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Dr Satheesh Reddy to continue as DRDO Chairman for two years

డీఆర్డీవో చైర్మన్ గా మరో రెండేళ్లు సతీశ్ రెడ్డి

» కేంద్రం ఉత్తర్వులు

హైదరాబాద్, ఆగస్టు 24 (ఆంధ్రజ్యోతి): దేశ రక్షణ పరిశోధన, అభివృద్ధి సంస్థ (డీఆర్డీవో) చైర్మన్ గా జి.సతీశ్ రెడ్డి పదవీ కాలాన్ని కేంద్రం మరో రెండేళ్లు పొడిగించింది. కాగా.. భారత రక్షణ రంగానికి అవసరమైన 108 ఆయుధ వ్యవస్థలు, ఉప వ్యవస్థలను ఫ్రైవేట్ రంగంలో అభివృద్ధి చేయడానికి రంగం సిద్ధమైంది. డీఆర్డీవో చైర్మన్ డాక్టర్ సతీశ్ రెడ్డి నేతృత్వంలోని బృందం ఈమేరకు ఒక జాబితాను రక్షణ మంత్రి రాజ్ నాథ్ సింగ్ కు సోమవారం సమర్పించింది. వాటిని మన దేశంలోనే తయారు చేసుకోవడం వల్ల అనేక ప్రయోజనాలుంటాయని 'ఆంధ్రజ్యోతి'కి సతీశ్ రెడ్డి వివరించారు.



Wed, 26 Aug 2020

India to export BrahMos missiles to friendly nations, say sources

BrahMos Aerospace, a joint venture of India and Russia, is one of the platforms which can be exported to friendly nations

By Huma Siddiqui

BrahMos Aerospace, a joint venture of India and Russia, is one of the platforms which can be exported to friendly nations. The Ministry of Defence (MoD) which is in the process of readying a list of military items that can be exported has BrahMos Missiles among other items. “After fulfilling the requirements of the Indian armed forces, BrahMos missile can be exported to third countries,” sources have confirmed to Financial Express Online.

The BrahMos Missile which has been designed developed and produced jointly by India and Russia has generated a lot of interest globally and both governments of both countries are ready to export this supersonic missile to other countries.

BrahMos Pavilion gets huge traffic in Moscow

The India-Russia BrahMos JV pavilion at the India Pavilion at the Army-2020 International Military and Technical Forum has been receiving a lot of attention. According to the Embassy of India in Moscow, the Indian Pavilion was inaugurated by Secretary (Defence Production) Raj Kumar and Indian Ambassador DB Venkatesh Verma.



From the Gulf Region, UAE has expressed its keenness to buy this missile, however, there has been no forward movement on this.

The defence secretary production is in Moscow accompanied by a high-level official and business delegation which has representatives of private sector companies for Army-2020. The weeklong event (Aug 23-29) has been organized by the Russian Defence Ministry. India is one of the 70 nations who are attending the event where the Russian industry has displayed its military ware including tanks and armoured vehicles made there locally are on display.

Exporting BrahMos

The missile has caught the attention of countries from South America to ASEAN nations, as well as Eastern European countries — they all are keen to buy the BrahMos which is a joint venture between India and Russia.

Several countries including Brazil, Chile, the Philippines, South Korea, Algeria, Greece, South Africa, Malaysia, Thailand, Egypt, Singapore, and Bulgaria have been expressing their interest for almost a while and the discussions have gone to the next level.

From the Gulf Region, UAE has expressed its keenness to buy this missile, however, there has been no forward movement on this. As has been reported by Financial Express Online earlier, “The UAE enjoys good relations with both India and Russia and there is no conflict of interest. There would be no problems if the missile is exported to that country,” a source said.

Talks were in an advanced stage with Vietnam and Indonesia, but there has been no further development.

More about BrahMos Aerospace

It was established in 1998 as a joint venture — NPO Mashinostroyeniya and Defence Research and Development Organisation and forming BrahMos Aerospace Private Limited. The BrahMos is a short-range ramjet supersonic cruise missile. It can be launched from aircraft, land, submarines or ships and has been developed at a low budget of \$ 300 million.

And, as has been reported by Financial Express Online, under the IGA which was signed in 1998 between the two countries, the issue of exporting to a third country will be decided jointly by the two countries. And the export to a third country will be done after the necessary intergovernmental procedures have been cleared in both countries.

The BrahMos NG, because of its shorter dimensions has greater export potential as it can be compatible with most platforms which are being used by friendly nations.

South American nation Chile has been keen to buy this missile and has been in constant talks with both India and Russia. As per the local laws, BrahMos Aerospace is already registered with Chilean Armed Forces. A top diplomat confirmed that “Since BrahMos NG can be accommodated on sea and air platforms, there has been a lot of interest from the government of Chile and their armed forces for ship and shore-based platforms.”

The NG of BrahMos has a shorter dimension is lighter and mightier to its predecessor variant and can go up to Mach 3.5.

BrahMos Aerospace has been actively participating in various expos in the South American Region including FIDAE show in Chile and is likely to put up a stand at the XII version of EXPONAVAL will be held at Con Naval Base and Valparaiso in Chile.

However, according to sources, “the event which is expected to take place from Dec 1-4 is expected to be postponed due to COVID-19 pandemic.” The Commander of the Chilean Navy has invited the Indian Navy Chief and has invited one of the Indian Navy warships to attend the event at Valparaiso and also M/s BrahMos.”

<https://www.financialexpress.com/defence/india-to-export-brahmos-missiles-to-friendly-nations-say-sources/2065032/>

Indian DRDO plans to develop ‘anti-terrorists vehicle’ but why are experts calling it a ‘wrong step’?

The Indian DRDO (Defence Research & Development Organization) is gearing up to work on the Self-Reliant India Project (Atma Nirbhar Bharat) and one name has created a lot of confusion – Anti-Terrorists Vehicle (ATV).

In a meeting with the Defense Minister Rajnath Singh, India’s Defense Research and Development Organisation (DRDO) has assured the government that they will be able to effectively deliver indigenous defense equipment which were earlier imported.

The Government of India on Sunday, 9th August declared that they would apply a self-imposed embargo on 101 defense equipment. This is an effort to give a secure environment for indigenous defense companies to grow and help India become self-reliant and realize the goal of “Aatm-Nirbhar Bharat”.

After receiving the list of 108 items that the DRDO would design, develop, and manufacture, the organization’s secretary Dr. G Satheesh Reddy tweeted: “This initiative will pave the way for Indian Defence industry to develop many technologies towards building an AtmaNirbhar Bharat.”

Singh told that the research organization had informed him about the systems and subsystems that have been identified as having a potential for the Indian industry. The list includes mini and micro UAVs, mine laying and marking equipment, armored engineering reconnaissance vehicle, and fuel system components for aircraft. However, the inclusion of ‘anti-terrorist vehicle’ abbreviated as ‘ATV’ in the list has raised eyebrows- which is speculated to be misinterpreted for ‘all-terrain vehicle’.

Out of the 108 items, 68 would be developed by the fall of this year. The rest 40 items would be developed by 2021, the report stated.

“The DRDO will provide its support to industries in this development process,” his tweet added. The indigenous industries would manufacture the products with a transfer of technology from the DRDO or team up to develop solutions jointly. Various engineering pioneer institutes like IITs and IISc will help in the process.

“DRDO will also provide support to industries for design, development, and testing of these systems on a requirement basis. All the requirements of these systems by R&D establishments, Armed Forces, and other Security Agencies can be met through development contracts or production orders on a suitable Indian industry.

This will allow DRDO to focus on the design & development of critical and advanced technologies and systems”, the government press release said.

<https://eurasianimes.com/indian-drdo-plans-to-develop-anti-terrorists-vehicle-but-why-are-experts-calling-it-a-wrong-step/>



Wed, 26 Aug 2020

Indian Army organises seminar on “Impact of disruptive technologies on our fighting philosophy in future conflicts”

New Delhi: Warfare has undergone a sea change due to the emergence of new domains of warfare and disruptive technologies. There is a technology tsunami which is underway and it will compel militaries to reorganize and re-structure to fight future wars. In order to address various aspects of the impact of disruptive technologies, a seminar was organized on the “Impact of Disruptive Technologies on Our Fighting Philosophy in Future Conflicts” as part of the Defense and Strategy Seminar 2020 at Army War College, Mhow from 24-25 August 2020. The event was conducted as a webinar due to the COVID-19 restrictions, across 54 locations with 82 outstations spread across the length and breadth of the country.

The panelists of the seminar comprised subject matter experts’ including military, technocrats, academician and speakers from across the spectrum of specialists on the subject to deliberate on the relevant themes and crystallize ideas and develop them into formal papers and Doctrines. Lieutenant General Raj Shukla, GOC-in-C, ARTRAC commenced the proceedings with an incisive and eloquent key note address. Disruptive technologies like Cloud Computing, Artificial Intelligence (AI), Augmented Reality/ Virtual Reality (AR / VR), Robotics, Big Data Analytics, Cyber, Small Satellite, 5G/6G, Quantum Computing and cyber warfare were discussed thread bare during the event. The Seminar was a sounding board for the Indian Army on doctrinal and strategic issues of vital national importance and resulted in obtaining insight into complex themes.

General MM Naravane, the Chief of Army Staff attended the seminar on 25 August 2020 to provide valuable strategic guidance to the Indian Army. The COAS highlighted the impact of disruptive technologies in warfare and war fighting and emphasized that the current modernization drive was focused on upgrading existing weapon systems and platforms, and Indian Armed Forces would have to pay adequate emphasis on the available disruptive technologies that have dual use and are being driven by commercial entities and innovations. He recommended that an overarching national mission to identify the needs and congruence of products into military applications must form part of armed forces modernization strategy.

The seminar was the first virtual initiative of its kind at such a large scale and the COAS complimented Army War College on the successful conduct of the seminar.

<https://indiaeducationdiary.in/indian-army-organises-seminar-on-impact-of-disruptive-technologies-on-our-fighting-philosophy-in-future-conflicts/>

क्या है 'डिसरप्टिव टेक्नोलॉजी' जिसके बारे में आर्मी चीफ ने कहा- भारतीय सेना को इसे अपनाना होगा

माना जाता है चीन को डिसरप्टिव टेक्नोलॉजी में महारत हासिल है। चीनी सेना परंपरगत-युद्ध यानि आमने सामने के युद्ध में इतनी परिपक्व नहीं है इसीलिए तकनीक के सहारे युद्ध लड़ने में विश्वास रखती है।

By नीरज राजपूत

नई दिल्ली: चीन से चल रही तनातनी के बीच भारतीय सेना ने महू स्थित वॉर कॉलेज में 'डिसरप्टिव टेक्नोलॉजी' पर एक बेहद ही अहम सेमिनार का आयोजन किया। इस सेमिनार में खुद थलसेना प्रमुख जनरल एम एम नरवणे भी मौजूद रहे। आपको बता दें कि आर्टिफिशियल इंटेलीजेंस, रोबोट्स, साइबर, 5जी, क्लॉउड कम्प्युटिंग और स्पेस तकनीक को डिसरप्टिव टेक्नोलॉजी की कैटेगरी में रखा जाता है, जिसमें चीनी सेना को बड़ी माहिरत हासिल है।

ये सेमिनार ऐसे समय में आयोजित किया गया जब एक दिन पहले ही चीफ ऑफ डिफेंस स्टाफ (सीडीएस) जनरल बिपिन रावत ने दो टूक कह दिया कि अगर चीन के साथ बातचीत फेल हुई तो भारत का सैन्य कारवाई का विकल्प खुला हुआ है।

इस सेमिनार में बोलते हुए थलसेनाध्यक्ष जनरल नरवणे ने साफ तौर पर कहा कि मौजूदा तकनीक को सेना में सम्मिलित करने की बेहद जरूरत है। इसके तहत मौजूदा हथियार और सैन्य साजो सामान को तकनीकी तौर से अपग्रेड किया जा रहा है। साथ ही इस बात की भी जरूरत है कि नई तकनीकों को ढूंढकर सेना में शामिल किया जाए, फिर भले ही वे 'दुधारी तलवार' ही क्यों ना हों।



थलसेना ने सम्मेलन के बाद मंगलवार को बयान जारी कर कहा कि महू (मध्य प्रदेश) स्थित वॉर कॉलेज में दो दिवसीय (24-25 अगस्त) सेमिनार का आयोजन किया गया। इस सम्मेलन की मुख्य थीम था, 'इम्पेक्ट ऑफ डिसरप्टिव टेक्नोलॉजी ऑन फाइटिंग फिलोसोफी इन फ्यूचर कॉन्फ्लिक्ट्स'।

थलसेना के प्रवक्ता, कर्नल अमन आनंद के मुताबिक, आज के समय में वॉरफेयर (युद्धकला) में काफी बदलाव आ चुका है। आज के समय में 'टेक्नोलॉजी की सुनामी' आ चुकी है, जिसके चलते भविष्य के युद्ध के लिए सेनाओं को खुद में बदलाव लाने होंगे। इस सुनामी में वॉरफेयर के नए परिदृश्य तो जुड़ ही गए हैं डिसरप्टिव टेक्नोलॉजी यानि हानिकारक तकनीक भी शामिल है। इसी के लिए भारतीय सेना ने वॉर कॉलेज में इस सेमिनार का आयोजन किया।

यहां पर ये बात दीगर है कि डिसरप्टिव टेक्नोलॉजी में चीनी सेना को महारत हासिल है यानि आर्टिफिशियल इंटेलीजेंस (जैसे ड्रोन-स्वार्मिंग), रोबोट्स, क्लॉउड कम्प्युटिंग, ऑगमेंटेड-वर्चुअल रिएलिटी, बिग डाटा एनेलेटिक्स, क्वांटम कम्प्युटिंग, 5-6जी, साइबर वॉरफेयर और स्मॉल सैटेलाइट्स (स्पेस)। माना जाता है कि चीनी सेना परंपरगत-युद्ध यानि आमने सामने के युद्ध में इतनी परिपक्व नहीं है इसीलिए तकनीक के सहारे युद्ध लड़ने में विश्वास रखती है।

चीन की इस डिसरप्टिव टेक्नोलॉजी को देखते हुए ही भारतीय सेना भी अपने आप को टेक्नोलॉजी-वॉरफेयर के लिए तैयार कर रही है। उसी कड़ी में वॉर कॉलेज में इस सेमिनार का आयोजन किया गया। कोविड प्रोटोकॉल्स को देखते हुए इस सेमिनार को वेबिनार का रूप भी दिया गया और एक साथ 54 अलग अलग लोकेशन्स पर 82 जगहों पर आयोजित

किया गया। इस सम्मेलन में सेना के वरिष्ठ अधिकारियों के साथ साथ टेक्नोक्रेट्स, एकेडेमिशियन और स्पेशलिस्ट व्यक्तियों ने हिस्सा लिया। सम्मेलन में थलसेना की ट्रेनिंग कमान के कमांडर, लेफ्टिनेंट जनरल राज शुक्ला ने भी शिरकत की।

<https://www.abplive.com/news/india/chief-of-army-staff-says-indian-army-will-have-to-adopt-disruptive-technology-1539106>

The Tribune

Wed, 26 Aug 2020

Need to identify dual-use technologies that can be used for military applications: Army Chief

The Army is working on a massive modernisation drive to enhance its combat capabilities in view of the evolving security challenges

New Delhi: Army Chief Gen MM Naravane on Tuesday pitched for carrying out a reality check on military technologies that are required to be fielded operationally in the Indian context.

He said the Indian armed forces would have to pay adequate emphasis on the available “disruptive technologies” that had a dual use and were being driven by commercial entities and innovations.

Addressing a seminar organised by the Army, Gen Naravane said an overarching national mission to identify the needs and congruence of products into military applications must form the modernisation strategy for the armed forces.

His comments came in the backdrop of the Defence Ministry’s renewed emphasis on ensuring self-reliance in defence manufacturing.

“There is a need to carry out a reality check as to which are the technologies that are required to be fielded operationally in the Indian context,” he said at the seminar on ‘Impact of disruptive technologies and fighting philosophy in future conflicts’.

The Army is working on a massive modernisation drive to enhance its combat capabilities in view of the evolving security challenges.

“We have to identify technologies that are feasible to be developed/procured indigenously or in collaboration, considering our indigenous technological base and costs involved in the development,” Gen Naravane said.

“We need to invest in these technologies alone and work in long term for maturing and fielding of these technologies,” he added.

The Army Chief also highlighted the impact of disruptive technologies in warfare and emphasised that the current modernisation drive was focused on upgrading existing weapon systems and platforms.

He recommended that an overarching national mission to identify the needs and congruence of products into military applications must form part of armed forces modernisation strategy, the Army said in a press statement.

Under the theme of disruptive technologies, the seminar deliberated on the application of artificial intelligence, virtual reality, robotics, big data analytics, quantum computing and cyber warfare in the military sphere in India.

Two weeks ago, Defence Minister Rajnath Singh had announced a ban on import of 101 military systems and weapons like transport aircraft, light combat helicopters, conventional



Army Chief Gen MM Naravane. File Photo

submarines and cruise missiles in a staggered manner by 2024 to promote India's domestic defence industry.

Following the announcement, the defence ministry has initiated a series of measures to promote the domestic defence industry.

The Defence Ministry has set a goal of a turnover of \$25 billion (Rs 1.75 lakh crore) in defence manufacturing in the next five years that included an export target of \$5 billion (Rs 35,000 crore) worth of military hardware. PTI

<https://www.tribuneindia.com/news/nation/need-to-identify-dual-use-technologies-that-can-be-used-for-military-applications-army-chief-131294>



Wed, 26 Aug 2020

India deploys troops with shoulder-fired missiles in key areas in eastern Ladakh

The IAF has already moved a sizeable number of its frontline fighter jets including Sukhoi 30 MKI, Jaguar and Mirage 2000 aircraft to several key air bases including Leh and Srinagar

The Indian Army has further bolstered its combat readiness in eastern Ladakh by deploying troops with shoulder-fired missiles in several sensitive areas in the backdrop of increasing activities by Chinese helicopters in the region, official sources said on Tuesday.

These missiles have a range of two to five km and they are capable of bringing down low flying helicopters and aircraft, they added.

The deployment of a sizeable number of troops with shoulder-fired missiles came as part of India's overall approach to significantly ramp up combat capabilities of the Army and the Indian Air Force (IAF) in eastern Ladakh.

There has been an increase in activities by Chinese air force in the region in the last few weeks following which the Army has decided to deploy troops with shoulder-fired missiles, the sources said.

The Indian Army has significantly increased deployment of troops and weaponry including tanks and artillery guns in various sensitive sectors along the Line of Actual Control (LAC) in the last few weeks.

The IAF has also significantly enhanced deployment of its frontline jets, attack helicopters and transport fleet in all its key bases guarding the airspace along the LAC.

It has enhanced deployment of its air defence systems in the region.

The IAF has already moved a sizeable number of its frontline fighter jets including Sukhoi 30 MKI, Jaguar and Mirage 2000 aircraft to several key air bases including Leh and Srinagar.

It has also deployed Apache attack choppers and Chinook heavy-lift helicopters to transport troops to various forward locations.

The frontline fighter jets have increased their sorties in Ladakh and nearby areas.

India and China have held several rounds of military and diplomatic talks in the last two-and-half months but no significant headway has been made in resolution of the border row in eastern Ladakh.

The formal process of disengagement of troops began on July 6, a day after a nearly two-hour telephonic conversation between National Security Advisor Ajit Doval and Chinese Foreign Minister Wang Yi on ways to bring down tensions in the area.

However, the process has not moved forward since mid-July.

The Chinese People's Liberation Army has pulled back from Galwan Valley and certain other friction points but the withdrawal of troops has not moved forward in Pangong Tso, Depsang and a couple of other areas, sources said.

In the five rounds of Corps Commander-level talks, the Indian side has been insisting on complete disengagement of Chinese troops at the earliest, and immediate restoration of status quo ante in all areas of eastern Ladakh prior to April.

Even as both sides have been engaged in diplomatic and military talks, the Indian Army is making elaborate preparations to maintain its current strength of troops in all key areas in eastern Ladakh in the harsh winter months.

<https://www.financialexpress.com/defence/india-deploys-troops-with-shoulder-fired-missiles-in-key-areas-in-eastern-ladakh/2065447/>

hindustantimes

Wed, 26 Aug 2020

Stand-off with PLA pushes India to go for new snow-free axis to Ladakh

The project to build a third road to Ladakh is targeted to be completed in two years.

It requires a 4.5 km tunnel to be built under Shingo La, a high mountain pass at 16,570 feet on the border between Ladakh and Himachal Pradesh

By Shishir Gupta

New Delhi: India's national security planners are pushing hard to complete an all-weather strategic route to Ladakh that will link Darcha in Himachal Pradesh to Nimu via Padum in Kargil's Zaskar valley, people familiar with the matter said. Nimu is 35 kilometres from Leh town and headquarters of XIV Corps responsible for the defence of East Ladakh and Siachen Glacier.

This would be the first all-weather route to Ladakh that is already connected by two other routes; the first via Zoji La in Jammu and Kashmir and the second, via Himachal's Manali-Upshi-Leh axis. The 9.02 kilometre Atal tunnel at Rohtang La, which will reduce the distance between Manali and Leh by 46 km, is set to become operational next month.

Senior military commanders said the third route to feed Ladakh by road is urgently needed given how Pakistan and its all-weather friend, China were eyeing the Siachen Glacier and Daulat Beg Oldie.

The defence ministry's road project is being given its hardest push by road and highways minister Nitin Gadkari and his colleague Gen VK Singh after China provoked a standoff along the Line of Actual Control in East Ladakh and started mobilising troops in depth areas. New Delhi perceives Beijing's reluctance to disengage despite reminders as an effort to set a new normal at the border.

Officials said the third route requires upgrading the Darcha-Padum-Nimu trekking route into a metalled road and building a 4.5 kilometre tunnel under Shingo La on the Darcha-Padum route. The project, which has been in the pipeline for a decade, is scheduled to be completed by the defence ministry within two years.

In an effort to ensure that the project meets its two-year deadline, Gadkari's ministry has proposed that the task to build the tunnel should be given to the company that constructed the 9.02 km tunnel at Rohtang La on the condition that it meets the timeline.

According to military commanders, the need to build the third axis was felt as tunnelling would be required under four more high mountain passes on the existing Manali-Leh route if the road has to be kept open throughout the year. The Atal tunnel at Rohtang La on this route has been built at a height of 10,171 feet and is already the world's longest at this altitude.

The four passes that would require tunnels on the existing Manali-Leh route are at higher altitudes: Baralacha La (16,500 feet), Nakee La (15,547 feet), Lachung La (16,616 feet), and Tanglang La (17,480 feet). These passes are only open for traffic between mid-May to mid-November and covered with deep snow remaining part of the year.

However, the Darcha-Padum-Nimu route requires only a single 4.5 km tunnel through the 16,570 feet Shingo La between Darcha and Padum to ensure that the road is closed only for two months in winter. Darcha is 147 kilometres from Manali and lies on the highway to Leh after Jispa and Keylong across Rohtang La.

The distance between Darcha and Padum is about 148 kilometres with the Zaskar sub-divisional town connected to Kargil via a 230-km long single lane road. Work is already on to construct the Darcha-Padum road with another 260 km road work in progress between Padum and Nimu, the 14 Corps headquarters in Ladakh.

“We are looking to build a road that bisects the Leh-Kargil highway around Lamayuru monastery and connects Darcha via Padum. This road will allow Indian military and the local population to get round-the-year supplies... The route is not under the prying eyes of the Pakistan Army as in Kaksar in Kargil district or the DSDBO (Darbuk-Shyok-Daulat Beg Oldie) route that is under observation of the People’s Liberation Army (PLA),” said a former army chief.

Apart from keeping the supply lines open for the military guarding Siachen, Kargil and DBO sectors, the Darcha-Nimu route will also develop the new union territory of Ladakh to match the aspirations of its people.

<https://www.hindustantimes.com/india-news/india-steps-up-building-new-snow-free-axis-to-ladakh-amid-china-standoff/story-d3wAmIzGliffOpk76jowON.html>



Wed, 26 Aug 2020

Indian Armed Forces to revive 'Project Cheetah': Here's all you need to know

Amid border tensions with China, Indian Armed Forces have decided to revive 'Project Cheetah' after being pending for a long time. Here's everything you need to know about the project
By Arfa Javaid

Amid border tensions with China, Indian Armed Forces have decided to revive 'Project Cheetah' after being pending for a long time. The estimated cost of the project is over 3,500 crores.

About the Project Cheetah

Project Cheetah is to upgrade the drones to carry out offensive operations against the enemy. Under this project, 90 Heron drones of the three services would be upgraded to be armed with laser-guided bombs, air to ground and air-launched anti-tank guided missiles.

How will the project benefit the IAF?

The newly equipped drones will help the IAF in keeping an eye on enemy locations from far distances and will also help them in controlling them through the satellite communication system.

Who will head the Committee?

The proposal of reviving the project has been sent to the newly formed high-level defence ministry committee and will be headed by Ajay Kumar. Ajay Kumar is currently the head of all capital procurements of Indian Army, Navy and Air Force.



Project Cheetah

Why the revival of Project Cheetah has been proposed?

The decision to revive Project Cheetah comes at a time when the country is facing border tensions with China. Recently, a stand-off between India and China took place along the Actual Line of Control in eastern Ladakh.

Heron Unmanned Aerial Vehicle

The Made in Israel, Heron Unmanned Aerial Vehicle is a medium-altitude UAV and can carry up to 250 kg of weight including thermographic camera, airborne ground surveillance visible light, radar systems, etc. The Heron UAV is capable of returning to base autonomously in case of lost communication.

Both the Indian Air Forces and the Indian Army use Israeli equipment including Herons. The Herons UAVs are currently deployed in Ladakh and China borders to keep an eye on the disengagement by Chinese troops and their build-up along the Actual Line of Control in the future.

[https://www.jagranjosh.com/general-knowledge/all-you-need-to-know-about-project-cheetah-1598363889-](https://www.jagranjosh.com/general-knowledge/all-you-need-to-know-about-project-cheetah-1598363889-1)

[1](#)

नवभारत टाइम्स

Wed, 26 Aug 2020

दुश्मन की सबमरीन को ढूँढकर नष्ट करने वाले 'P8I' का नया बेड़ा मिलेगा नेवी को

इंडियन नेवी को 11 नए शिप भी मिलने हैं। यह भारत में ही बन रहे हैं और कोविड-19 की वजह से इनकी डिलीवरी में कुछ देरी होने की संभावना है। मुंबई के मझगांव डॉकयार्ड में 15 बी पूनम पाण्डे

हाइलाइट्स:

- चार P8I आने हैं, पहला आएगा नवंबर तक
- अभी नेवी के पास हैं ऐसे 8 विमान, 4 और आने हैं और 6 का कॉन्ट्रैक्ट अगले साल होगा साइन
- नए शिप के कंस्ट्रक्शन में कोरोना की वजह से हुई कुछ देरी

नई दिल्ली: भारत-चीन तनाव के बीच इंडियन नेवी को पी-8-आई का नया बेड़ा मिलेगा। पी-8-आई टोही विमान है जो गहरे पानी में दुश्मन की सबमरीन को ढूँढकर इसे नष्ट कर सकता है। नेवी के पास अभी इस तरह के 8 टोही विमान हैं, अब नेवी को 4 और पी-8-आई मिलने हैं। इनमें चार में से पहला टोही विमान नवंबर तक आ जाएगा। पी-8-आई अमेरिकी कंपनी से लिए गए हैं।

पहला विमान इसी साल जुलाई तक आना था

इंडियन नेवी ने 4 और पी-8-आई लेने का कॉन्ट्रैक्ट साइन किया था और इन चार में से पहला विमान इसी साल जुलाई तक आना था। हालांकि कोविड-19 की वजह से इसमें देरी हो गई और अब पहला पी-8-आई टोही विमान नवंबर तक आने की उम्मीद है। नेवी के एक अधिकारी ने कहा कि इसके अलावा 6 और पी-8-आई लेने के लिए अप्रूवल मिल गया है और इसका कॉन्ट्रैक्ट अगले साल अगस्त-सितंबर तक साइन हो सकता है।

पी-8-आई विमान की खूबियां

पी-8-आई टोही विमान निगरानी रखने की कैपिबिलिटी बढ़ाएंगे। जिस तरह चीन हिंद महासागर में अपनी मौजूदगी बढ़ा रहा है उसमें नेवी की निगरानी रखने की कैपिबिलिटी बढ़ाना बेहद अहम है। पी-8-आई विमान का रेंज ऑफ



ऑपरेशन 3000 किलोमीटर तक है यानी यह 3000 किलोमीटर दूर तक जाकर अपना मिशन पूरा कर वापस आ सकता है। इसमें लेटेस्ट सर्विलांस कैपेबिलिटी है। यह अपने एरिया ऑफ ऑपरेशन में ज्यादा देर तक रह सकता है। यह 11 से 14 घंटों तक लगातार उड़ान भर सकता है। यह कई बार अपनी उपयोगिता साबित कर चुका है। यह टोही विमान एंटी सबमरीन और एंटी शिप है। यानी दुश्मन की सबमरीन और शिप का पता लगाकर उसे नष्ट कर सकता है।

इंडियन नेवी को मिलेंगे 11 शिप

इंडियन नेवी को 11 नए शिप भी मिलने हैं। यह भारत में ही बन रहे हैं और कोविड-19 की वजह से इनकी डिलीवरी में कुछ देरी होने की संभावना है। मुंबई के मझगांव डॉकयार्ड में 15 बी प्रोजेक्ट के तहत 4 नए शिप बन रहे हैं। इसकी डिलीवरी 2021 की शुरुआत से होनी थी पर यह कुछ डिले हो सकता है। इसमें 4 कोलकाता क्लास फॉलोऑन शिप हैं। यह डिस्ट्रॉयर शिप हैं। इनमें एंटी शिप, एंटी एयर और एंटी सबमरीन कैपेबिलिटी है। इसमें दो हेलिकॉप्टर आ सकते हैं ये वे हेलिकॉप्टर होंगे जिनकी एंटी शिप, एंटी सबमरीन कैपेबिलिटी होगी। इसके अलावा प्रोजेक्ट 17 ए के तहत 7 शिप और बन रहे हैं।

इनकी डिलीवरी 2022 से होनी है

ये शिवालिक क्लास फॉलोऑन शिप हैं। इनकी डिलीवरी 2022 से होनी है। नेवी के एक अधिकारी के मुताबिक कोविड-19 की वजह से इसमें जो देरी हुई है वह कवर हो जाएगी। ये कोलकाता क्लास फॉलोऑन शिप हैं। ये फ्रिगेट क्लास के हैं और साइज में डिस्ट्रॉयर शिप से छोटे होंगे। इसमें एक हेलिकॉप्टर कैरी कर सकते हैं। डिस्ट्रॉयर क्लास फ्रिगेट क्लास से ज्यादा घातक होती है। इसके चार शिप मझगांव डॉकयार्ड में बन रहे हैं और तीन शिप कोलकाता में।

<https://navbharattimes.indiatimes.com/india/indian-navy-to-induct-four-more-p8i-reconnaissance-aircraft/articleshow/77743648.cms>



DEFENCE AVIATION POST
Your Connect To The World Of Defence And Aviation

Wed, 26 Aug 2020

India to upgrade airstrips in Andaman and Nicobar Islands into full-fledged fighter bases to counter China

India is planning to upgrade its airstrips at INS Kohassa, Shibpur located in the north Andaman, and at the Campbell strip in Nicobar into full-fledged fighter bases, reports *Hindustan Times*.

In addition to these, as per the report, the airstrip at Lakshadweep is also set to be upgraded for military operations. While the elevation of the airstrips in Andaman and Nicobar islands into full-fledged fighter bases will secure the Bay of Bengal up to the Malacca Straits, the up-gradation of the airstrip in Lakshadweep will secure the Arabian Sea up to the Gulf of Aden.



The aim behind the move is to operate the facilities in the two island territories as new aircraft carriers for India, extending the reach of the Indian Navy in areas far away from the mainland Indian coastline.

This also gains significance as the both the islands sit on the busiest sea lanes of the world with more than half of the world's trade passing through them.

<https://www.defenceaviationpost.com/2020/08/india-to-upgrade-airstrips-in-andaman-and-nicobar-islands-into-full-fledged-fighter-bases-to-counter-china/>

INS Viraat, decommissioned three years ago, to be dismantled at Alang in Gujarat

Synopsis

INS Viraat, the second Centaur-class aircraft carrier, was in service for 30 years before being decommissioned in March 2017. There were proposals in the past to preserve it as a maritime museum.

Ahmedabad: INS Viraat, the aircraft carrier that served the Indian Navy for 30 years before being decommissioned three years ago, is likely to be towed from Mumbai to Alang in Gujarat's Bhavnagar district next month to be dismantled and sold as scrap, an official said on Tuesday. The longest serving warship, inducted into the Indian Navy in 1987, was bought by Shree Ram Group for Rs 38.54 crore at an auction conducted by the Metal Scrap Trade Corporation Limited last month.

It will likely be towed from the Naval Dockyard in Mumbai to ship breaking yard at Alang next month, the company's chairman Mukesh Patel said.

"We have made the entire payment and received delivery order from the government. So, depending on the monsoon condition, it will be towed to Alang from the Naval Dockyard in Mumbai where it is stationed now, most likely by mid or end of September after receiving the required permission from the Directorate General of Shipping," Patel said.

It will take around three days for the ship to be towed from Mumbai to Alang. It will be scrapped at the country's first certified eco-friendly ship recycling yard in nine to 12 months, he said.

INS Viraat, the second Centaur-class aircraft carrier, was in service for 30 years before being decommissioned in March 2017.

There were proposals in the past to preserve it as a maritime museum.

In July last year, the central government said in Parliament that the decision to scrap INS Viraat was taken in due consultation with the Indian Navy.

The aircraft carrier, in its earlier avatar, had won the Falklands War against Argentina in 1982 for the Royal British Navy.

It weighs about 27,800 tonnes and served in the British Navy as HMS Hermes from November 1959 to April 1984 and after refurbishment, was commissioned into the Indian Navy.

In late 80s, the Indian Navy purchased it at a cost of USD 65 million and it was re-commissioned on May 12, 1987.

INS Viraat is the second aircraft carrier to be broken down in India.

In 2014, INS Vikrant was dismantled in Mumbai.

<https://economictimes.indiatimes.com/news/defence/ins-viraat-decommissioned-three-years-ago-to-be-dismantled-at-alang-in-gujarat/articleshow/77739691.cms>



Aircraft carrier INS Viraat

Auto companies look for big bang in Defense sector to bolster growth prospects

- *It is estimated that around 4 trillion rupees worth of orders will now be placed with the domestic industry over the course of the next few years.*

In the wake of slow business in current times, several auto and auto companies are reportedly looking at exploring prospects in India's defense sector in a bid to reverse falling fortunes. And with the Indian government looking at providing impetus to local manufacturing for the country's defense acquisitions, it may well turn out to be the perfect time for such companies to strike big.

According to a report in Hindustan Times, companies including Force Motors, Bharat Forge, Automotive Axles and Ashok Leyland are looking at a larger foray into India's defense sector. "There will be a number of indigenized developments, which will bolster the defence logistics industry," Vipin Sondhi, managing director and CEO, Ashok Leyland, was quoted as saying in the report. "Now, with clarity on



File photo of Mahindra Armored Light Specialist vehicle used for representational purpose.

the restricted items, the industry will work on strengthening its product offerings."

Defense Minister Rajnath Singh, earlier this month - on August 9, had announced that there will be an imports embargo on as many as 101 items. Of these, 69 items have an embargo till December of 2020 while the remaining have an embargo till December of 2025. This means that local players now have a massive opportunity to step in and rise to the occasion. "This will also offer an opportunity to suppliers to participate with the automakers in the development and growth," Sondhi added.

While several Indian companies have had a presence in the country's defense sector, that share is likely to increase manifold now. As part of the government's '*Atmanirbhar Bharat*' plans, manufacturing locally for India's defense needs forms a core part of its vision.

India is one of the largest importers of defense equipment in the world. While Russia has been the biggest supplier, recent times have seen US and Israel also stepping up exports to India. According to Reuters, Indian defence services had contracted around 3.5 trillion rupees worth of items between April of 2015 and August of 2020 that are now on hold. It is estimated that around 4 trillion rupees worth of orders will now be placed with the domestic industry over the course of the next few years which also means that the Indian auto and auto component sector stand to gain big time.

<https://auto.hindustantimes.com/auto/news/auto-companies-look-for-big-bang-in-defense-sector-to-bolster-growth-prospects-41598322540747.html>

India hopes for early operationalisation of IGA with Russia to manufacture defence spare parts

By Dipanjan Roy Chaudhury

Synopsis

“Despite the complexities of the Coronavirus pandemic, India felt it was very important for us to come and participate in ARMY-2020. We would have liked to have participated with a much bigger delegation,” Indian ambassador to Russia DB Venkatesh Varma told Russian magazine ‘New Defence Order Strategy’.

New Delhi: India has expressed hope that the Inter-Governmental Agreement (IGA) with Russia to manufacture spare parts of defence equipment here will be operationalised soon.

“Despite the complexities of the Coronavirus pandemic, India felt it was very important for us to come and participate in ARMY-2020. We would have liked to have participated with a much bigger delegation,” Indian ambassador to Russia DB Venkatesh Varma told Russian magazine ‘New Defence Order Strategy’.

He pointed out that India would have liked its participation to be bigger at the exhibition, but at least there is some participation and this is of great significance considering the global situation. The Indian Delegation at ARMY-2020 is headed by Raj Kumar, the Secretary of Defence The forum, organised by the Russian Defence Ministry, is being held from August 23-29.

Besides the exhibition the forum is also hosting discussions among global military officials, researchers and defence industry experts about the application of 3D technologies in designing, manufacturing and operating weapons and military equipment,

The Indian Secretary of Defence Production held meetings with the Federal Service for Military-Technical Cooperation (FSMTC), Rosoboronexport and the Russian deputy minister for Industry and Trade Oleg Ryazansev. The Russian Deputy Prime Minister Yury Borisov and the CEO of [Rostec](#) Sergey Chemezov Visited India's pavilion on the first day of the Forum.

"A number of issues were discussed. We were very happy to see the positive support that Russia has extended to India's "Make In India" programme. We have signed an intergovernmental agreement on the manufacturing of spare parts of Russian equipment supplied to India, now these spare parts will be manufactured in India. Now a number of original equipment manufacturers (OEMs) on both sides are in touch with each other; this is a big step forward," Varma pointed out.

India and Russia had signed IGA last year at the annual summit held in Vladivostok for manufacturing of spare parts of Russian defence equipment supplied to India.

With regard to US reservations on S-400 systems that Russia will supply to India, Varma said, "India has a strategic partnership with Russia that has been longstanding. Recently we have established relationship of strategic partnership with the United States. We do not see any contradiction between the two. India would like to promote relations with both Russia and the United States. With respect to defence cooperation, India is an independent country, we make decisions on each case based on its own merits, and I'm sure that both Russia and the United States respect the fact that India makes such decisions in its own interest."

<https://economictimes.indiatimes.com/news/defence/india-hopes-for-early-operationalisation-of-iga-with-russia-to-manufacture-defence-spare-parts/articleshow/77745715.cms>



India and Russia had signed IGA last year at the annual summit held in Vladivostok for manufacturing of spare parts of Russian defence equipment supplied to India.

Wed, 26 Aug 2020

Indian Satellite AstroSat detects extreme UV Light coming from Galaxy 9.3 Billion Light-years Away

It took nearly two years since then to carefully analyse the data to ascertain that the emission is indeed from the galaxy. Since UV radiation is absorbed by the Earth's atmosphere, it has to be observed from space

AstroSat, India's first multi-wavelength satellite, has detected an extreme ultraviolet (UV) light from a galaxy which is 9.3 billion light-years away from Earth, the Inter-University Centre for Astronomy and Astrophysics (IUCAA) said on Monday.

A release from the Pune-based Inter-University Centre for Astronomy and Astrophysics said a global team led by IUCAA scientists have achieved the major breakthrough.

"India's first multi-wavelength satellite, which has five unique X-ray and ultraviolet telescopes working in tandem, AstroSat, has detected extreme-UV light from a galaxy, called AUDFs01, 9.3 billion light-years away from Earth," it said.

The discovery was made by an international team of astronomers led by Dr Kanak Saha, associate professor of astronomy at the IUCAA, and published on August 24 by "Nature Astronomy", the release said.

This team comprised scientists from India, France, Switzerland, the USA, Japan and The Netherlands. Dr Saha and his team observed the galaxy, which is located in the Hubble Extreme Deep field, through AstroSat.

These observations lasted for more than 28 hours in October 2016, the release stated.

But it took nearly two years since then to carefully analyse the data to ascertain that the emission is indeed from the galaxy. Since UV radiation is absorbed by the Earth's atmosphere, it has to be observed from space, it said.

Earlier, NASA's Hubble Space Telescope (HST), a significantly larger than UVIT (UV imaging telescope), did not detect any UV emission (with energy greater than 13.6 eV) from this galaxy because it is too faint, it said.

"AstroSat/UVIT was able to achieve this unique feat because the background noise in the UVIT detector is much less than the ones on HST," said the release quoting Dr Saha.

Dr Saha said they knew it would be an uphill task to convince the international community that UVIT has recorded extreme-UV emission from this galaxy when more powerful HST has not.

Dr Somak Raychaudhury, Director of IUCAA, said, "This is a very important clue to how the dark ages of the universe ended and there was light in the universe. We need to know when this started, but it has been very hard to find the earliest sources of light. I am very proud that my colleagues have made such an important discovery."

<https://www.news18.com/news/buzz/indian-satellite-detects-extreme-uv-light-coming-from-galaxy-9-3-billion-light-years-away-2816525.html>



Representative image / News18.

Global magnetic field of the solar corona measured for the first time

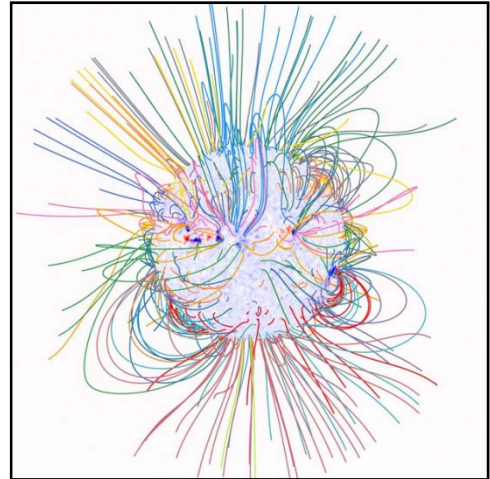
An international team led by Professor Tian Hui from Peking University has recently measured the global magnetic field of the solar corona for the first time. The team used observations from the Coronal Multi-channel Polarimeter, an instrument designed by Dr. Steve Tomczyk at the National Center for Atmospheric Research, USA. Their results have been recently published in *Science* and *Science China Technological Sciences*. Yang Zihao, a first-year graduate student at Peking University, is the first author of both papers.

The Sun is a magnetized star, and its magnetic field plays a critical role in shaping the solar atmosphere. The 11-year solar cycle, the spectacular solar eruptions and the million-degree solar corona are all driven or governed by the evolution of the solar magnetic field. Due to the magnetic coupling of different atmospheric layers, information on the magnetic field of the whole atmosphere is required to study the interplay between solar plasma and the magnetic field. However, routine measurements of the solar magnetic field have only been achieved at the photospheric level (solar surface). More than one century has passed since the first measurement of the solar magnetic field, but we still do not have a precise knowledge of the magnetic field in the upper solar atmosphere, especially the corona, which impedes our complete understanding of solar magnetism and its interaction with solar plasma.

More than 20 years ago, a technique called coronal seismology or magnetoseismology was introduced for coronal magnetic field diagnostics. This method makes use of magnetohydrodynamic (MHD) oscillations or waves that are observed in coronal loops or other coronal structures. From the MHD theory, the observed wave parameters can be used to infer the average magnitudes of the magnetic field in the oscillating structures. However, these oscillations/waves are only occasionally observed in small regions of the corona, and thus their potential for magnetic field diagnostics is limited.

CoMP is a coronagraph with a 20-cm aperture. Using the Fe XIII 1074.7 nm and 1079.8 nm infrared spectral lines, it can observe the solar corona in the range of about 1.05 to 1.35 solar radii from the solar center through imaging spectroscopy and spectropolarimetry. The Doppler image sequence obtained from CoMP observations often reveals the prevalence of propagating periodic disturbances, indicating the ubiquitous presence of transverse MHD waves in the corona. The team has successfully applied the magnetoseismology method to these pervasive waves. They have extended the previously developed wave-tracking technique to the whole field of view, and obtained the global distribution of the wave phase speed. The intensity ratio of the two Fe XIII lines is sensitive to electron density, thus has been used to derive the global map of coronal electron density. Combining the wave-tracking and density diagnostic results, they have successfully mapped the magnetic field in the global corona.

This is the first time that a global map of the coronal magnetic field has been obtained through actual coronal observations, thus marking a leap towards solving the problem of coronal magnetic field measurements. In principle, with this technique, global coronal magnetic field maps could now be routinely obtained, filling in the missing part of the measurements of the Sun's global



Magnetic field of the Sun calculated from the potential field source surface model (Yang et al. 2020, *Sci China Tech Sci*). Credit: School of Earth and Space Sciences, Peking University

magnetism. Together with simultaneously measured photospheric magnetograms, these synoptic coronal magnetograms will provide critical information to advance our understanding of the magnetic coupling between different atmospheric layers as well as the physical mechanisms responsible for solar eruptions and solar cycle.

More information: Z.-H. Yang et al. Global maps of the magnetic field in the solar corona, *Science*, 369, 694 (2020). [DOI: 10.1126/science.abb4462](https://doi.org/10.1126/science.abb4462)

Z.-H. Yang et al. Mapping the magnetic field in the solar corona through magnetoseismology, *Sci China Tech Sci* (2020).

Journal information: *Science*
<https://phys.org/news/2020-08-global-magnetic-field-solar-corona-1.html>



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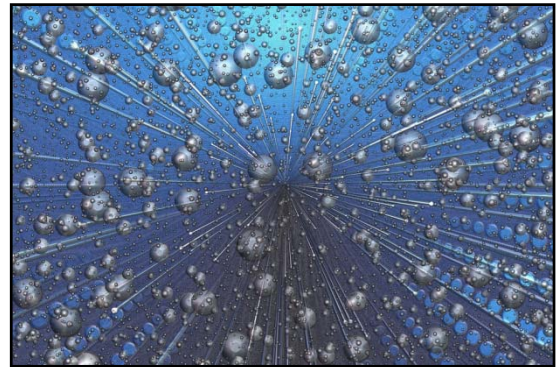
Beating noise via superposition of order

Information can successfully be transmitted through noisy channels using quantum mechanics, according to new research from The University of Queensland and Griffith University.

We all know it's impossible to take a picture through thick smoke or fog—physicists would say, 'it's impossible to send information through a completely noisy channel.'

But UQ physicist Dr. Jacqui Romero from the ARC Centre of Excellence for Engineered Quantum Systems (EQUS) said that you can get your picture if you use quantum mechanics, using a principle called 'superposition of order.'

"This is another example of quantum physics assisting classical communication," Dr. Romero said.



Credit: CC0 Public Domain

"Classically, no information can be transmitted through a single completely noisy channel, let alone two completely noisy channels.

"But with quantum mechanics, adding a second channel actually provides a way to successfully get the information through.

"We show that by combining the noisy channels such that you don't know which noisy channel was applied first, it becomes possible to transmit some information."

UQ Ph.D. student Kaumudibikash Goswami, also at EQUS, said that if you're sending information through two noisy media A and B then you would normally think about doing it in an order: either send the information through A, then B, or vice versa.

"The quantum superposition of order means that we lose this idea of an order of events, or of one event causing another," Mr Goswami said.

"This is what allows us to successfully transmit information through the noisy channels.

"More surprisingly, if one medium is noise-free, then superposition of order can completely nullify the effect of the other noisy medium, leading to perfect transmission of information.

"This can be useful in satellite communication as well as secret sharing."

The research is published in *Physical Review Research*.

More information: Physical Review Research, [DOI: 10.1103/PhysRevResearch.2.033292](https://doi.org/10.1103/PhysRevResearch.2.033292)
<https://phys.org/news/2020-08-noise-superposition.html>

Microwaving new materials

By Sherry Stokes

Microwave ovens are the mainstay of cooking appliances in our homes. Five years ago, when Reeja Jayan was a new professor at Carnegie Mellon University, she was intrigued by the idea of using microwaves to grow materials. She and other researchers had shown that microwave radiation enabled temperature crystallization and growth of ceramic oxides. Exactly how microwaves did this was not well understood, and this mystery inspired Jayan to reengineer a \$30 microwave oven so she could investigate the dynamics effects of microwave radiation on the growth of materials.

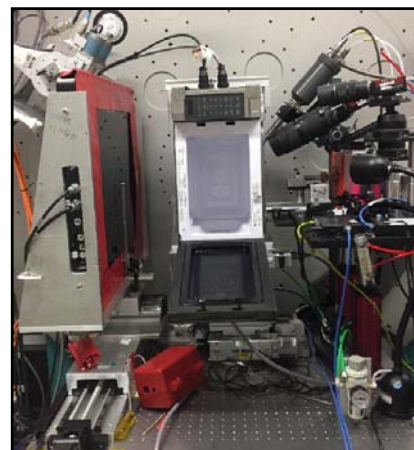
Today, Jayan, who is now an associate professor of mechanical engineering, has made a breakthrough in our understanding of how microwaves affect materials chemistry. She and her student Nathan Nakamura exposed tin oxide (a ceramic) to 2.45 GHz microwave radiation and figured out how to monitor (in situ) atomic structural changes as they occurred. This discovery is important because she demonstrated that microwaves affected the tin oxide's oxygen sublattice via distortions introduced in the local atomic structure. Such distortions do not occur during conventional materials synthesis (where energy is directly applied as heat).

Unlike prior studies, which suffered from the inability to monitor structural changes while the microwaves were applied, Jayan developed novel tools (a custom-designed microwave reactor enabling in-situ synchrotron X-ray scattering) for studying these dynamic, field-driven changes in local atomic structure as they happen. By revealing the dynamics of how microwaves affect specific chemical bonds during the synthesis, Jayan is laying the groundwork for tailor-made ceramic materials with new electronic, thermal, and mechanical properties.

"Once we know the dynamics, we can use this knowledge to make materials that are far away from equilibrium as well as devise new energy efficient processes for existing materials, such as 3-D printing of ceramics," she says. The commercialization of additive manufacturing of metals and plastics is widespread, but the same cannot be said for ceramic materials. 3-D printing of ceramics could advance industries ranging from healthcare—imagine artificial bones and dental implants—to industrial tooling and electronics—ceramics can survive high temperatures that metals can't. However, integrating ceramic materials with today's 3-D printing technologies is difficult because ceramics are brittle, ultrahigh temperatures are required, and we don't understand how to control their properties during printing processes.

Jayan's findings were derived from unconventional experiments that relied on a combination of tools. She used X-ray pair distribution function (PDF) analysis to provide real-time, in situ structural information about tin oxide as it was being exposed to microwave radiation. She compared these results to tin oxide that was synthesized without electromagnetic field exposure. The comparisons revealed that the microwaves were influencing atomic-scale structure by disturbing the oxygen sublattice. "We were the first to prove that microwaves create such localized interactions by devising a method to watch them live during a chemical reaction," says Jayan.

These experiments were extremely difficult to conduct and required a custom-built microwave reactor. (This represented a significant upgrade in cost and engineering compared to the original domestic oven). The reactor was designed in collaboration with Gerling Applied Engineering, and



If you look carefully in the center of this photo, you will see the \$30 microwave oven that Reeja Jayan reengineered to start her early experiments. Credit: Reeja Jayan

the experiments were conducted at the US Department of Energy Brookhaven National Laboratory (BNL). Dr. Sanjit Ghose and Dr. Jianming Bai, lead scientists at BNL, were instrumental in helping Jayan's team integrate the microwave reactor into the beamline.

"Another takeaway from this research is that microwaves can do more than just heating. They can have a non-thermal effect, which can rearrange the structure of materials like a jigsaw puzzle," says Jayan. Building on this concept, she is investigating how to use microwaves to engineer new materials.

The results of Jayan's research were published in the *Journal of Materials Chemistry A*, in "In situ synchrotron pair distribution function analysis to monitor synthetic pathways under electromagnetic excitation." The paper was recognized as part of the 2020 Emerging Investigators Issue of the journal. Jayan's work was supported by a Young Investigator grant from the U.S. Department of Defense, Air Force Office of Scientific Research.

More information: Nathan Nakamura et al. In situ synchrotron pair distribution function analysis to monitor synthetic pathways under electromagnetic excitation, *Journal of Materials Chemistry A* (2020). DOI: [10.1039/D0TA03721D](https://doi.org/10.1039/D0TA03721D)

Journal information: [Journal of Materials Chemistry A](https://phys.org/news/2020-08-microwaving-materials.html)
<https://phys.org/news/2020-08-microwaving-materials.html>



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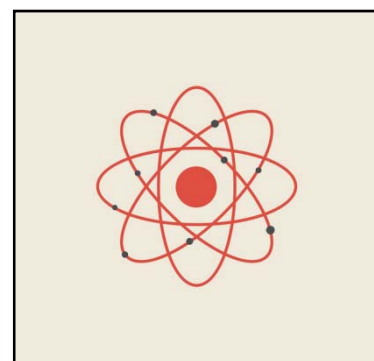
Physicists discover new two-dimensional material

By Bob Whitby

University of Arkansas scientists are part of an international team that has discovered a two-dimensional ferroelectric material just two atoms thick.

Two-dimensional materials are ultrathin membranes that hold promise for novel optoelectronic, thermal, and mechanical applications, including ultra-thin data-storage devices that would be both foldable and information dense.

Ferroelectric materials are those with an intrinsic dipole moment—a measure of the separation of positive and negative charges—that can be switched by an electric field, said Barraza-Lopez. "For example, a single water molecule has an intrinsic electron dipole moment as well, but the thermal motion of individual water molecules under ordinary conditions (for instance, in a water bottle) prevents the creation of an intrinsic dipole moment over macroscopic distances."



Credit: CC0 Public Domain

There has been a vigorous push by researchers to deploy atomically thin, two-dimensional ferroelectrics in the past five years, he said. The new material discovered by the team, a tin selenide monolayer, is only the third two-dimensional ferroelectric belonging to the chemical family of group-IV monochalcogenides that has been experimentally grown thus far. In addition to U of A scientists the team included researchers from the Max Planck Institute for Microstructure Physics in Germany and the Beijing Academy of Quantum Information Sciences in China. The discovery was described in a paper published in the journal *Nano Letters*.

Using a scanning tunneling microscope, researchers switched the electron dipole moment of tin selenide monolayers grown on a graphitic substrate. Calculations performed by U of A graduate student Brandon Miller verified a highly oriented growth of this material on such substrate.

The experimental deployment of these materials helps corroborate theoretical predictions underlying truly novel physical behavior. For example, these semiconducting ferroelectric materials undergo phase transitions induced by temperature in which their intrinsic electric dipole

is quenched (individual intrinsic electric dipoles fluctuate like they do in water); they also host non-linear optical effects that could be useful for ultra-compact optoelectronics applications.

More information: Salvador Barraza-Lopez et al. Water Splits To Degrade Two-Dimensional Group-IV Monochalcogenides in Nanoseconds, *ACS Central Science* (2018). DOI: [10.1021/acscentsci.8b00589](https://doi.org/10.1021/acscentsci.8b00589)

Journal information: [*Nano Letters*](#)

<https://phys.org/news/2020-08-physicists-two-dimensional-material.html>



Wed, 26 Aug 2020

Researchers discover a new way cells can dispose of misfolded proteins

During the process of cellular protein synthesis mistakes can happen. Sometimes, proteins end up being misfolded. They do not shape up into the specific 3-D structure that is required for proper function. Misshaped secreted and transmembrane proteins usually trigger safety mechanisms that dispose of them by shuttling them from their place of synthesis, the endoplasmic reticulum (ER), to the cytosol, where they are degraded in a cellular structure called proteasome.

"Many proteins in the cell have sugar (glycan) chemical groups attached to them. Research has suggested that when these glycosylated proteins are misfolded, removing the N-glycan groups might be one of the steps required for their destruction," said Dr. Hamed Jafar-Nejad, associate professor of molecular and human genetics at Baylor College of Medicine and lead scientist of the study.

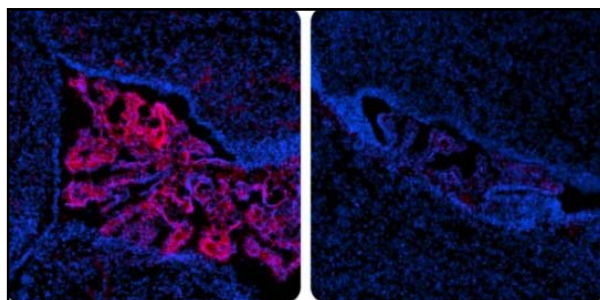
For many years, scientists have thought that once misfolded glycoproteins exit the ER and enter the cytosol, the enzyme N-glycanase 1 (NGLY1) removes their N-glycan groups, thereby facilitating the disposal of the misfolded glycoproteins by the proteasome.

"We found that for a critical signaling protein called BMP4, removal of N-glycans by NGLY1 does not occur after the misfolded molecules have been transferred into the cytosol, but is instead required for the transfer itself to be accomplished," said first author Dr. Antonio Galeone, who was a postdoctoral fellow in Dr. Jafar-Nejad's lab during the development of this project. He is currently in the Department of Biosciences at the University of Milan.

An intriguing finding

In humans, loss-of-function mutations in NGLY1 cause a multisystem developmental disorder called NGLY1 deficiency. Jafar-Nejad, Galeone and their colleagues from other institutions work with fruit fly and mouse models to investigate how NGLY1 mutations lead to developmental defects in various organs, hoping to find ways to treat this rare condition.

Previous findings from the Jafar-Nejad group had shown that the fruit fly equivalent of human NGLY1 is required to promote bone morphogenetic protein (BMP) signaling in a specific developmental context. However, how this actually happened at a molecular level remained a mystery. Moreover, whether mammalian NGLY1 plays a role in BMP signaling was not known.



Credit: Brain sections of wild-type (normal, left) and Ngly1-deficient (right) murine embryos. When the Ngly1-mediated mechanism for disposing of misfolded BMP signaling proteins fails (right panel), brain development can be dramatically affected. The structure in the middle of each panel is the choroid plexus of the fourth ventricle, which contributes to normal brain development. DAPI staining (blue) shows the cell nuclei and active BMP signaling is visualized in red. Note that the absence of Ngly1 (right) leads to a major reduction in the size and red staining (BMP signaling) of the choroid plexus, highlighting the importance of Ngly1 in BMP signaling and choroid plexus development. Credit: Jafar-Nejad lab/*eLife*, 2020.

In the current study, the researchers discovered that NGLY1 promotes the activity of one of the BMP pathway ligands called BMP4, both in fruit flies and mammals, by removing the N-glycan groups from misfolded BMP4 proteins.

But how does the degradation of misfolded BMP4 already removed from the ER contribute to BMP4 signaling mediated by properly folded BMP4 molecules that remain in the ER and are later secreted?

The researchers expected that the elimination of misfolded BMP4 proteins would happen as had been suggested for other proteins: defective BMP4 molecules would move into the cytosol, where NGLY1 removed the N-glycan groups, followed by proteasomal degradation.

Unexpectedly, they found that the N-glycan groups were removed before the defective BMP4 was fully moved from the ER into the cytosol. If the N-glycan groups were not removed, the defective BMP4 molecules did not transfer into the cytosol and accumulated in the ER.

Novel regulation of BMP4 signaling

Intrigued by these findings, Jafar-Nejad, Galeone and their colleagues reviewed the scientific literature and found previous work showing that NGLY1 is not exclusively a free cytosolic enzyme. Specifically, biochemical experiments had suggested that a small fraction of NGLY1 associates with the ER, although the functional significance of this association was not known.

The researchers showed that when misfolded BMP4 forms in the ER, NGLY1 is recruited to the ER through interaction with another protein called VCP.

Using laboratory-made NGLY1 mutations that impair NGLY1's ability to bind VCP and be recruited to the ER without affecting its ability to remove N-glycan groups, the researchers showed that a perfectly functional NGLY1 that cannot be recruited to the ER cannot remove N-glycan groups from misfolded BMP4 molecules. This leads to the accumulation of misfolded BMP4 molecules in the ER and induction of ER stress, both of which may contribute to disease.

"Importantly, pharmacological inhibition of proteasomal function resulted in accumulation of de-glycosylated BMP4 in the cell, but did not impair BMP4 signaling, strongly suggesting that the critical function of NGLY1 in BMP4 signaling is to help remove misfolded BMP4 molecules from the ER," Galeone said. "Once these molecules are in the cytosol, they do not inhibit normal BMP4 signaling anymore, whether they are degraded by the proteasome or not."

These and other experiments led the researchers to propose that in normal conditions, accumulation of misfolded BMP4 in the ER triggers recruitment of NGLY1 to the ER. The ER-associated NGLY1 removes the N-glycan groups from the misfolded BMP4 molecules, promoting their transfer into the cytosol. This in turn allows properly folded BMP4 molecules to traffic from the ER to the extracellular space, where they will conduct their function.

A better understanding of NGLY1 deficiency

Before this study, NFE2L1 was the only biologically relevant, direct target of NGLY1 that had been identified in animals. NFE2L1 is critical in the activation of proteasomal gene expression and can only function when its N-glycans are removed by NGLY1.

The researchers' findings identify a new critical target of NGLY1 and indicate that there is a division of labor in the function of NGLY1: only NGLY1 molecules recruited to the ER can remove glycan groups from BMP4, but NGLY1 molecules in the cytosol can remove glycans from NFE2L1, even when they are not recruited to the ER.

"This suggests that loss of NGLY1 not only leads to the accumulation of misfolded proteins in the cytosol, but can also result in the accumulation of other not-yet-identified NGLY1 targets in the ER," Jafar-Nejad said.

The study also suggests that, in addition to mutations that inactivate NGLY1, mutations that affect NGLY1's ability to be recruited to the ER might also cause some of the characteristics of NGLY1 deficiency observed in human patients.

Therefore, mutations that abolish NGLY1's binding to VCP, but spare its enzymatic activity, might cause a yet-to-be-determined subset of the characteristics of NGLY1 deficiency observed in human patients.

"Identification of a new direct target of NGLY1 with broad roles in mammalian biology may help explain how NGLY1 deficiency affects multiple organs in human patients, and potentially guide the discovery of therapeutic approaches," Galeone said.

BMP4 not only plays critical roles in animal development but also is implicated in certain cancers, such as ovarian and esophageal malignancies. Discovering important pathways involved in rare conditions such as NGLY1 deficiency also can benefit research on common diseases in which those pathways are involved.

More information: Antonio Galeone et al, Regulation of BMP4/Dpp retrotranslocation and signaling by deglycosylation, *eLife* (2020). DOI: [10.7554/eLife.55596](https://doi.org/10.7554/eLife.55596)

Journal information: *eLife*

<https://phys.org/news/2020-08-cells-dispose-misfolded-proteins.html>



Wed, 26 Aug 2020

Enzyme prisons: Cell signaling with just one molecule

A team at the Max Dellbrück Center has answered a question that has puzzled scientists for some 40 years. In the journal *Cell*, the group explains how cells are able to switch on completely different signaling pathways using only one signaling molecule: the nucleotide cAMP. To achieve this, the molecule is virtually imprisoned in nanometer-sized spaces.

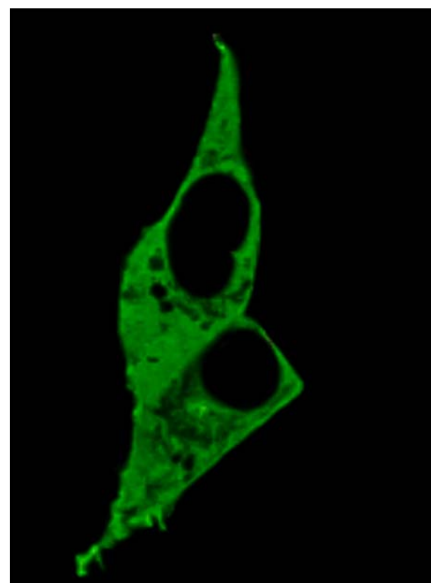
There are up to a hundred different receptors on the surface of each cell in the human body. The cell uses these receptors to receive extracellular signals, which it then transmits to its interior. Such signals arrive at the cell in various forms, including as sensory perceptions, neurotransmitters like dopamine, or hormones like insulin.

One of the most important signaling molecules the cell uses to transmit such stimuli to its interior, which then triggers the corresponding signaling pathways, is a small molecule called cAMP. This so-called second messenger was discovered in the 1950s. Until now, experimental observations have assumed that cAMP diffuses freely—i.e., that its concentration is basically the same throughout the cell—and that one signal should therefore encompass the entire cell.

"But since the early 1980s we have known, for example, that two different heart cell receptors release exactly the same amount of cAMP when they receive an external signal, yet completely different effects are produced inside the cell," reports Dr. Andreas Bock. Together with Dr. Paolo Annibale, Bock is temporarily heading the Receptor Signaling Lab at the Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC) in Berlin.

Like holes in a Swiss cheese

Bock and Annibale, who are the study's two lead authors, have now solved this apparent contradiction—which has preoccupied scientists for almost forty years. The team now reports in



The confocal image shows cells expressing one of the newly designed nanorulers to map nanometer-size cAMP gradients in intact cells. Credit: Paolo Annibale, MDC

Cell that, contrary to previous assumptions, the majority of cAMP molecules cannot move around freely in the cell, but are actually bound to certain proteins—particularly protein kinases. In addition to the three scientists and Professor Martin Falcke from the MDC, the research project involved other Berlin researchers as well as scientists from Würzburg and Minneapolis.

"Due to this protein binding, the concentration of free cAMP in the cell is actually very low," says Professor Martin Lohse, who is last author of the study and former head of the group. "This gives the rather slow cAMP-degrading enzymes, the phosphodiesterases (PDEs), enough time to form nanometer-sized compartments around themselves that are almost free of cAMP." The signaling molecule is then regulated separately in each of these tiny compartments. "This enables cells to process different receptor signals simultaneously in many such compartments," explains Lohse. The researchers were able to demonstrate this using the example of the cAMP-dependent protein kinase A (PKA), the activation of which in different compartments required different amounts of cAMP.

"You can imagine these cleared-out compartments rather like the holes in a Swiss cheese—or like tiny prisons in which the actually rather slow-working PDE keeps watch over the much faster cAMP to make sure it does not break out and trigger unintended effects in the cell," explains Annibale. "Once the perpetrator is locked up, the police no longer have to chase after it."

Nanometer-scale measurements

The team identified the movements of the signaling molecule in the cell using fluorescent cAMP molecules and special methods of fluorescence spectroscopy—including fluctuation spectroscopy and anisotropy—which Annibale developed even further for the study. So-called nanorulers helped the group to measure the size of the holes in which cAMP switches on specific signaling pathways. "These are elongated proteins that we were able to use like a tiny ruler," explains Bock, who invented this particular nanoruler.

The team's measurements showed that most compartments are actually smaller than 10 nanometers—i.e., 10 millionths of a millimeter. This way, the cell is able to create thousands of distinct cellular domains in which it can regulate cAMP separately and thus protect itself from the signaling molecule's unintended effects. "We were able to show that a specific signaling pathway was initially interrupted in a hole that was virtually cAMP-free," said Annibale. "But when we inhibited the PDEs that create these holes, the pathway continued on unobstructed."

A chip rather than a switch

"This means the cell does not act like a single on/off switch, but rather like an entire chip containing thousands of such switches," explains Lohse, summarizing the findings of the research. "The mistake made in past experiments was to use cAMP concentrations that were far too high, thus enabling a large amount of the signaling molecule to diffuse freely in the cell because all binding sites were occupied."

As a next step, the researchers want to further investigate the architecture of the cAMP 'prisons' and find out which PDEs protect which signaling proteins. In the future, medical research could also benefit from their findings. "Many drugs work by altering signaling pathways within the cell," explains Lohse. "Thanks to the discovery of this cell compartmentalization, we now know there are a great many more potential targets that can be searched for."

"A study from San Diego, which was published at the same time as our article in *Cell*, shows that cells begin to proliferate when their individual signaling pathways are no longer regulated by spatial separation," says Bock. In addition, he adds, it is already known that the distribution of cAMP concentration levels in heart cells changes in heart failure, for example. Their work could therefore open up new avenues for both cancer and cardiovascular research.

More information: Andreas Bock et al, Optical Mapping of cAMP Signaling at the Nanometer Scale, *Cell* (2020). DOI: [10.1016/j.cell.2020.07.035](https://doi.org/10.1016/j.cell.2020.07.035)

Journal information: [*Cell*](#)

<https://phys.org/news/2020-08-enzyme-prisons-cell-molecule.html>

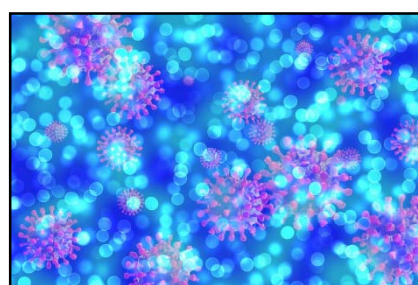


Wed, 26 Aug 2020

Blocking cellular communication stops SARS-CoV-2

In the transmission of signals within the cell which, for example, stimulate cell growth or trigger metabolic processes, phosphate groups play an important biochemical role. The phosphate groups are often attached to proteins or removed to control activity. In this process, a change in the protein triggers the next one and the signal is transmitted in a signaling cascade. The target is usually the cell nucleus, where genes are switched on or off.

For the first time, biochemists and virologists from Goethe University have now succeeded in documenting the full picture of all the communication pathways in a human cell infected with SARS-CoV-2 and observed what changes the infection triggers. To do so, they analyzed all proteins carrying a phosphate group at a given moment in time—what is known as the phosphoproteome. The result: SARS-CoV-2 evidently uses above all those signaling pathways of the host cell where a growth signal is transmitted into the cell from outside. If these signaling pathways are interrupted, the virus is no longer able to replicate.



Credit: Pixabay/CC0 Public Domain

Dr. Christian Münch from the Institute of Biochemistry II at Goethe University explains: "The signaling pathways of the growth factors can be blocked precisely at the point where the signal from outside the cell docks onto a signal receiver—a growth factor receptor. There are, however, a number of very effective cancer drugs that interrupt growth factor signaling pathways slightly further down the cascade, through which the signals of different growth factor receptors are blocked. We've tested five of these substances on our cells, and all five led to a complete stop of SARS-CoV-2 replication."

Professor Jindrich Cinatl from the Institute of Medical Virology at University Hospital Frankfurt says: "We conducted our experiments on cultivated cells in the laboratory. This means that the results cannot be transferred to humans without further tests. However, from trials with other infectious viruses we know that viruses often alter signaling pathways in their human host cells and that this is important for virus replication. At the same time, already approved drugs have a gigantic lead in terms of development so that it would be possible—on the basis of our results and just a few more experiments—to start clinical studies very quickly."

Via INNOVECTIS, the researchers have patented their method of interrupting signaling pathways by means of specific inhibitors in order to treat COVID-19. INNOVECTIS was founded in 2000 as a subsidiary of Goethe University and has operated successfully since then as a service provider in the transfer of academic know-how into business practice.

More information: Kevin Klann et al. Growth factor receptor signaling inhibition prevents SARS-CoV-2 replication, *Molecular Cell* (2020). DOI: [10.1016/j.molcel.2020.08.006](https://doi.org/10.1016/j.molcel.2020.08.006)

Journal information: [Molecular Cell](https://www.molecularcell.com)

<https://phys.org/news/2020-08-blocking-cellular-sars-cov-.html>

Effectiveness of cloth masks depends on type of covering

Months into the COVID-19 pandemic, wearing a mask while out in public has become the recommended practice. However, many still question the effectiveness of this.

To allay these doubts, Padmanabha Prasanna Simha, from the Indian Space Research Organisation, and Prasanna Simha Mohan Rao, from the Sri Jayadeva Institute of Cardiovascular Sciences and Research, experimentally visualized the flow fields of coughs under various common mouth covering scenarios. They present their findings in the journal *Physics of Fluids*.

"If a person can reduce the extent of how much they contaminate the environment by mitigating the spread, it's a far better situation for other healthy individuals who may enter places that have such contaminated areas," Simha said.

Density and temperature are intricately related, and coughs tend to be warmer than their surrounding area. Tapping into this connection, Simha and Rao utilized a technique called schlieren imaging, which visualizes changes in density, to capture pictures of voluntary coughs from five test subjects. By tracking the motion of a cough over successive images, the team estimated velocity and spread of the expelled droplets.

Unsurprisingly, they found N95 masks to be the most effective at reducing the horizontal spread of a cough. The N95 masks reduced a cough's initial velocity by up to a factor of 10 and limit its spread to between 0.1 and 0.25 meters.

An uncovered cough, in contrast, can travel up to 3 meters, but even a simple disposable mask can bring this all the way down to 0.5 meters.

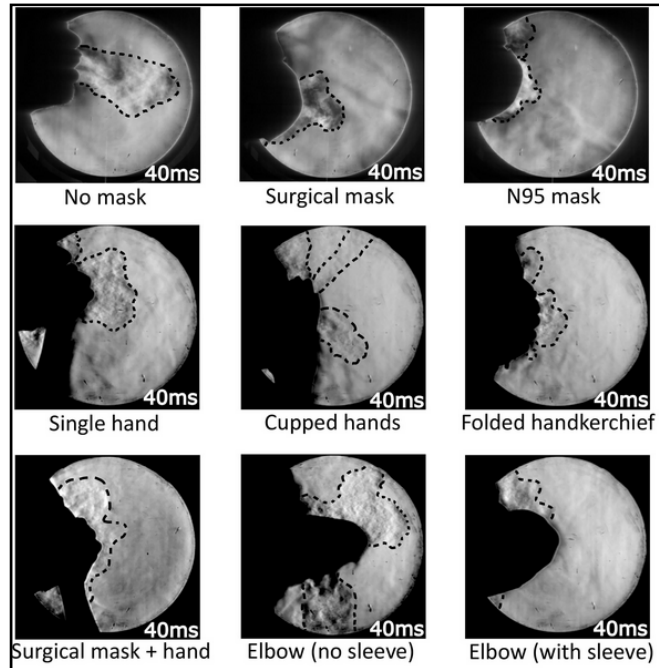
"Even if a mask does not filter out all the particles, if we can prevent clouds of such particles from traveling very far, it's better than not doing anything," said Simha. "In situations where sophisticated masks are not available, any mask is better than no mask at all for the general public in slowing the spread of infection."

Some of the other comparisons, however, were striking.

For example, using an elbow to cover up a cough is typically considered a good alternative in a pinch, which is contradictory to what the pair found. Unless covered by a sleeve, a bare arm cannot form the proper seal against the nose necessary to obstruct airflow. A cough is then able to leak through any openings and propagate in many directions.

Simha and Rao hope their findings will put to rest the argument that regular cloth masks are ineffective, but they emphasize that masks must continue to be used in conjunction with social distancing.

"Adequate distancing is something that must not be ignored, since masks are not foolproof," Simha said.



Schlieren images of coughs with varying degrees of face covering. Credit: Padmanabha Prasanna Simha, Indian Space Research Organisation

More information: "Universal trends in human cough airflows at large distances," *Physics of Fluids* (2020). DOI: [10.1063/5.0021666](https://doi.org/10.1063/5.0021666)

Journal information: *Physics of Fluids*
<https://phys.org/news/2020-08-effectiveness-masks.html>

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IIT Guwahati research on Covid-19 detection sensor to be presented at BRICS conclave in Sept

By Kangkan Kalita

Guwahati: A research carried out by IIT Guwahati scholar Sayantan Sinha on a sensor which can detect the Covid-19 virus will be showcased at the BRICS-Young Scientist Conclave (YSC)-2020 to be organized by Russia in September.

The research, which has been selected by the central department of science and technology, was supervised by eminent scientist Subhendu Sekhar Bag.

Elaborating on the research, Sayantan their project — which is a proposed peptide-based biosensor — will be capable of detecting the novel coronavirus in any environmental or biological sample. This sensor will thus remove the need of carrying out rapid antigen or RT-PCR tests which are much more costlier. As per his estimates, the sensor will cost around Rs 50.

“No sample preparation is needed. It is a ready technology. If such a sensor can be developed, it can be applied and used by everyone. irrespective of knowledge and proficiency. The project is designed in such a way that it would be well accepted and understood by the masses. The ultimate goal is to develop the prototype as a spray. This spray will be formulated based on our sensor molecule, which, when sprayed on the infected surface can detect the virus,” he told TOI.

The project titled “Development of a Fluorescent Peptide based sensor for rapid and specific detection of SARS-CoV-2 in Environment” aims at developing a biosensor that will detect SARS-CoV-2 in the outer environment.

At a time when the entire world is fighting against the deadly virus, detection of it has become a necessity. Presently, most detection protocols, procedures, sensors and kits are focused towards detection of the viral RNA (which is indicated by isolation of RNA from the virus during testing), but these techniques are expensive, laborious and needs special expertise and often fail to give results instantly.

The idea of the BRICS Young Scientist Forum was adopted at the 2nd BRICS Science, Technology, and Innovation ministerial meeting. BRICS-YSC-2020 is one of the most reputed meet of young scientists, representing their country at the forum. Every year, 21 participants are selected from India. This time, 20 young scientists have been selected to represent India at the BRICS platform.

“I have been selected in the category of four young innovators. My project is assigned to the thematic area Ecology (section: chemical biology),” Sayantan, a final year PhD student at the Chemical Biology Laboratory and Center for the Environment at IIT Guwahati, said.

BRICS YSC-2020 is tentatively scheduled to be held at Chelyabinsk in Russia between September 7 and 11.

“My project is assigned to the thematic area Ecology under section chemical biology. My competition was even tougher than the others, as only two positions have been assigned for young innovators. The mode of selection was based on academic profile and research contributions as well as the merit of submitted research project proposal in respective fields,” he added.

<https://timesofindia.indiatimes.com/home/education/news/iit-guwahati-research-on-covid-19-detection-sensor-to-be-presented-at-brics-conclave-in-sept/articleshow/77737337.cms>

Hepatitis drugs can help treat Covid-19, get hospitalised patients discharged early: Study

New research has added to the growing body of evidence that sofosbuvir and daclatasvir, a drug combination commonly used for the treatment of hepatitis C, can improve clinical outcomes in patients with moderate or severe COVID-19.

Three studies, published in *Journal of Antimicrobial Chemotherapy*, researched the use of sofosbuvir and daclatasvir for the treatment of COVID-19.

These three studies come from Iran, which has developed its own pill containing sofosbuvir and daclatasvir, and is in a position to test this in a large clinical trial as Iran is a massively impacted country, reporting some 2,500 cases and 200 deaths a day.

"Despite the encouraging initial results, it is too early to reach a verdict. Larger, well-designed studies are required to confirm our results," said Shahin Merat, the lead author of one of the *Journal of Antimicrobial Chemotherapy* articles, from Tehran University in Iran.

Thus far, no effective antiviral therapy has been found to treat COVID-19. The aim of the trials was to assess if the addition of sofosbuvir and daclatasvir improved clinical outcomes in patients with moderate or severe COVID-19.

In one trial, researchers recruited 66 patients and allocated them to either the treatment group or the control group. The study found that clinical recovery within 14 days was achieved by 88 per cent in the treatment group and 67 per cent in the control group. The treatment group had a significantly shorter median duration of hospitalisation (six days) than the control group (eight days).

In another study, subjects suffering from COVID-19 were divided into two groups, with one group receiving ribavirin and the other receiving sofosbuvir/daclatasvir. All participants also received the recommended national standard treatment which, at that time, was lopinavir/ritonavir and single-dose hydroxychloroquine.

The results indicated that the median duration of stay was five days for the sofosbuvir/daclatasvir group and nine days for the ribavirin group. The mortality in the sofosbuvir/daclatasvir group was six per cent and 33 per cent for the ribavirin group. The relative risk of death for patients treated with sofosbuvir/daclatasvir was 0.17 per cent.

The results of these studies suggest that the addition of sofosbuvir and daclatasvir to standard care may reduce the duration of hospital stays for COVID-19 patients compared to standard care alone.

Earlier, a study published in the journal *The Lancet*, had found that hepatitis C virus drugs may be effective in treating patients with COVID-19.

<https://weather.com/en-IN/india/coronavirus/news/2020-08-25-hepatitis-drugs-can-help-treat-covid-19-finds-new-research>

Covid-19: Scientists decode how severe viral infection causes immune system ‘exhaustion’

Scientists have identified mechanisms behind the deterioration of the immune system in response to severe viral infections, an advance that may lead to the development of novel therapeutics for diseases like Covid-19

Melbourne: Scientists have identified mechanisms behind the deterioration of the immune system in response to severe viral infections, an advance that may lead to the development of novel therapeutics for diseases like Covid-19.

The study, published in the journal Nature Immunology, noted that severe viral infections cause impairments to some components of the immune system such as the T cells in a process called immune ‘exhaustion’.

According to the researchers, including those from the University of Melbourne in Australia, this process has also been reported in patients with severe Covid-19.

They said overcoming immune exhaustion is a major goal for the development of new therapies for severe viral infections.

While earlier studies had shown that during severe infections, T cells lost their function slowly, and over long periods of time, the current study found that they can be impaired within just a few days.

In the research, the scientists also identified several new mediators of immune exhaustion that maybe targeted in new therapies.

“This is an exciting finding, particularly in the context of Covid-19 as one of the big questions is why some people get severely sick, while others experience mild disease,” said study co-author Daniel Utschneider from the University of Melbourne.

“We looked at both mild and overwhelming Lymphocytic Choriomeningitis Virus infections in mice, which serves as a model for severe viral infections in humans, early after onset of disease, and identified striking differences at the molecular and functional level,” Utschneider said.

The researchers demonstrated that in response to overwhelming infections that are difficult to eliminate and may become chronic, T cells down-regulate their function within days. However, they said the T cells responding to a weaker infection remained highly functional.

“These findings are extremely exciting. Our data show that T cells could be manipulated during early stages of severe viral infection to improve their activity,” said Axel Kallies, another co-author of the study from the University of Melbourne.

<https://www.hindustantimes.com/india-news/covid-19-scientists-decode-how-severe-viral-infection-causes-immune-system-exhaustion/story-z5W2gVFICmiL3hiSKKpGPJ.html>



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Nasal COVID-19 vaccine shows better results than injected drug, says research

Washington: Unlike other Covid-19 vaccines, scientists have developed a nasal vaccine that targets the novel Coronavirus, and it can be given in one dose via the nose and has been found to be effective in preventing infection in mice susceptible to the virus.

The researchers found that the nasal delivery route created a strong immune response throughout the body, but it was particularly effective in the nose and respiratory tract, preventing the infection from taking hold in the body.

According to the study, published in the journal Cell, the research team next plan to test the vaccine in non-human primates and humans to see if it is safe and effective in preventing Covid-19 infection.

“We were happily surprised to see a strong immune response in the cells of the inner lining of the nose and upper airway — and profound protection from infection with this virus,” said study senior author Michael S Diamond from the Washington University.

“These mice were well protected from disease. And in some of the mice, we saw evidence of sterilizing immunity, where there is no sign of infection whatsoever after the mouse is challenged with the virus,” Diamond added.

To develop the vaccine, the researchers inserted the virus’ spike protein, which coronavirus uses to invade cells, inside another virus – called an adenovirus – that causes the common cold.

But the scientists tweaked the adenovirus, rendering it unable to cause illness.

The harmless adenovirus carries the spike protein into the nose, enabling the body to mount an immune defence against the SARS-CoV-2 virus without becoming sick.

In another innovation beyond nasal delivery, the new vaccine incorporates two mutations into the spike protein that stabilize it in a specific shape that is most conducive to forming antibodies against it.

The researchers compared this vaccine administered to the mice in two ways — in the nose and through intramuscular injection.

While the injection-induced an immune response that prevented pneumonia, it did not prevent infection in the nose and lungs.

Such a vaccine might reduce the severity of Covid-19, but it would not totally block infection or prevent infected individuals from spreading the virus.

In contrast, the nasal delivery route prevented infection in both the upper and lower respiratory tract — the nose and lungs — suggesting that vaccinated individuals would not spread the virus or develop infections elsewhere in the body.

The researchers said the study is promising but cautioned that the vaccine so far has only been studied in mice.

“In these mouse models, the vaccine is highly protective and we’re looking forward to beginning the next round of studies,” the study authors wrote.

(With inputs from IANS)

<https://kalingatv.com/nation/nasal-covid-19-vaccine-shows-better-results-than-injected-drug-says-research/>

Infection in recovered covid patients and its implication on vaccine development

By Neetu Chandra Sharma

- **Researchers also said there was evidence that some recovered patients of covid-19 have waning antibody level after few months**

New Delhi: As several cases of coronavirus reinfection among recovered patients come to light from across the world, scientists have raised concern over its implications on vaccine development and delivery.

Researchers from Department of Microbiology, Li Ka Shing Faculty of Medicine, The University of Hong Kong (HKU), on Monday documented first instance of human re-infection by SARS-CoV-2 by using the next generation sequencing. The team showed that the genome sequence of the virus strain in the first episode of covid-19 infection is clearly different from the genome sequence of the virus strain found during second episode of infection.



Since the immunity can be short lasting after natural infection, scientists said vaccination should also be considered for those with one episode of infection.

Researchers also said there was evidence that some recovered patients of covid-19 have waning antibody level after few months. Since the immunity can be short lasting after natural infection, scientists said vaccination should also be considered for those with one episode of infection.

“Our findings suggest that SARS-CoV-2 may persist in the global human population as is the case for other common-cold associated human coronaviruses, even if patients have acquired immunity via natural infection,” the researchers said.

While India has large number of recovered covid-19 patients, the country might have to think vaccinating them as well. There is little information about the virus and longevity of the immunity after its infection or reinfection is not known.

“One of the many unknowns about this virus is how much protection does an infection produce and for how long. Experience from other human coronaviruses indicate that infection with SARS-CoV-1 (the virus that caused SARS), concentrations of IgG (antibodies) remained high for approximately 4-5 months before subsequently declining slowly during the next 2-3 years. Thus, possibly opening a window for re-infection,” said Lalit Kant, a scientist and former head of epidemiology and communicable diseases at the Indian Council of Medical Research (ICMR).

However, the immune response to covid-19 is not yet fully understood and definitive data on post-infection immunity and its duration are lacking, he added.

Kant said limited data on antibody responses to SARS-CoV-2 and one small animal model study, suggest that recovery from covid-19 might confer immunity against reinfection, at least temporarily.

“But not all animal studies necessarily apply to humans. Initial vaccine related studies show the vaccine produced antibodies and killer T-cells to combat the infection. The duration of these responses is being studied in vaccine trials,” said Kant.

In India, there are at least five domestic vaccine manufacturers that are working on indigenous vaccines—Serum Institute of India, Pune; Bharat Biotech, Hyderabad; Zydus Cadila, Ahmedabad; Gennova Biopharmaceuticals, Pune; and Biological E, Hyderabad.

“Whole dead virus vaccine possibly cover all strains but mutated strains keep coming then every time new vaccine required beside old one like flu vaccine,” said Jugal Kishore, professor and head, department of community medicine, Safdarjung Hospital.

“But whole virus may not be specific and may have some side effects. But we really don't know much till some results of vaccine come,” he said.

According to sources, India is also in touch with Russia for a vaccine the country has developed. However, there is little clarity over its efficacy in Indian population. Moreover, the delivery of vaccine is also clear so far. Government has said it is considering various benchmarks, such as cost, ease of administration and efficacy to determine the covid-19 vaccine candidates for mass immunisation in India.

“Covid-19 is a new disease. So far there is no scientific evidence that the vaccine will have to be administered every year. We don't know if SARS CoV-2 virus will behave like Flu virus for which new vaccines are to be continuously developed,” said Naveen Thacker, former civil society organisations representative, Gavi Board, the vaccine alliance.

“The immunity in covid-19 will also be mediated through memory B cells and T cells immunity also comes in play so drop in antibodies level or a case report of reinfection should not be a cause of concern,” he said.

<https://www.livemint.com/science/health/infection-in-recovered-covid-patients-and-its-implication-on-vaccine-development-11598341513239.html>

live**mint**

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Oxford Covid-19 vaccine: Serum Institute begins clinical trial in India

By Leroy Leo

- *The 'Covishield' vaccine's trials begin with the first patients screened by Bharati Vidyapeeth Deemed University (BVDU) Medical College and Hospital in Pune*
- *The hospital aims to have about 300-350 participants as part of the trial*

New Delhi: Serum Institute of India's trial for 'Covishield' vaccine developed by the University of Oxford started on Tuesday, with the first patients screened by Bharati Vidyapeeth Deemed University (BVDU) Medical College and Hospital in Pune.

“Today, we have screened some patients. Tomorrow, we will get their covid antibody test reports, and if they come negative, we will inoculate with the 'Covishield' vaccine,” Sanjay Lalwani, principal investigator for the hospital told Mint, adding that the hospital aims to have about 300-350 participants as part of the trial.

Indian Council of Medical Research director general Balram Bhargava on Tuesday confirmed that the trials for the 'Covishield' vaccine, jointly developed by the University of Oxford and Astrazeneca plc, have begun. ICMR is the secondary sponsor to the phase 2 and 3 trial of around 1,600 patients.

Screening and enrolment of participants in the trial is only done after getting approval from the ethics committee of the hospital. So far, seven hospitals, including BVDU, of the 17 sites have received ethics committee approval, according to the government's clinical trial registry.

Other hospitals that received ethics committee approval, which include Jehangir Clinical Development Center and KEM Hospital in Pune, King George Hospital at Visakhapatnam, Rajendra Memorial Research Institute of Medical Sciences at Patna, are expected to start screening



The Oxford covid vaccine is seen one of the leading vaccine candidates.

of patients later this week. About two or three days after the approval, the hospitals will start giving doses of the vaccine, a source in the know said, requesting anonymity.

Serum Institute, which is the world's largest vaccine manufacturer by volume, had in June signed an agreement with British-Swedish multinational pharmaceutical company AstraZeneca to supply an additional 1 billion doses, principally for low- and middle-income countries.

As it is a contract manufacturer of the vaccine, the company had secured the Indian drug regulator's approval to conduct a phase II and III trial as per regulations.

Pune-based Serum Institute is the third firm to conduct human trials of a covid-19 vaccine in India after Bharat Biotech (for Covaxin) and Zydus Cadila (for ZyCoV-D) started phase I and II trails last month.

Interim data from a clinical study published in The Lancet journal last month showed that the Oxford vaccine candidate was safe and provided dual immunity against the highly infectious respiratory disease.

The Bill & Melinda Gates Foundation will provide at-risk funding of \$150 million to support Serum Institute of India's manufacturing of two promising vaccines by University of Oxford and Novavax under the condition that the Pune-based firm prices the two vaccines at a maximum of \$3 per dose.

<https://www.livemint.com/news/india/oxford-covid-19-vaccine-serum-institute-begins-clinical-trial-in-india-11598365676108.html>

