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समाचार पत्रों से चयित अंश Newspapers Clippings

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COVID-19: DRDO's Contribution*Tue, 15 Sept 2020*

MPs को लोकसभा स्पीकर ने भेजी DRDO की किट, इसमें मास्क और सैनिटाइजर के अलावा ये चीजें हैं मौजूद

कोविड संकट को देखते हुए मानसून सत्र में कई बदलाव किए गए हैं। कोरोना वायरस का संक्रमण सदन के अंदर ने फैले इसके लिए कई उपाय किए गए हैं।

अखिलेश शर्मा Edited By नितेश श्रीवास्तव

नई दिल्ली: कोविड संकट को देखते हुए मानसून सत्र में कई बदलाव किए गए हैं। कोरोना वायरस का संक्रमण सदन के अंदर ने फैले इसके लिए कई उपाय किए गए हैं। सोशल डिस्टेंसिंग और मास्क की अनिवार्यता के साथ लोकसभा अध्यक्ष की तरफ से एक पत्र और DRDO किट सभी सांसदों को भी भेजी गया है। इस किट में मास्क, सैनिटाइजर और रोग प्रतिरोधक क्षमता बढ़ाने वाली चाय और कोविड से बचाव का मैनुअल है।

लोकसभा अध्यक्ष द्वारा भेजी गई किट के साथ पत्र के जरिए सांसदों से सदन की कार्यवाही के दौरान सहयोग की अपेक्षा की गई है। पत्र में लिखा है कि संकट की स्थिति को देखते हुए मानसून सत्र 14 सितंबर से 1 अक्टूबर तक चलेगा। संसद का सत्र असाधारण परिस्थितियों के बीच संवैधानिक दायित्वों की पूर्ति के लिए किया जा रहा है। लिहाजा कोरोना से बचाव को देखते हुए लोकसभा सचिवों द्वारा आपकी सुरक्षा के लिए कुछ इंतजाम किए गए हैं। साथ ही आपको एक DRDO की किट भेजी जा रही है, जिसमें मास्क, सैनिटाइजर और इम्यूनिटी बढ़ाने वाली चाय शामिल है।

बता दें कि कोरोना संकट के बीच संसद में आज से 18 दिनों के मानसून सत्र की शुरुआत हुई। सत्र में सीमा पर चीन के साथ गतिरोध, कोविड-19 का प्रकोप से निपटने में सरकार की नीतियां, आर्थिक चुनौतियां जैसे मुद्दे छाप रहने की संभावना है। जहां एक तरफ विपक्षी दल इन सभी महत्वपूर्ण मुद्दों पर चर्चा कराना चाहते हैं तो वहीं दूसरी तरफ सरकार की नजर करीब दो दर्जन विधेयकों को पारित कराने पर है।

<https://khabar.ndtv.com/news/india/monsoon-session-lok-sabha-speaker-sends-drdo-kit-for-mps-amid-corona-crisis-2294934>

Immunity tea bags, sanitisers, masks in MPs' Covid Kit, sent by speaker

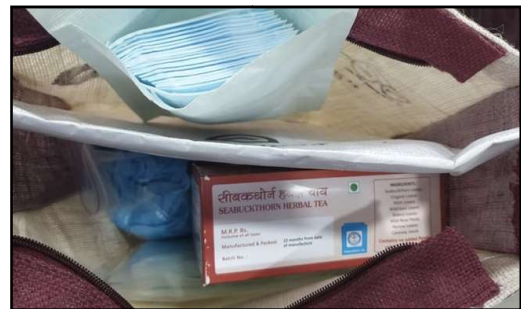
Each kit contains 40 disposable masks, five N-95 masks, 20 bottles of sanitisers of 50 ml each, face shields, 40 pairs of gloves, a touch-free hook to open and close doors without touching them, herbal sanitation wipes and tea bags to enhance immunity

By Akhilesh Sharma, Edited by Shylaja Varma

New Delhi: All parliamentarians attending the monsoon session have been given COVID-19 kits to protect them from the raging pandemic. The 18-day session, which began today, will have numerous safety measures.

The kits, provided by the DRDO (Defence Research and Development Organisation), were sent to the MPs on Sunday by Lok Sabha Speaker Om Birla.

Each kit contains 40 disposable masks, five N-95 masks, 20 bottles of sanitisers of 50 ml each, face shields, 40 pairs of gloves, a touch-free hook to open and close doors without touching them, herbal sanitation wipes and tea bags to enhance immunity. Each kit also contains a Covid safety manual for the MPs.



The kits, provided by the DRDO, were sent to the MPs on Sunday by Lok Sabha Speaker Om Birla.

"As you are aware, the Monsoon Session of Parliament is commencing on 14th September 2020 and will last up to October 1 without any holiday in between. This session is being held in extraordinary circumstances. While discharging our Constitutional responsibilities, we also have to comply with all the Covid-19 related guidelines," Mr Birla said in a letter to parliamentarians.

"I am sending a sanitisation kit along with this letter for your use. The kit provided by DRDO contains sanitisers, face masks, face shields, etc. I am sure that I will continue to receive your full cooperation in conducting proceedings of the House," Mr Birla said.

The session is being held amid huge safety measures at the parliament building complex. The measures include seating MPs in a staggered way in chambers of both Houses, as well as galleries to maintain physical distancing, introduction of mobile app for registering of their attendance and seats separated with poly-carbon sheets in the House.

At least seven union ministers have contracted coronavirus and two dozen lawmakers are recovering from it. An MP and several MLAs have died. Around 200 of the 785 MPs are above the age of 65 years, the population vulnerable to coronavirus.

Ahead of the session, all members were requested to get themselves tested for COVID-19 and one of them tested positive.

<https://www.ndtv.com/india-news/parliament-monsoon-session-2020-immunity-tea-bags-sanitisers-masks-in-mps-covid-kit-sent-by-speaker-om-birla-2294959>

नवभारत टाइम्स

Tue, 15 Sept 2020

ब्रह्मोस को और घातक बना रहे भारत-रूस, दुश्मनों के अवाक्स प्लेन का बनेगा 'काल'

New Brahmos Missile: भारत और रूस सुपरसोनिक क्रूज मिसाइल ब्रह्मोस के नए वैरियंट को बना रहे हैं। नई मिसाइल दुश्मन देश के अवाक्स सिस्टम (एयरबोर्न अर्ली वार्निंग एंड कंट्रोल) वाले प्लेन को मार गिराने में कारगर होगी।

By Priyesh Mishra

भारत और रूस सुपरसोनिक क्रूज मिसाइल ब्रह्मोस के नए वैरियंट को बना रहे हैं। नई मिसाइल दुश्मन देश के अवाक्स सिस्टम (एयरबोर्न अर्ली वार्निंग एंड कंट्रोल) वाले प्लेन को मार गिराने में कारगर होगी। अवाक्स सिस्टम को उसके साइज और वजन के हिसाब से भारी और मध्यम श्रेणी के विमानों के ऊपर लगाया जाता है। इसकी मदद से विमान के अंदर बैठे ऑपरेटर्स एक निश्चित दूरी तक हवाई जहाजों और मिसाइलों की उड़ान पर नजर रखते हैं।

2024 तक तैयार हो जाएगी यह मिसाइल

ब्रह्मोस उपक्रम के संयुक्त निदेशक अलेक्जेंडर मिकोशेव ने बताया कि ब्रह्मोस का नया वैरियंट 2024 तक तैयार हो जाएगा। उन्होंने बताया कि नई मिसाइल एक साथ कई निशानों को साधने में सक्षम होगी। उन्होंने पहले ही बताया था कि भारत के स्वदेशी हल्के लड़ाकू विमान तेजस को इस मिसाइल के एयर वैरियंट से लैस किया जाएगा।

ब्रह्मोस की रेंज को बढ़ा रहा है भारत

भारत और रूस पहले से ही इस सुपरसोनिक मिसाइल की रेंज 290 किलोमीटर से बढ़ाकर 600 किलोमीटर करने की योजना पर काम कर रहे हैं। इस मिसाइल की रेंज बढ़ने से भारत की मारक क्षमता में बड़ी वृद्धि होगी। ब्रह्मोस कम दूरी की रैमजेट इंजन युक्त, सुपरसोनिक क्रूज मिसाइल है। इसे पनडुब्बी से, पानी के जहाज से, लड़ाकू विमान से या जमीन से दागा जा सकता है।

क्या होता है रैमजेट इंजन

किसी भी मिसाइल की स्पीड बढ़ाने के लिए अब रैमजेट इंजन का प्रयोग किया जा रहा है। भारत की सबसे तेज मिसाइल ब्रह्मोस में भी यही इंजन लगा हुआ है। इसकी मदद से मिसाइल की स्पीड तीन गुना तक तेज हो जाती है। अगर किसी मिसाइल की क्षमता 100 किमी दूरी तक है तो उसे रैमजेट इंजन की मदद से 320 किमी तक किया जा सकता है।

भारत-रूस ने मिलकर बनाई ब्रह्मोस मिसाइल

ब्रह्मोस सुपर सोनिक क्रूज मिसाइल को रूस की एनपीओ मशीनोस्ट्रॉयेनिया और भारत के रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने संयुक्त रूप से विकसित किया है। यह रूस की पी-800 ऑक्सिड क्रूज मिसाइल की



ब्रह्मोस को और घातक बना रहे भारत-रूस,
दुश्मनों के अवाक्स प्लेन का बनेगा 'काल'

प्रौद्योगिकी पर आधारित है। ब्रह्मोस मिसाइल का नाम भारत की ब्रह्मपुत्र और रूस की मस्कवा नदी पर रखा गया है। इस सुपरसोनिक क्रूज मिसाइल की गति ध्वनि की गति से लगभग तीन गुना अधिक है।

ब्रह्मोस के एयर लॉन्च वर्जन से लैस होंगे ये विमान

ब्रह्मोस मिसाइल के एयर लॉन्च वर्जन को जल्द ही सुखोई 30 एमकेआई और स्वदेशी एलसीए तेजस विमान में लगाया जाएगा। इन विमानों के कई बार इस मिसाइल का फायर टेस्ट किया जा चुका है। हवा से सतह पर मार करने में सक्षम 2.5 टन वजनी ब्रह्मोस मिसाइल की मारक क्षमता 290 किलोमीटर है।

<https://navbharattimes.indiatimes.com/world/rest-of-europe/russia-india-to-launch-new-brahmos-missile-capable-of-downing-pakistan-and-china-awacs-aircraft/articleshow/78105123.cms>



Tue, 15 Sept 2020

Indian Tejas Fighter Jets to be equipped with upgraded BrahMos Missiles that can shoot-down enemy AWACS

The new BrahMos missiles will be increasingly vital for any air force if they can shoot-down enemy AWACS which are often called the 'Eye in the Sky'

India and Russia are reportedly working on a new variant of the BrahMos supersonic cruise missile that can destroy an enemy's AWACS aircraft (Airborne Warning and Control System) using Indian Tejas jets as a platform.

While the predecessors of the missiles were able to destroy the land and sea-based targets, the new variant will be used to shoot down aerial targets and are expected to be launched by 2024.

According to multiple reports including by Sputnik News, Joint Managing Director of BrahMos Aerospace, suggested that the new missiles will boast of different target-seeking equipment, while still using the same platform.

He had earlier suggested that Hindustan Aeronautics Limited's Tejas, the lightweight, single-engine fourth-generation fighter jet will be used as a carrier for the new missile.

AWACS are considered integral to modern warfare, due to their ability to detect and track incoming fighters, cruise missiles, and drones much before ground-based radars, direct friendly fighters during air combat with enemy jets.

They also keep tabs on enemy troop build-ups and movement of warships. The new BrahMos missiles will be increasingly vital for any air force if they can shoot-down enemy AWACS which are often called the 'Eye in the Sky'

The joint venture defense firm of BrahMos Aerospace was recently cleared by both partner nations India as well as Russia to export the missile to friendly countries.

Tactical Missiles Corporation (TMC) JSC CEO Boris Obnosov, while speaking about the decision said, "This rapidly developing joint venture is one of the best examples of military-technical cooperation" between India and Russia.

<https://eurasianimes.com/india-russia-upgrading-supersonic-brahmos-cruise-missiles-to-shoot-down-enemys-eye-in-the-sky/>

ब्रह्मोस के नए वैरिएंट को देख बौखलाया चीन, जारी किया युद्धाभ्यास का प्रोपेगेंडा वीडियो

भारत और रूस पहले से ही इस सुपरसोनिक मिसाइल की रेंज 290 किलोमीटर से बढ़ाकर 600 किलोमीटर करने की योजना पर काम कर रहे हैं। इस मिसाइल की रेंज बढ़ने से भारत की मारक क्षमता बढ़ेगी और नए वैरिएंट के आने से दुश्मनों में और दहशत पैदा होगी।

जब से पूर्वी लद्दाख में भारत-चीन तनाव चरम पर है, तब से सरहद पर भारत की सुपरसोनिक क्रूज मिसाइल ब्रह्मोस रेडी टू फायर मोड में है। फाइटर जेट में लगी इस मिसाइल ने ड्रैगन की नींद उड़ा रखी है और अब इसे और घातक बनाया जा रहा है। भारत और रूस मिलकर ब्रह्मोस के नए वैरिएंट बना रहे हैं। ये नई मिसाइल दुश्मन देश के अवाक्स सिस्टम वाले प्लेन को मार गिराने में कारगर होंगी।

अभी ब्रह्मोस से जमीन और समुद्र में ही टारगेट किया जा सकता है। जबकि ब्रह्मोस का सुपर वर्जन हवा में दुश्मनों को ढेर कर सकता है। नई मिसाइल एक साथ कई निशानों को साधने में सक्षम होगी। स्वदेशी फाइटर प्लेन तेजस को इस मिसाइल के एयर वैरियंट से लैस किया जाएगा। ब्रह्मोस का नया वैरियंट 2024 तक तैयार हो जाएगा।



भारत और रूस पहले से ही इस सुपरसोनिक मिसाइल की रेंज 290 किलोमीटर से बढ़ाकर 600 किलोमीटर करने की योजना पर काम कर रहे हैं। इस मिसाइल की रेंज बढ़ने से भारत की मारक क्षमता बढ़ेगी और नए वैरिएंट के आने से दुश्मनों में और दहशत पैदा होगी।

भारत की ताकत देख प्रोपेगेंडा फैला रहा चीन

भारत की इस ताकत का एहसास कर चीन नए-नए प्रोपेगेंडा पर काम कर रहा है। एक तरफ तो चीन पेंगोंग में हार के बाद शांति के कबूतर उड़ा रहा है, वहीं दूसरी तरफ LAC से करीब डेढ़ हजार किलोमीटर दूर बारूद की बारिश कर रहा है। चीन जैविक हथियारों से युद्धाभ्यास कर रहा है। PLA के गुपु 77 ने साढ़े चार हजार फीट की ऊंचाई पर केमिकल वॉर एक्सरसाइज की है।

माउंटेन वॉरफेयर में पिछले 84 दिनों में पांच बार भारतीय सैनिकों से मार खाने वाली चीनी सेना अब लद्दाख से पीछे हटकर तिब्बत के पठारों पर युद्ध के लिए अभ्यास कर रही है। ऐसे में उन्हें प्रोपेगेंडा फैलाने के लिए वीडियो जारी कर अपनी ताकत का प्रमाण देना पड़ रहा है।

<https://www.tv9bharatvarsh.com/india/china-furious-after-seeing-new-variant-of-brahmos-missile-released-propaganda-video-warfare-286503.html>

Usage of drone technology in India: Changing phases

It is crucial for any entity or entrepreneur involved in the ecosystem of UAV to understand the regulations, the operational impediments and the permissible usages to be able to design this new-age technology

By Neeraj Dubey

Unmanned aerial vehicles (UAVs) or drones can easily reach the most inaccessible places, which underscore its extreme usefulness for various purposes such as military, disaster management or surveillance. On the flip side, the same ease can effortlessly be misused especially to threaten the national security, which makes it crucial to monitor and regulate the usage of UAVs, particularly in civil or private space.

Regulatory roadmap

UAVs have traditionally been used by Indian defence forces since 1999 and some were imported in the guise of toys for civil usage. However, in 2014, just as the UAV sector had started getting commercial traction, a major e-commerce company announced to use UAVs to deliver their products within the city limits of Mumbai and Bengaluru. In another incident, a pizza was delivered in Mumbai using a drone. The two incidents alarmed the authorities and as a knee-jerk reaction a blanket ban was imposed on the civil usage of UAVs in the interest of national security and the Directorate General of Foreign Trade banned its import. Flying drones for commercial purposes became legal in India from December 2018 when the Directorate General of Civil Aviation (DGCA) released the Civil Aviation Requirements, Section 3 – Air Transport Series X, Part I, Issue I - guidelines for the operation of UAVs.



Representational

Changing usage pattern

The revised stance on UAVs is aimed at creating jobs in sectors such as disaster management, media, forestry, infrastructure, construction, transport, land surveillance, precision agriculture, 3D digital mapping, and tracking environmental issues such as erosion and deforestation. Using UAVs in mines for compliance reporting and monitoring volumetric production and to ensure all equipment and manpower is deployed safely; and in oil refineries for creating a positioning system that works like an internal GPS allowing drones to monitor structures such as a boiler inside a plant, autonomously—are good instances of using technology for enhancing efficacy and dexterity. UAVs aid in increasing the work efficiency, hence, a great emphasis is also laid on promoting innovation in drone technology. For this, under the “beyond visual line of sight” policy, DGCA has selected certain companies to run pilot projects to enable BVLOS Experiment Assessment and Monitoring Committee decide the policies for the next phase of developments.

Hindrances

A seamless usage of drones is, however, not unhindered as the Unmanned Aircraft System Rules, 2020, specifically restrict the flying or assisting an UAV over the ‘no operation’ areas mentioned in Schedule VIII, except in accordance with the conditions of the central government and on request made by any government authority or any airport operator in exceptional circumstances. The restrictions further include no-photography in non-permissible areas, carrying any payload, carriage of arms, ammunition, explosives, military stores, etc. and the dropping of articles from a UAS in motion.

Growth prospects

Despite these reasonable restrictions, the permissible usage is expected to have far-reaching positive impact on the sectors wherever the UAVs can be used extensively. Another encouraging aspect for UAVs is its increased use by the government and its agencies like the Indian Railways for the inspection and tracing of progress of its project; GAIL India to enhance the surveillance of its network of gas transmission pipelines; NHAI for carrying out sovereign function for constructions and maintenance of highways; and Coal India using drones to check illegal mining and pilferage. The government has started the *Garud* portal to fast track approval for drones for COVID-19 operations and issued an exemption notice for granting conditional exemptions to government agencies from certain compliances for operating RPAS to aid in disaster management.

Usage in defence

As far as military usages are concerned, the Indian government approved the purchase of Heron TP missile-armed drones from Israel in 2018 and the General Atomics MQ-9 Guardian/Predator-B long-range unmanned combat aerial vehicle from the US. DRDO is working on the development of high-intensity laser weapons usable in C-UAS technologies. Indian government is simultaneously working in the area of counter-drone technology to develop drone disabling technologies around Indian airports. DRDO has also developed its own domestic UAV program to develop a domestic arsenal to replace and augment the existing fleet of vehicles like DRDO Lakshya, DRDO Rustom and DRDO Nishant.

Risks mitigation

On one hand, drones may be misused for unethical activities like espionage, trespassing, photography, hacking other devices, unauthorized surveillance to track the profiles or to aggregate personal data of people by either states or private agencies and penetrating test networks to collect unencrypted data or establish fake access point—these can have serious threats to privacy and consumer power. On the other hand, drones can also be subjected to hacking or jamming or spoofing or its data can be subjected to misuse; drones can be used to possibly cause accidents due to collisions, battery failures, and loss of navigational control or failure of any equipment.

In 2019, the ministry of civil aviation (MoCA) released the National Counter Rogue Drone Guidelines to address the security issues due to unregulated and unchecked operations of drones, thereby, laying down preventive measures for assessing threats by drone, creating awareness about various technologies involved in handling of drone threat, ready reckoner for anti-drone measures and understanding the multi-dimensionality of drone threats. Since the non-compliance continued, the MoCA issued a public notice on January 13, 2020, giving a one-time opportunity to the unregulated and non-complying drones to voluntarily disclose the required information online without any repercussions. The regulatory steps to improve the monitoring of drones include starting Digital Sky platform for convenient filing of paperwork to obtain unique identification numbers and operators' permits. The Indian Institute of Drones powered by the government of India provides training to professionals in drone technology and gives them a platform to carryout UAV piloting and operations with emphasis on safety and security issues.

In the end

It is crucial for any entity or entrepreneur involved in the ecosystem of UAV to understand the regulations, the operational impediments and the permissible usages to be able to design this new-age technology for the best advantages to its customers and target market. Usage of AI in UAV has not been addressed in the existing regulations leaving it to the stakeholders to manoeuvre wisely within the existing permissible framework of regulations.

(Opinions expressed by Entrepreneur contributors are their own.)

<https://www.entrepreneur.com/article/356135>

ThePrint

Tue, 15 Sept 2020

Fresh India-China corps commanders' talks will have new terms of engagement, challenges

A big challenge will be China's willingness to put its words about wanting peace into action, especially with Communist Party plenary around the corner

By Snehesh Alex Philip

New Delhi: The terms of engagement for the next round of corps commander talks between India and China will forgo the earlier concept of “equitable disengagement”, and will now take into account the changed dynamics on the ground, which will give India better bargaining power, ThePrint has learnt.

However, one of the biggest challenges is for China to put its words of wanting peace at the Line of Actual Control (LAC) into action. This becomes more important as the fifth plenary session of the 19th Central Committee of the Communist Party of China (CPC) is scheduled in October.

Sources in the defence and security establishment said the immediate focus of the much-awaited corps commander talks will be to ensure that no clash takes place at the southern bank of Pangong Tso, which has been dominated by India since the night of 29 August.

The sources said the status quo remains, with no forward movement, and the Chinese continue to position themselves opposite forward posts of the Indian Army. They also underlined that it is for China to live up to its words of wanting peace on the ground, and any Indian disengagement will happen only after China initiates it.

The changes

Asked about what would change with respect to the talks, sources said the fresh round would be held on new terms.

During the previous five rounds of corps commander-level talks, disengagement was based on mutual withdrawal of equal distance. While these steps were successful in the Galwan Valley and Hot Springs areas, they weren't successful on the northern bank of the Pangong Tso, where Chinese had come in by eight kilometres. This meant that India could not pull back from an area which it dominates, and has had bases in for long.

Another issue was with the creation of a zone, loosely termed as “buffer zone” from the point of face-off. However, since China had come into Indian territory, the buffer zone at some places was actually more on the Indian side.

Adding to these issues was the fact that China was not agreeing to a time-scale disengagement process. This is why talks had reached a deadlock, with the last corps commander talks being held on 2 August.

With India realising that talks are not moving forward, a part of the military plan that had been worked out was put into motion, leading to deployment and reconnaissance in certain areas by specialised elements of the Army.

Chinese attempt to capture more territory on the southern bank of Pangong Tso on the night of 29 August forced the Indian Army to move in and capture certain heights. On 31 August, more troops came and dominated Requin Pass and Spanggur Gap in the hills in the Chushul sector.

Indian troops also climbed up the ridgeline of Finger 4, and have now taken by dominating positions against the Chinese, who have captured territory up to Finger 4.

Following this move, there has been a flurry of statements by the Chinese, and PLA troops even opened fire in the air to intimidate Indian forces, who are standing their ground.

China even asked for a meeting with Defence Minister Rajnath Singh in Moscow and had a detailed discussion with External Affairs Minister S. Jaishankar.

Challenges ahead

Sources said the main challenge in future talks will be that everything will start afresh. "However, the single biggest challenge is for the Chinese to put their words into action," a source said, explaining that both sides have undertaken tactical moves at the LAC ahead of the winters.

The source said while India is used to deployment of soldiers in extreme weather, it will be new to the Chinese.

"India's move in the last week of August and the fact that the winters are approaching changes a lot of dynamics," a source said.

Former Army chief Gen. V.P. Malik (ret'd) pointed out that the fate of India-China diplomatic dialogue and military situation in eastern Ladakh over the next few days depends to a large extent on how Chinese President Xi Jinping wishes to project himself in the coming CPC plenary.

<https://theprint.in/defence/fresh-india-china-corps-commanders-talks-will-have-new-terms-of-engagement-challenges/502362/>

नवभारत टाइम्स

Tue, 15 Sept 2020

इंडो-पैसिफिक में चीन की 'दादागिरी' के दिन

खत्म, भारत के साथ आई जापानी सेना

चीन से बढ़ते खतरों के बीच जापान ने भारत के साथ सैन्य सहयोग को बढ़ाने की तैयारी शुरू कर दी है। सोमवार को जापानी सेना के चीफ ऑफ स्टाफ जनरल यूसा ने भारतीय सेना प्रमुख जनरल एमएम नरवणे से बातचीत की।

By Priyesh Mishra

टोक्यो: चीन से बढ़ते खतरों के बीच जापान ने भारत के साथ सैन्य सहयोग को बढ़ाने की तैयारी शुरू कर दी है। सोमवार को जापानी सेना के चीफ ऑफ स्टाफ जनरल यूसा ने भारतीय सेना प्रमुख जनरल एमएम नरवणे से बातचीत की। इस दौरान दोनों सेना प्रमुखों ने इंडो पैसिफिक क्षेत्र में चीन की बढ़ती घुसपैठ के खिलाफ आपसी सहयोग को बढ़ाने पर सहमति जताई।

भारत के साथ जापान ने किया बड़ा रक्षा समझौता

पिछले गुरुवार को ही जापान ने भारत के साथ डिफेंस सेक्टर में लॉजिस्टिक और सर्विसेज के लिए बड़ा समझौता किया था। नई दिल्ली में हुए इस समझौते में भारत की तरफ से रक्षा सचिव अजय कुमार और जापान की तरफ से भारत में राजदूत सुजुकी सतोशी ने हिस्सा लिया। इस समझौते के



इंडियन आर्मी चीफ और जापानी आर्मी चीफ

तहत अब भारतीय सेना जापान से और जापानी सेना भारत से अपनी जरूरतों के सामान का आसानी से आदान-प्रदान कर सकेंगी।

जापानी रक्षा मंत्री ने चीन के खिलाफ भारत से मांगा था सहयोग

पूर्वी चीन सागर में चीनी युद्धपोतों की बढ़ती घुसपैठ से परेशान होकर जापान के रक्षा मंत्री तारो कोनो ने भारत को व्यापक क्षेत्रीय तंत्र बनाने का सुझाव दिया था। उन्होंने कहा कि रक्षा मंत्री होने के नाते मैं यह कहना चाहता हूं कि चीन, जापान के लिए सुरक्षा खतरा बन गया है। जापानी रक्षा मंत्री ने कहा कि चीन के पास क्षमता भी और उसका यह इरादा भी है। उन्होंने कहा कि इंडो-पैसफिक क्षेत्र में भारत जापान सहयोग करें।

दादागिरी के लिए कोरोना का उपयोग कर रहा चीन

जापान ने कहा कि चीन अपने प्रभाव का विस्तार करने और सामरिक वर्चस्व कायम करने के लिए कोरोना वायरस महामारी का भी उपयोग कर रहा है। इस कारण जापान और इस क्षेत्र के लिए एक बड़ा खतरा पैदा हो गया है। पूर्वी चाइना सी को लेकर चीन का सभी पड़ोसी देशों से विवाद है। इसे दबाने के लिए चीनी नेवी इस क्षेत्र में लगातार युद्धाभ्यास भी कर रही है। जिसके कारण आसपास के देशों को जानबूझकर समुद्र में जाने से रोका जा रहा है।

इन द्वीपों को लेकर जापान से भिड़ा चीन

चीन और जापान में पूर्वी चीन सागर में स्थित द्वीपों को लेकर आपस में विवाद है। दोनों देश इन निर्जन द्वीपों पर अपना दावा करते हैं। जिन्हें जापान में सेनकाकु और चीन में डियाओस के नाम से जाना जाता है। इन द्वीपों का प्रशासन 1972 से जापान के हाथों में है। वहीं, चीन का दावा है कि ये द्वीप उसके अधिकार क्षेत्र में आते हैं और जापान को अपना दावा छोड़ देना चाहिए। इतना ही नहीं चीन की कम्यूनिस्ट पार्टी तो इसपर कब्जे के लिए सैन्य कार्रवाई तक की धमकी दे चुकी है।

चीन समुद्र में चला रहा पावर गेम

साउथ चाइना सी में 'जबरन कब्जा' तेज कर दिया है। पिछले रविवार को चीन ने साउथ चाइना सी की 80 जगहों का नाम बदल दिया। इनमें से 25 आइलैंड्स और रीफ्स हैं, जबकि बाकी 55 समुद्र के नीचे के भौगोलिक स्ट्रक्चर हैं। यह चीन का समुद्र के उन हिस्सों पर कब्जे का इशारा है जो 9-डैश लाइन से कवर्ड हैं। यह लाइन इंटरनैशनल लॉ के मुताबिक, गैरकानूनी मानी जाती है। चीन के इस कदम से ना सिर्फ उसके छोटे पड़ोसी देशों, बल्कि भारत और अमेरिका की टेंशन भी बढ़ गई है।

<https://navbharattimes.indiatimes.com/world/asian-countries/japan-army-chief-general-yuasa-discussion-with-indian-army-chief-general-mm-naravane-amid-tension-with-china/articleshow/78109253.cms>

China laying cables to boost communications at Ladakh flashpoint: Report

Thousands of Indian and Chinese troops backed by tanks and aircraft are locked in an uneasy stalemate along a 70 km-long front to the south of the lake

Leh: Two Indian officials said Chinese troops were laying a network of optical fibre cables south of Pangong Lake in Ladakh, suggesting they were digging in for the long haul despite high-level talks aimed at resolving a standoff there.

Such cables, which would provide forward troops with secure lines of communication to bases in the rear, have recently been spotted to the south of Pangong Tso lake in Ladakh, a senior government official said.

China's foreign ministry did not immediately respond to questions on the matter from Reuters, while defence officials could not immediately be reached for comment.

Thousands of Indian and Chinese troops backed by tanks and aircraft are locked in an uneasy stalemate along a 70 km-long front to the south of the lake. A third Indian official said on Monday that there had been no significant withdrawals or reinforcements on either side since the foreign ministers of the two countries met last week.

"It is as tense as earlier," he said.

Above Leh, Ladakh's main city, Indian Air Force fighter planes flew throughout the morning, their engines booming and echoing across the valley surrounded by brown, barren mountains.

"Our biggest worry is that they have laid optical fibre cables for high-speed communications," the first official said, referring to the lake's southern bank, where Indian and Chinese troops are only a few hundred metres apart at some points.

"They have been laying optical fibre cables on the southern bank at breakneck speed," he said.

Indian intelligence agencies noted similar cables to the north of the Pangong Tso lake around a month ago, the second government official said.

The first government official said the authorities were alerted to such activity after satellite imagery showed unusual lines in the sand of the high-altitude deserts to the south of Pangong Tso.

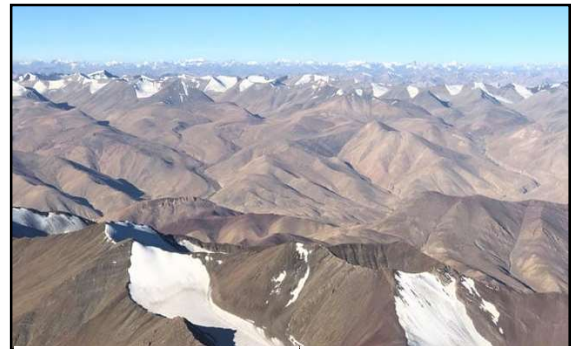
These lines were judged by experts - and corroborated by foreign intelligence agencies - to be communication cables laid in trenches, he said, including near the Spanggur gap, among hilltops where soldiers fired in the air recently for the first time in decades.

Officials say a build-up in border infrastructure on their side is also likely to have played a part in the months-long confrontation.

A former military intelligence official, who declined to be named because of the sensitivity of the matter, said optical fibre cables offered communications security as well as the ability to send data such as pictures and documents.

"If you speak on radio, it can get caught. Communications on optical fibre cables is secure," he said.

The Indian military still depends on radio communications, the first official said, although he said it was encrypted.



Snow-covered mountain range is seen from a passenger airplane in Ladakh (File)

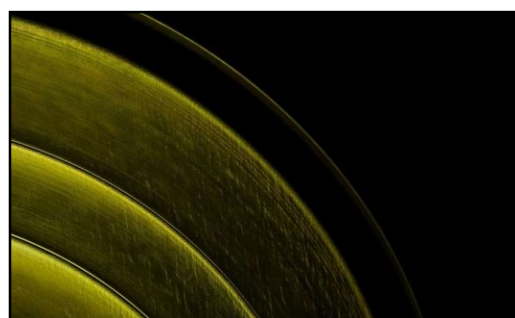
<https://www.ndtv.com/india-news/china-laying-cables-to-boost-communications-at-ladakh-flashpoint-report-2295302>

Tue, 15 Sept 2020

Physicists discover new magnetoelectric effect

Electricity and magnetism are closely related: Power lines generate a magnetic field, rotating magnets in a generator produce electricity. However, the phenomenon is much more complicated: electrical and magnetic properties of certain materials are also coupled with each other. Electrical properties of some crystals can be influenced by magnetic fields—and vice versa. In this case one speaks of a "magnetoelectric effect." It plays an important technological role, for example in certain types of sensors or in the search for new concepts of data storage.

A special material was investigated for which, at first glance, no magnetoelectric effect would be expected at all. But careful experiments have now shown that the effect can be observed in this material, it only works completely differently than usual. It can be controlled in a highly sensitive way: Even small changes in the direction of the magnetic field can switch the electrical properties of the material to a completely different state.



Credit: CC0 Public Domain

Symmetry controls the coupling

"Whether the electrical and magnetic properties of a crystal are coupled or not depends on the crystal's internal symmetry," says Prof. Andrei Pimenov from the Institute of Solid State Physics at TU Wien. "If the crystal has a high degree of symmetry, for example, if one side of the crystal is exactly the mirror image of the other side, then for theoretical reasons there can be no magnetoelectric effect."

This applies to the crystal, which has now been examined in detail—a so-called langasite made of lanthanum, gallium, silicon and oxygen, doped with holmium atoms. "The crystal structure is so symmetrical that it should actually not allow any magnetoelectric effect. And in the case of weak magnetic fields there is indeed no coupling whatsoever with the electrical properties of the crystal," says Andrei Pimenov. "But if we increase the strength of the magnetic field, something remarkable happens: The holmium atoms change their quantum state and gain a magnetic moment. This breaks the internal symmetry of the crystal."

From a purely geometrical point of view, the crystal is still symmetrical, but the magnetism of the atoms has to be taken into account as well, and this is what breaks the symmetry. Therefore the electrical polarization of the crystal can be changed with a magnetic field. "Polarization is when the positive and negative charges in the crystal are displaced a little bit, with respect to each other," explains Pimenov. "This would be easy to achieve with an electric field—but due to the magnetoelectric effect, this is also possible using a magnetic field."

It's not the strength, it's the direction

The stronger the magnetic field, the stronger its effect on electrical polarization. "The relationship between polarization and magnetic field strength is approximately linear, which is nothing unusual," says Andrei Pimenov. "What is remarkable, however, is that the relationship between polarization and the direction of the magnetic field is strongly non-linear. If you change the direction of the magnetic field a little bit, the polarization can completely tip over. This is a new form of the magnetoelectric effect, which was not known before." So a small rotation may decide whether the magnetic field can change the electrical polarization of the crystal or not.

Possibility for new storage technologies

"The magnetoelectric effect will play an increasingly important role for various technological applications," says Andrei Pimenov. "In a next step, we will try to change magnetic properties with an electric field instead of changing electrical properties with a magnetic field. In principle, this should be possible in exactly the same way."

If this succeeds, it would be a promising new way to store data in solids. "In magnetic memories such as computer hard disks, magnetic fields are needed today," Pimenov explains. "They are generated with magnetic coils, which requires a relatively large amount of energy and time. If there were a direct way to switch the magnetic properties of a solid-state memory with an electric field, this would be a breakthrough."

More information: Lukas Weymann et al. Unusual magnetoelectric effect in paramagnetic rare-earth langasite, *npj Quantum Materials* (2020). DOI: [10.1038/s41535-020-00263-9](https://doi.org/10.1038/s41535-020-00263-9)
<https://phys.org/news/2020-09-physicists-magnetoelectric-effect.html>



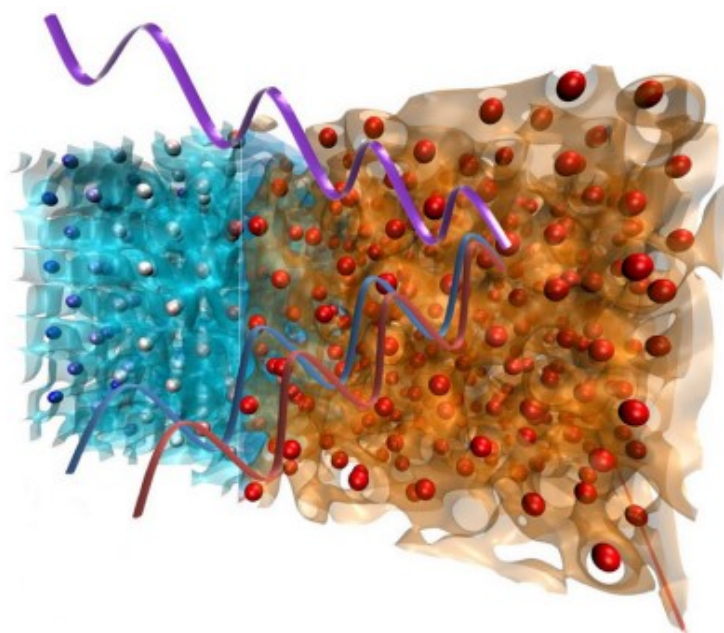
Tue, 15 Sept 2020

Collective quantum effect: When electrons keep together

By Luise Träger

In the first experiment to take advantage of a new technology for producing powerful attosecond X-ray laser pulses, a research team led by scientists from the Department of Energy's SLAC National Accelerator Laboratory and Stanford University showed they can create electronic ripples in molecules through a process called "impulsive Raman scattering."

Many celestial objects such as stars or planets contain matter that is exposed to high temperatures and pressure—experts call it warm dense matter (WDM). Although this state of matter on earth only occurs in the earth's core, research on WDM is fundamental for various future areas such as clean energy, harder materials or a better understanding of solar systems. In a study recently published in *Physical Review Letters*, a team led by physicist Dr. Tobias Dornheim



Simulation of a disturbance of a warm dense matter system by a laser beam.
Credit: Jan Vorberger

of the Center for Advanced Systems Understanding (CASUS) at Helmholtz Center Dresden-Rossendorf (HZDR) and alumnus of Kiel University (CAU), now reveals that warm dense matter behaves significantly differently than assumed, which calls into question its previous description.

To study the exotic state of warm dense matter on earth, scientists create it artificially in laboratories. This can be realized by compression through powerful lasers for example at the European XFEL in Schenefeld near Hamburg. "A sample, such as a plastic or aluminum foil, is illuminated with a laser beam, it heats up very strongly and is then compressed by a generated

shock wave. The resulting spectra—that means how the sample behaves under these conditions—is recorded on detectors and in a scope of 10^{-10} m (1 angstrom) we can determine its material properties," explains Dr. Jan Vorberger from HZDR, adding: "However, important parameters such as temperature or density cannot be measured directly. Therefore, theoretical models are of central importance for the evaluation of the WDM experiments."

System reacts weaker the more it is perturbed

Tobias Dornheim develops such simulation models for the theoretical description of warm dense matter. From what scientists knew until now, calculations have been based exclusively on the assumption of a "linear reaction." That means, the more the samples—so called targets—are hit by laser irradiation, thus the more strongly the electrons are excited in these materials, the more strongly they react. In their new publication, however, Dr. Tobias Dornheim of CASUS, Dr. Jan Vorberger of HZDR and Prof. Dr. Michael Bonitz of CAU now show that under strong excitation the reaction is weaker than expected. They conclude that it is crucial to take into account nonlinear effects. The results have far-reaching implications for the interpretation of experiments with warm dense matter. "With this study we have laid the foundation for many new developments in the warm dense matter theory," Dornheim estimates, "and a lot of research on the nonlinear electronic density response of WDM will be done within the next years."

Their results are based on extensive computer simulations using the quantum statistical path-integral Monte Carlo method (PIMC). Richard Feynman laid the foundations of the method back in the 1950s. In recent years, Dr. Dornheim has successfully improved the algorithms to make calculations more efficient and faster. Nevertheless, for the mentioned study, supercomputers calculated on more than 10,000 CPU cores for more than 400 days. The calculations were carried out at the high performance clusters Hypnos and Hemera of the HZDR, the Taurus cluster at the Center for Information Services and High Performance Computing (ZIH) of the Technical University of Dresden, computers at the North German Association for High Performance Computing (HLRN) and at the computer center of the CAU.

WDM could play an important role for the energy industry

Research on warm dense matter is not only important for understanding the structure of planets such as Jupiter and Saturn or our solar system and its evolution, but is also applied in materials science, for example in the development of super-hard materials. However, it could play the most important role in the energy industry by contributing to the realization of inertial fusion—an almost inexhaustible and clean energy source with future potential.

More information: Tobias Dornheim et al. Nonlinear Electronic Density Response in Warm Dense Matter, *Physical Review Letters* (2020). [DOI: 10.1103/PhysRevLett.125.085001](https://doi.org/10.1103/PhysRevLett.125.085001)

Journal information: [*Physical Review Letters*](#)

[https://phys.org/news/2020-09-quantum-effect-electrons.html#:~:text=Many%20celestial%20objects%20such%20as,warm%20dense%20matter%20\(WDM\).&text=To%20study%20the%20exotic%20state,create%20it%20artificially%20in%20laboratories.](https://phys.org/news/2020-09-quantum-effect-electrons.html#:~:text=Many%20celestial%20objects%20such%20as,warm%20dense%20matter%20(WDM).&text=To%20study%20the%20exotic%20state,create%20it%20artificially%20in%20laboratories.)

The Hall effect links superconductivity and quantum criticality in a strange metal

By Ingrid Fadelli

Over the past few decades, researchers have identified a number of superconducting materials with atypical properties, known as unconventional superconductors. Many of these superconductors share the same anomalous charge transport properties and are thus collectively characterized as "strange metals."

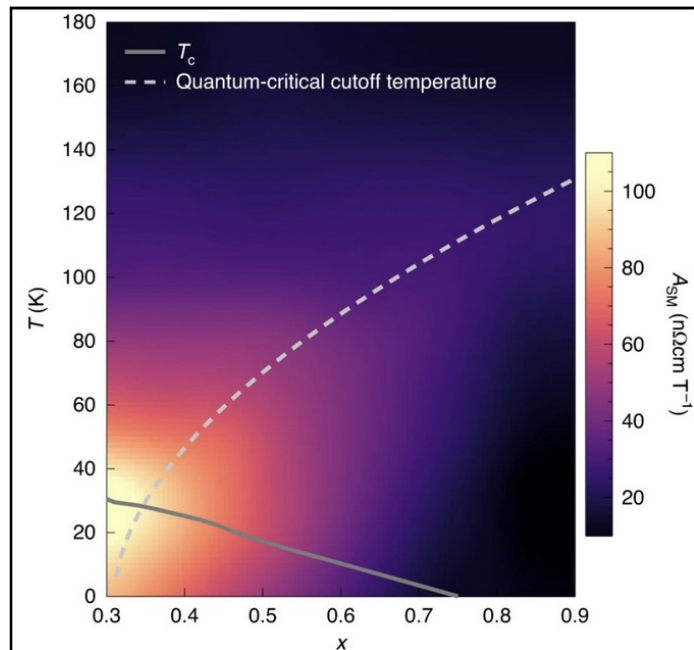
Researchers at the University of California, Berkeley (UC Berkeley) and Los Alamos National Laboratory have been investigating the anomalous transport properties of strange metals, along with several other teams worldwide. In a recent paper published in *Nature Physics*, they showed that in one of these materials, $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$, superconductivity and quantum criticality are linked by what is known as the Hall effect.

For decades, physicists have been unable to fully understand T-linear resistivity, a signature of strange metals that has often been observed in many unconventional superconductors. In 2016, the team at UC Berkeley and Los Alamos National Lab observed an unusual scaling relationship between the magnetic field and temperature in superconductor $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$.

Scaling phenomena are typically observed just before a system transitions from one phase to another (e.g. from liquid to gas), moments called critical points. This inspired the researchers to investigate whether a similar phenomenon also occurred in the Hall effect, a related charge transport phenomenon.

"The scaling behavior arises because near a critical point, some properties become scale invariant," James G. Analytis, one of the researchers who carried out the study, told Phys.org. "This is because there are phase fluctuations at the critical point that occur at all length and time scales. The same basic phenomenon leads to critical opalescence in a liquid-gas transition, but in the present case, the fluctuations have their origin in the Heisenberg uncertainty principle. In our recent study, we did not observe the scaling behavior as clearly as we did before, but we found something we did not expect."

To conduct their experiments, Analytis and their colleagues synthesized $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ crystals at the Lawrence Berkeley National Laboratory (LBNL) and then placed them under high magnetic fields at Los Alamos National Lab's high field facility, which is managed by the NSF-funded National High Magnetic Field Lab (NHMFL). At this field facility, researchers can collect measurements for a significant amount of magnet time.



The amplitude of the strange metal contribution in the Hall effect as a function of composition x and temperature T , estimated from the field dependence of R_H . The white dotted line is a guide to the eye, emphasizing the boundary of the region where the strange metal R_H is independent of x . Above the line the strange metal Hall depends only on temperature and independent of composition x , below the line these contributions persist to zero temperature, suggesting a direct connection to the superconducting ground state. Credit: *Nature Physics* (2020). Hayes et al.

"It is highly competitive to get this magnet time, which allows you to measure up to 65 T," Analytis explained. "Each material needs to be measured separately, with multiple samples to ensure reproducibility. In all, we probably spent about four weeks of magnet time to gather our data."

The experiments carried out by Analytis and his colleagues yielded a number of interesting results. First, the researchers found that the Hall effect appears to be composed of two different 'terms': a conventional one that is simply related to the number of electrons in the system, and a strange-metal term that peaks when $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ is approaching its quantum critical point.

"Separating the Hall effect into two contributions is quite natural in ferromagnetic metals because the system has two clear contributions; the carriers in the metal and the magnetically ordered spins," Analytis explained. "The second contribution is called the anomalous Hall effect. What we see appears to be analogous to an anomalous Hall effect, but I emphasize that there is no ferromagnetism. Here, the anomalous contribution appears to arise from magnetic fluctuations near the critical point."

Two key facts illustrate the link between quantum criticality and superconductivity unveiled by Analytis and his colleagues: The first is that in strange metals, superconductivity occurs in a whole phase diagram; the second is that the Hall effect is essentially a measure of the number of particles (i.e., electrons or holes) in a system.

The researchers observed that the anomalous effect observed in $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ as it approaches its quantum critical point only ceases when superconductivity does. Moreover, they found that the zero-temperature magnitude of the Hall effect's anomalous term were correlated to the magnitude of the superconducting T_c . This suggests that the strange metal's contribution to the Hall effect is, in fact, a measure of the emergent entities that are responsible for superconductivity.

"There was a second observation connected to the scale invariance observed before," Analytis said. "In a region of the phase diagram known as the 'critical fan' (the region thought to be dominated by fluctuations), the strange metal contribution depends only on the temperature, as if temperature sets the scale of the fluctuations in the system. Most importantly, the strange metal contribution was independent of composition X , even though the conventional contribution changed by a factor of three or more; which means that the strange metal Hall effect is not simply an additional source of charge, but that it arises from the collective motion of all the electrons as they approach a quantum critical phase transition."

When studying high T_c , researchers typically try to understand the emergent excitations that are responsible for superconductivity in a material. In conventional superconductors, these excitations are now known to be characterized as simple electrons or holes.

The recent study by Analytis and his colleagues could ultimately illuminate the nature of the excitations responsible for superconductivity in strange metals, which has so far remained elusive. Moreover, the researchers have identified a strategy that can be used to measure whether these excitations are present in a material or not.

"It would be very exciting to see whether the properties we unveiled extend to other superconductors," Analytis said. "Right now, we would like to extend these measurements to different parts of the phase diagram and to different compounds. These are all long and complicated experiments requiring extensive synthesis and time in high field labs (like the NHMFL), but at least we know exactly what we are looking for, now."

In their next studies, the researchers would also like to start looking for strategies and tools that could be used to probe the spin degrees of freedom in unconventional superconductors directly. In fact, most existing methods tend to examine a material's charge degrees of freedom, which considerably limits their generalizability across different materials.

"The Hall effect will always mix these up, and we got lucky that in these materials, they separate into 'conventional' and 'strange metal' contributions," Analytis said. "But in order to see universalities across different materials classes, it will be important to develop new probes with more direct sensitivity to the 'strange metal' part of the system."

More information: Superconductivity and quantum criticality linked by the Hall effect in a strange metal. *Nature Physics* (2020). DOI: [10.1038/s41567-020-0982-x](https://doi.org/10.1038/s41567-020-0982-x).

Scaling between magnetic field and temperature in the high-temperature superconductor BaFe₂(As_{1-x}P_x)₂. *Nature Physics* (2016). DOI: [10.1038/nphys3773](https://doi.org/10.1038/nphys3773).

Journal information: *Nature Physics*
<https://phys.org/news/2020-09-hall-effect-links-superconductivity-quantum.html>



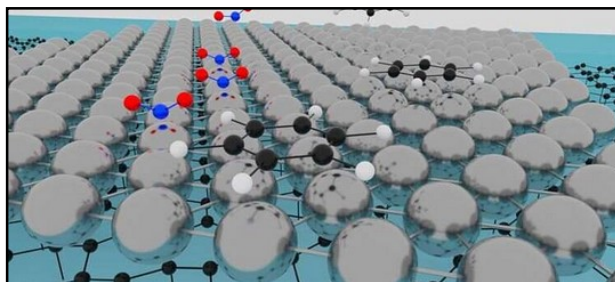
Tue, 15 Sept 2020

Single-atom-thin platinum makes a great chemical sensor

By Joshua Worth

Researchers at Chalmers University of Technology, Sweden, together with colleagues from other universities, have discovered the possibility to prepare one-atom thin platinum for use as a chemical sensor. The results were recently published in the scientific journal *Advanced Material Interfaces*.

A schematic of platinum atoms deposited on the surface of the carbon "buffer-layer," which is a graphene-like 2-D insulating material grown epitaxially on silicon carbide, that enables two-dimensional growth of platinum.



"In a nutshell, we managed to make a metal layer just one-atom thick—sort of a new material. We found that this atomically-thin metal is super sensitive to its chemical environment. Its electrical resistance changes significantly when it interacts with gasses," explains Kyung Ho Kim, postdoc at the Quantum Device Physics Laboratory at the Department of Microtechnology and Nanoscience at Chalmers, and lead author of the article.

The essence of the research is the development of 2-D materials beyond graphene.

"Atomically thin platinum could be useful for ultra-sensitive and fast electrical detection of chemicals. We have studied the case of platinum in great detail, but other metals like palladium produce similar results," says Samuel Lara Avila, Associate Professor at the Quantum Device Physics Laboratory and one of the authors of the article.

The researchers used the sensitive chemical-to-electrical transduction capability of atomically thin platinum to detect toxic gasses at the parts-per-billion level. They demonstrated this with detection of benzene, a compound that is carcinogenic even at very small concentrations, and for which no low-cost detection apparatus exists.

"This new approach, using atomically thin metals, is very promising for future air-quality monitoring applications," says Jens Eriksson, Head of the Applied sensor science unit at Linköping University and a co-author of the paper.

Boosting the sensitivity of solid-state gas sensors by incorporating nanostructured materials as the active sensing element can be complicated by effects on the interfaces. Interfaces at nanoparticles, grains, or contacts may result in nonlinear current–voltage response, high electrical resistance, and ultimately, electric noise that limits the sensor read-out.

This work reports the possibility to prepare electrically continuous platinum layers on one atom thickness, by physical vapor deposition on the carbon zero layer (also known as the buffer layer) grown epitaxially on silicon carbide. With a 3–4 Å thin Pt layer, the electrical conductivity of the metal is strongly modulated when interacting with chemical analytes, due to charges being

transferred to/from Pt. The strong interaction with chemical species, together with the scalability of the material, enables the fabrication of chemiresistor devices for electrical read-out of chemical species with sub part-per-billion (ppb) detection limits. The 2-D system formed by atomically thin Pt on the carbon zero [layer](#) on SiC opens up a route for resilient and high sensitivity chemical detection and can be the path for designing new heterogenous catalysts with superior activity and selectivity.

More information: Kyung Ho Kim et al. Chemical Sensing with Atomically Thin Platinum Templated by a 2D Insulator, *Advanced Materials Interfaces* (2020). DOI: [10.1002/admi.201902104](https://doi.org/10.1002/admi.201902104)
<https://phys.org/news/2020-09-atom-thin-platinum-great-chemical-sensor.html>



Tue, 15 Sept 2020

Attosecond pulses reveal electronic ripples in molecules

By Ali Sundermier

In the first experiment to take advantage of a new technology for producing powerful attosecond X-ray laser pulses, a research team led by scientists from the Department of Energy's SLAC National Accelerator Laboratory and Stanford University showed they can create electronic ripples in molecules through a process called "impulsive Raman scattering."

Exploiting this unique interaction will allow scientists to study how electrons zipping around molecules kick off key processes in biology, chemistry, materials science and more. The researchers described their results in *Physical Review Letters*.

Typically, when X-ray pulses interact with matter the X-rays cause the molecules' innermost "core" electrons to jump to higher energies. These core-excited states are highly unstable, decaying in just millionths of a billionth of a second. In a majority of X-ray experiments, that's how the story ends: The excited electrons quickly return to their rightful places by transferring their energy to a neighboring electron, forcing it out of the atom and producing a charged ion.



However, with a sufficiently short and intense X-ray pulse, the atom can be forced to respond differently, opening up new ways to measure and control matter. The X-rays can excite the core electron but then also drive an outlying electron to fill the gap. This allows the molecule to enter an excited state while keeping its atoms in a stable, neutral state. Since this Raman process relies on core-level electrons, the electronic excitation is initially highly localized in the molecule, making it easier to pinpoint its origin and track its evolution.

"If you think of the molecule's electrons as a lake, the Raman interaction is similar to taking a rock and tossing it into the water," says co-author and SLAC scientist James Cryan. "This 'excitation' creates waves that ripple across the surface from a specific point. In a similar way, X-ray excitations create 'charge waves' that ripple across the molecule. They provide researchers with an entirely new way to measure the response of a molecule to light."

Pulses of visible light can also be used to create excited state molecules, but those pulses are more like a small earthquake that ripples the entire surface of the water. The impulsive Raman X-ray excitation gives much more information about the properties of the molecule, the equivalent of dropping rocks in various places to produce and observe different ripple patterns.

Earlier LCLS experiments demonstrated the Raman process in atoms, but until now observing this process in molecules has evaded scientists. This experiment succeeded because of recent developments in producing X-ray free-electron laser (FEL) pulses 10 to 100 times shorter than before. Led by SLAC scientist Agostino Marinelli, the X-ray Laser-Enhanced Attosecond Pulse project (XLEAP) provided a method to generate intense pulses that are just 280 attoseconds, or billionths of a billionth of a second, long. These pulses were critical to the success of the experiment and will allow scientists to jumpstart chemical reactions and coherent quantum processes in the future.

"This experiment showcases the unique properties of attosecond FELs compared to state of the art laser-based attosecond sources," Marinelli says. "Most importantly, this experiment shows how close collaboration between accelerator scientists and the user community can lead to exciting new science."

More information: Jordan T. O'Neal et al. Electronic Population Transfer via Impulsive Stimulated X-Ray Raman Scattering with Attosecond Soft-X-Ray Pulses, *Physical Review Letters* (2020). DOI: [10.1103/PhysRevLett.125.073203](https://doi.org/10.1103/PhysRevLett.125.073203)

Journal information: [Physical Review Letters](https://phys.org/news/2020-09-attosecond-pulses-reveal-electronic-ripples.html)
<https://phys.org/news/2020-09-attosecond-pulses-reveal-electronic-ripples.html>

COVID-19 Research News



Tue, 15 Sept 2020

Mechanism discovered how the coronavirus hijacks the cell

Researchers at ETH Zurich and the University of Bern have discovered a mechanism by which the corona virus manipulates human cells to ensure its own replication. This knowledge will help to develop drugs and vaccines against the coronavirus.

Like a pirate hijacking a ship, a virus takes control of an infected cell because every virus depends on the resources and molecular machines of the cell to multiply. This also applies to SARS-CoV-2, the causative agent of the COVID-19 pandemic. Researchers at ETH



Zurich and the University of Bern have now

discovered a mechanism that the corona virus uses to favor the production of its proteins over the cell's own ones. This mechanism leads to the cells greatly reducing the production of their own proteins, and instead producing almost only viral proteins. This not only boosts the production of new viruses, but also inhibits the immune response against the corona infection.

Coronaviruses replicate in a cell. On the right are complete viruses. Credit: David S. Goodsell. RCSB Protein Data Bank

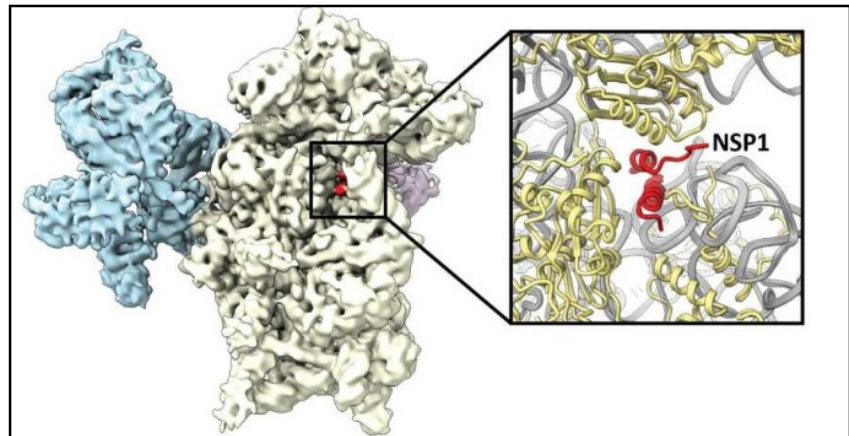
discovered a mechanism that the corona virus uses to favor the production of its proteins over the cell's own ones. This mechanism leads to the cells greatly reducing the production of their own proteins, and instead producing almost only viral proteins. This not only boosts the production of new viruses, but also inhibits the immune response against the corona infection.

After the virus has entered a human cell during a SARS-CoV-2 infection, the viral protein NSP1 is produced as one of the first viral proteins. It was already known from other corona viruses that NSP1 inhibits the production of the cell's own proteins, but it was not yet clear how this occurs. The collaborating groups from ETH Zurich and the University of Bern have now discovered how NSP1 inhibits cellular protein production. This work now appears in press and complements the independently obtained results on a related topic that were recently published by a research team in Germany.

A starting point for vaccine and drug development

Ribosomes are the cellular machines that produce proteins. They read the blueprint, the so-called messenger RNA, for a given protein and assemble the amino acids in the corresponding order. During reading, the messenger RNA passes through a channel on the ribosome. The researchers could show that NSP1 binds to this channel and thus blocks the ribosome. Using cryo-electron microscopy, the binding site of NSP1 in the ribosome channel could be elucidated at atomic resolution. "This detailed image provides important information for potential design of a

drug that can prevent NSP1 binding without interfering with ribosomal function. If NSP1 can no longer interact with the ribosome, this allows activation of cellular defense systems that can stop viral replication," explains Nenad Ban, professor for molecular biology at ETH Zurich and co-author of the study.



The virus protein NSP1 (red) binds to the ribosome (white and blue) and thus inhibits the production of cellular proteins. Credit: ETH Zurich / Nenad Ban

Using biochemical and cellular experiments, the researchers were able to show that NSP1 alone is sufficient to inhibit protein production. Based on the detailed picture of the binding mode of NSP1, the researchers were able to produce modified NSP1 variants that have lost their inhibitory effect. SARS-CoV-2 viruses with such inactive variants of the NSP1 protein will likely be attenuated that they can no longer cause severe disease. Such attenuated viruses can potentially be used as a vaccine, a principle on which many other vaccinations against viral diseases are already based.

The researchers were also interested in the question why the viral proteins are produced in large quantities despite the inhibition of ribosomal function by NSP1. They found out that the viral RNA has unique properties because of which it is read very efficiently by ribosomes compared to cellular messenger RNAs. "By NSP1 blocking ribosomes, functional ribosomes become scarce and at the same time viral RNA can make up almost half of the total RNA in the cell. Under these conditions, the viral RNA is preferentially read from the still functional ribosomes compared to the cell's own messenger RNA," explains Oliver Mühlemann, professor of biochemistry at the University of Bern and co-author of the study.

More information: Katharina Schubert et al. SARS-CoV-2 Nsp1 binds the ribosomal mRNA channel to inhibit translation, *Nature Structural & Molecular Biology* (2020). DOI: [10.1038/s41594-020-0511-8](https://doi.org/10.1038/s41594-020-0511-8)

Journal information: [Nature Structural & Molecular Biology](https://phys.org/news/2020-09-mechanism-coronavirus-hijacks-cell.html)
<https://phys.org/news/2020-09-mechanism-coronavirus-hijacks-cell.html>

Graphene used to inactivate two human coronaviruses in lab

Laser-induced graphene has been shown to inactivate coronaviruses

Laser-induced graphene has been shown to inactivate over 100 per cent of two species of human coronaviruses in 10 minutes under sunlight, during initial laboratory tests conducted in China, scientists say.

The researchers from City University of Hong Kong (CityU) plan to conduct tests with SARS-CoV-2 virus, that causes COVID-19, in future.

The team also developed graphene masks with an anti-bacterial efficiency of 80 per cent, which the researchers said can be enhanced to almost 100 per cent with exposure to sunlight for around 10 minutes.

The graphene masks are easily produced at low cost, and can help to resolve the problems of sourcing raw materials and disposing of non-biodegradable masks, according to the research published in the journal ACS Nano.

The researchers described the production of laser-induced graphene as a "green technique."

All carbon-containing materials, such as cellulose or paper, can be converted into graphene using this technique, they said.

The conversion can be carried out under ambient conditions without using chemicals other than the raw materials, nor causing pollution," they said.

"Laser-induced graphene masks are reusable. If biomaterials are used for producing graphene, it can help to resolve the problem of sourcing raw material for masks," said CityU Assistant professor, Ye Ruquan.

The researchers noted that face masks have become an important tool in fighting against the COVID-19 pandemic. Commonly used surgical masks are not anti-bacterial.

This may lead to the risk of secondary transmission of bacterial infection when people touch the contaminated surfaces of the used masks or discard them improperly, they said.

Graphene is known for its anti-bacterial properties, so as early as last September, before the outbreak of COVID-19, researchers led by Ruquan, started working on masks with laser-induced graphene.

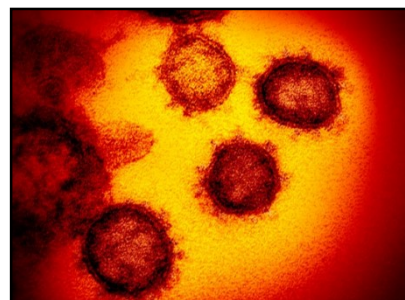
The team tested their laser-induced graphene with E. coli, and it achieved high anti-bacterial efficiency of about 82 per cent.

In comparison, the anti-bacterial efficiency of activated carbon fibre and melt-blown fabrics, both commonly-used materials in masks, were only 2 per cent and 9 per cent respectively, the researchers said.

Experiment results also showed that over 90 per cent of the E. coli deposited on them remained alive even after 8 hours, while most of the E. coli deposited on the graphene surface were dead after 8 hours, they said.

The laser-induced graphene also showed a superior anti-bacterial capacity for aerosolised bacteria.

The team is currently working with laboratories in China to test the graphene material with two species of human coronaviruses. Initial tests showed that it inactivated over 90 per cent of the virus in five minutes and almost 100 per cent in 10 minutes under sunlight.



Ye said that more research on the exact mechanism of graphene's bacteria-killing property is needed.

However, he believed it might be related to the damage of bacterial cell membranes by graphene's sharp edge, and the bacteria may be killed by dehydration induced by the water-repelling property of graphene.

<https://www.theweek.in/news/health/2020/09/14/Graphene-used-to-inactivate-two-human-coronaviruses-in-lab.html>



Tue, 15 Sept 2020

How do COVID-19 triggered blood clots affect the heart? A doctor answers

'Emerging evidence indicates that COVID-19 leads to blood clots in an estimated 30 per cent of critically-ill patients,' says Dr Zakia Khan, Senior Interventional Cardiologist of Fortis Hospital, Kalyan

There is a lot that is still to be explored, with regard to the novel coronavirus that causes COVID-19. As the healthcare sector in different countries looks for answers as to how the body reacts and defends itself when the virus invades it, newer possibilities emerge every day. Among them is the problem of the heart, and how it continues to function in the presence of the viral infection.

People who have blood clots, almost always experience a cough and sharp pain in the chest. Clotting is one of the body's natural responses to injury, and it occurs when a volume of blood changes to a semi-solid state in order to prevent excessive blood loss, says Dr Zakia Khan, Senior Interventional Cardiologist, Fortis Hospital, Kalyan.

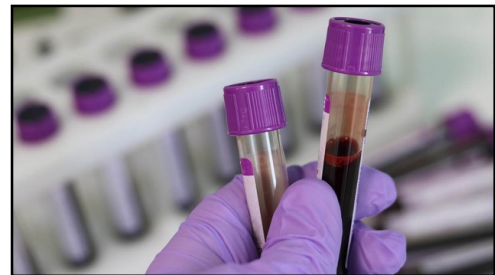
"Emerging evidence indicates that COVID-19 leads to blood clots in an estimated 30 per cent of critically-ill patients. A blood clot (also called a thrombus), increases the risk of complications and death among those who have COVID-19. This infection causes blood clots in 20–30 per cent of critically ill patients."

Dr Khan goes on to say that clots that form inside a deep vein can be extremely dangerous. These clots may not dissolve on their own, and they can stop the blood flow. In some situations, a clot can break off and travel to another part of the body. "This thrombus is then called an 'embolus'. If the embolus reaches the brain, heart, or lungs, it can result in a life-threatening condition, such as a heart attack or stroke."

The doctor says that research suggests clotting occurs when the novel coronavirus attacks the endothelial cells that line the blood vessels. "The virus does this by binding to the ACE2 receptors, which are present in the endothelial cell membrane. Once bound to the receptors, blood vessels release proteins that cause the blood to clot. Studies also indicate that COVID-19 causes the body's immune system to trigger a hyperactive inflammatory response. This inflammation may also cause clotting. There are various other factors that may also play a role in blood clotting in people with COVID-19."

Patients who require hospital care due to the infection also have other risk factors for blood clots, if they fall under any of these categories:

- Being older
- Being overweight



Excessive blood clotting in people with COVID-19 may be responsible for several complications arising from the infection. (Source: Pixabay)

- Having hypertension, or high blood pressure
- Existing diabetes
- Are on medications that increase the risk of blood clotting
- Have a history of heart failure
- Having periods of inactivity, such as prolonged bed rest
- Have undergone surgery recently
- Are a smoker or have a history of smoking
- A personal or family history of DVT or pulmonary embolism
- Those with a blood clotting disorder

Complications from blood clots on the heart

“Excessive blood clotting in people with COVID-19 may be responsible for several complications arising from the infection. Research indicates that people with COVID-19, who have a higher rate of blood clotting activity, are more likely to require treatment in the intensive care unit. Also, blood clots in the arteries can cause a heart attack or other cardiac issues. According to a study of 187 patients with COVID-19 at a hospital in Wuhan, 27.8 per cent of the patients developed damage to the heart.”

Current and developing treatments

“Treatment includes prescribing blood-thinning medications. Many doctors begin this treatment during a person’s hospital stay and continue for 2 weeks after discharge to reduce the risk of blood clots. Taking blood thinners, however, also increase the risk of bleeding out, which may make blood thinners unsuitable for high-risk patients. There are some reports that people on mechanical ventilation with COVID-19, who took blood thinners had lower mortality than those who did not take the medication. Currently, researchers are testing new treatment options to help treat and prevent blood clots,” says Dr Khan.

Prevention

The doctor suggests that the best way to prevent infection with the novel coronavirus is to practise good hand hygiene, wear a mask and practise physical distancing. “People with an increased risk of blood clots should speak with their doctor. In some cases, the doctor may recommend using blood-thinning medication. However, these medications are not suitable for everyone.”

Some other ways to reduce the risk of blood clots include:

- Staying active as much as possible
- Wearing special stockings to improve blood flow
- Drinking plenty of water to prevent dehydration
- Losing weight, if necessary
- Avoiding alcohol and tobacco consumption

<https://indianexpress.com/article/lifestyle/health/how-do-the-covid-19-triggered-blood-clots-affect-the-heart-a-doctor-answers-6595409/>

Scientists in UK test effectiveness of inhalable Covid-19 vaccine

Researchers at Imperial College London and Oxford University said a trial involving 30 people would test Covid-19 vaccines developed by both institutions when participants inhale the droplets in their mouths, which would directly target their respiratory systems

London: British scientists are beginning a small study comparing how two experimental coronavirus vaccines might work when they are inhaled by people instead of being injected.

In a statement on Monday, researchers at Imperial College London and Oxford University said a trial involving 30 people would test vaccines developed by both institutions when participants inhale the droplets in their mouths, which would directly target their respiratory systems.

Larger studies of the Imperial and Oxford vaccine are already under way, but this study aims to see if the vaccines might be more effective if they are inhaled.

"We have evidence that delivering influenza vaccines via a nasal spray can protect people against flu as well as help to reduce the transmission of the disease," said Dr Chris Chiu of Imperial, who is leading the research. He suggested that might also be the case with Covid-19.

"It is critical we explore whether targeting the airways directly can provide an effective response compared to a vaccine injected into muscle," Chiu said in a statement.

The study is currently recruiting participants aged 18 to 55 and hopes to begin vaccinating people in London in the coming weeks.

Previous studies have shown vaccines delivered by inhalation require lower doses than by injection, which might help stretch limited supplies.

"It may well be that one group has the right vaccine but the wrong delivery method, and only trials such as this will be able to tell us that," said Robin Shattock, who is leading the development of Imperial's vaccine.

The Imperial vaccine uses synthetic strands of genetic code based on the virus. Once injected into the muscle, the body's own cells are instructed to make copies of a spiky protein on the coronavirus. That is expected to trigger in turn an immune response so the body can fight off any future Covid-19 infection.

In comparison, Oxford's vaccine uses a harmless virus - a chimpanzee cold virus, engineered so it can't spread - to carry the coronavirus' spike protein into the body, which should trigger an immune response.

Last week, Oxford temporarily paused its large-scale vaccination tests after one participant in the U.K. reported severe neurological symptoms; it was restarted on Sunday.

<https://www.indiatoday.in/coronavirus-outbreak/story/scientists-in-uk-test-effectiveness-of-covid-19-vaccine-to-be-inhaled-1721749-2020-09-14>

Won't be enough Covid-19 vaccines till 2024: Serum Institute's Adar Poonawalla

Adar Poonawalla's remarks came a day after Union health minister Harsh Vardhan said a vaccine against the coronavirus disease would be ready by early next year

Edited By Kanishka Sarkar

New Delhi: Adar Poonawalla, the chief executive of Serum Institute of India (SII), has warned there won't be enough vaccines against the coronavirus disease (Covid-19) for everyone in the world till the end of 2024, according to a report on Monday.

The CEO of the world's largest vaccine manufacturer has estimated that the world will need around 15 billion doses of the Covid-19 shot if it is a two-dose vaccine. "It's going to take four to five years until everyone gets the vaccine on this planet," Poonawalla told the Financial Times.

The Pune-based pharma firm has partnered with five international pharmaceutical firms, including AstraZeneca and Novavax, to develop a Covid-19 vaccine and committed to producing one billion doses, of which it has pledged half to India.

Poonawalla's remarks came a day after Union health minister Harsh Vardhan said a vaccine against the coronavirus disease would be ready by early next year. "It may be ready by the first quarter of next year," he had said.

On SII's word to produce a billion doses, he said that the commitment far exceeded the capacity of other vaccine producers. "I know the world wants to be optimistic on it... [but] I have not heard of anyone coming even close to that [level] right now," he told the business daily in a video call from London.

The Financial Times reported that as part of SII's agreement with AstraZeneca, the firm will aim to produce vaccine doses that cost around \$3 for 68 countries and under its agreement with Novavax, for 92 countries.

The company may also partner with Russia's Gamaleya Research Institute to manufacture the Sputnik vaccine, according to the newspaper.

Last week, human trials of the Oxford vaccine candidate by AstraZeneca were halted after a volunteer fell sick in the UK following which the Serum Institute of India also paused the trials as it was issued a show-cause notice by the Drug Controller of India. The trials, however, have resumed in Britain.

After the human trials of the Oxford vaccine resumed in the UK late last week, Poonawalla had tweeted, "As I'd mentioned earlier, we should not jump to conclusions until the trials are fully concluded. The recent chain of events are a clear example why we should not bias the process and should respect the process till the end."

<https://www.hindustantimes.com/india-news/serum-institute-of-india-s-adar-poonawalla-says-there-won-t-be-enough-covid-19-vaccines-till-2024/story-nwdl0qvTOY9BCTLddiOCgO.html>



Adar Poonawalla, CEO of Serum Institute said it would take at least four to five years to produce enough Covid-19 vaccines. (Abhijit Bhatlekar/ Mint)

