 66% of healthcare workers we see levels of these protective antibodies are high and that this robust antibody response is complemented by T cells which we see reacting to various parts of the virus," Gibbons said.

Describing the finding as "good news", he explained that if someone has been infected with the coronavirus, there is a good chance that they will have developed antibodies and T cells that may provide some protection in case they encounter the virus again.

Much of the debate on protective immunity has focussed on the different roles of B cells, which make antibodies, and T cells, white blood cells which help protect from viruses, including direct killing.

The latest study found that while protective antibody responses were usually complemented by a T cell response, over half of the healthcare workers had different antibody and T cell responses.

The workers did not produce a T cell response specific to proteins found on the outer layer of the SARS-CoV-2 virus.

The research also found that T cell responses tended to be higher in those with the classic, defining symptoms of COVID-19, while asymptomatic infection resulted in a weaker T cell immunity than symptomatic infection, but equivalent neutralising antibody responses.

The new study also provides reassurance for vaccination efforts, suggesting that even following mild infection, individuals carry antibody and T cell immunity to many parts of the virus, known as epitopes.

The researchers noted that while new variants are appearing, the changes to the virus don't necessarily occur within these epitopes so it is hoped the vast majority of immune recognition can likely continue unperturbed.

"Our study in asymptomatic and mild cases gives a positive insight into the durability of immunity to SARS-CoV-2 after four months of infection," Corinna Pade, a Postdoctoral Research Scientist at Queen Mary, said.

The researchers noted that it is an important finding as mild or even no symptoms of COVID-19 are very common and representative of most infections in the community.

"Such abundant immune responses also give hope for the long-lasting efficacy of vaccines," Pade added.

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

https://www.livemint.com/science/news/lasting-immunity-against-covid-found-after-mild-or-asymptomatic-infection-study-11609163406120.html