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Government of India**

Ministry of Defence

Wed, 04 Nov 2020 6:01PM

Enhanced version of PINAKA Rocket System successfully Flight Tested

Enhanced PINAKA rocket, developed by Defence Research and Development Organisation (DRDO) has been successfully flight tested from Integrated Test Range, Chandipur off the coast of Odisha today, 04 November 2020. Development of Enhanced Pinaka system was taken up to achieve longer range performance compared to earlier design with reduced length. The design and development has been carried out by Pune based DRDO laboratories, namely Armament Research and Development Establishment, ARDE and High Energy Materials Research Laboratory, HEMRL.

A total of six rockets were launched in quick succession and the tests met complete mission objectives. Rockets tested have been manufactured by M/s Economic Explosives Limited, Nagpur, to whom the technology has been transferred. All the flight articles were tracked by Range instruments such as telemetry, radar and Electro Optical Tracking Systems which confirmed the flight performance.

Enhanced version of the Pinaka rocket would replace the existing Pinaka Mk-I rockets which are currently under production.

<https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1670104>



**Press Information Bureau
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रक्षा मंत्रालय

Wed, 04 Nov 2020 6:01PM

पिनाका रॉकेट प्रणाली के अत्याधुनिक रॉकेट का सफलतापूर्वक परीक्षण

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने पिनाका रॉकेट प्रणाली के अत्याधुनिक रॉकेट का सफलतापूर्वक परीक्षण किया है। यह परीक्षण उड़ीसा स्थित एकीकृत परीक्षण केंद्र चांदीपुर केंद्र से 4 नवंबर 2020 को किया गया। डीआरडीओ द्वारा विकसित की गई पिनाका प्रणाली में नया रॉकेट पहले की तुलना में न केवल ज्यादा दूरी तक सटीक निशाना लगा सकता है, बल्कि उसी लंबाई भी पिछले रॉकेट की तुलना

में कम रखी गई है। रॉकेट की डिजाइन और लंबाई संबंधित काम डीआरडीओ की प्रयोगशाला पुणे में किया गया है। पुणे स्थित इस संस्थान को ऑर्मामेंट रिसर्च एंड डेवलपमेंट एस्टैब्लिशमेंट, एआरडीई और हाई एनर्जी मैटेरियल्स रिसर्च लैबोरेटरी, एचईएमआरएल के नाम से जाना जाता है।

बुधवार को हुए परीक्षण के दौरान, एक के बाद एक छह रॉकेट का सफल परीक्षण किया गया। परीक्षण किए गए रॉकेट का निर्माण एम/एस इकोनॉमिक एक्सप्लोसिव लिमिटेड, नागपुर द्वारा किया गया है। जिसे तकनीकी स्थानांतरित की गई। परीक्षण के दौरान रॉकेट पर निगरानी करने का काम रॉडार और इलेक्ट्रो ऑप्टिकल ट्रैकिंग सिस्टम, टेलीमेट्री उपकरणों द्वारा किया गया।

पिनाका प्रणाली के तहत अत्याधुनिक रॉकेट पिनाका एमके-1 रॉकेट की जगह लेंगे। जो अभी उत्पादन प्रक्रिया में हैं।

<https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=1670166>



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రక్షణ మంత్రిత్వ శాఖ

Wed, 04 Nov 2020 6:01PM

ఆధునీకరించిన పినాకా రాకెట్ సిస్టమ్ ప్లాట్ టెస్టింగ్ విజయవంతం

'డిఫెన్స్ రీసర్చ్ అండ్ డెవలప్‌మెంట్ ఆర్గనైజేషన్' (డీఆర్డీఓ) అభివృద్ధి చేసిన ఆధునీకరించి పినాకా రాకెట్ వ్యవస్థను ఈ రోజు (నవంబర్ 04, 2020) ఒడిశా రాష్ట్ర తీరం చండీపూర్ ఇంటిగ్రేటెడ్ టెస్టింగ్ రేంజ్ నుండి విజయవంతంగా పరీక్షించారు. మునుపటి రూపకల్పనతో పోలిస్తే.. తగ్గిన పొడవుతో సుదీర్ఘ శ్రేణి పని తీరును సాధించడానికి గాను మెరుగైన పినాకా వ్యవస్థ అభివృద్ధి జరిగింది.

ఈ వ్యవస్థ రూపకల్పన, అభివృద్ధిని పూణే ఆధారిత డీఆర్డీఓ ప్రయోగశాలల్లో చేపట్టారు. ఆర్మీమెంట్ రీసర్చ్ అండ్ డెవలప్‌మెంట్ ఎస్టాబ్లిష్‌మెంట్, ఏఆర్డీఈ మరియు హై ఎనర్జీ మెటీరియల్స్ రీసర్చ్ లాబొరేటరీ, హెచ్ఎంఆర్ఎల్లో ఆయా పనులను చేపట్టారు. ప్రయోగంలో భాగంగా మొత్తం ఆరు రాకెట్లను వెంటవెంటనే ఇక్కడ నుంచి ప్రయోగించారు. ఈ రాకెట్ల పరీక్షలు పూర్తిగా మిషన్ లక్ష్యాలను చేరుకున్నాయి. పరీక్షించిన ఈ రాకెట్లను నాగ్‌పూర్‌లోని మెస్సర్స్ ఎకనామిక్ ఎక్స్ ప్లోజివ్ లిమిటెడ్ తయారు చేసింది. వీరికి సాంకేతిక పరిజ్ఞానం బదిలీ చేయబడింది. ఈ విమాన ఆర్థికల్స్‌ను టెలిమెట్రీ, రాడార్, ఎలక్ట్రో ఆప్టికల్ ట్రాకింగ్ సిస్టమ్ రేంజ్ సాధనాలను ట్రాక్ చేశారు. ఇది విమానాల పనితీరును నిర్ధారించింది. ఆధునీకరించిన పినాకా రాకెట్ వ్యవస్థ ప్రస్తుతం ఉత్పత్తి చేస్తున్న పినాకా ఎంకె రాకెట్స్ స్థానంలో అందుబాటులోకి తీసున్నారు.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1670231>

Enhanced version of Pinaka Mk-1 missile successfully flight-tested

DRDO officials said the enhanced version of the Pinaka Mk-1 system was taken up to achieve longer-range performance compared to the earlier design with lesser length

By Sushant Kulkarni

AN enhanced version of the Pinaka Mk-1 missile, developed by the Defence Research and Development Organisation (DRDO) was successfully flight-tested from the Integrated Test Range in Chandipur, off the coast of Odisha, on Wednesday.

DRDO officials said the enhanced version of the Pinaka Mk-1 system was taken up to achieve longer-range performance compared to the earlier design with lesser length. The design and development has been carried out by Pune-based DRDO laboratories — Armament Research and Development Establishment (ARDE) and High Energy Materials Research Laboratory (HEMRL).



The Enhanced Pinaka Mk-1 will eventually replace the Pinaka Mk-1 missiles, which are currently used by regiments of the Indian Army along India's frontiers with China and Pakistan.

The Pinaka rockets have a range of around 37 km. (Twitter/@DRDO_India)

The test on Wednesday was in continuation of a number of missile trials conducted by the DRDO in the last two months. A total of 15 tests, over a vast spectrum of ranges and purposes, have been conducted during this period.

The Pinaka, a multi-barrel rocket-launcher (MBRL) system named after Shiva's bow, can fire a salvo of 12 rockets over a period of 44 seconds. One battery of Pinaka system consists of six launch vehicles, accompanied by loader systems, radar and links with network-based systems and a command post. One battery can neutralise an area of 1 km by 1 km.

As a key tactic of long-range artillery battle, the launchers have to 'shoot and scoot' to ensure they themselves do not become the targets, especially being detectable due to its back blast.

The development of the Pinaka multi-barrel rocket systems was started by the DRDO in the late 1980s, as an alternative to the Multi Barrel Rocket Launcher systems of Russian make called like the 'Grad', which are still used by some regiments. After successful tests of Pinaka Mark-1 in the late 1990, it was first used successfully in the battlefield during the 1999 Kargil War. Subsequently, multiple regiments of the system came up over the 2000s.

While the Mark-1 has a range of 38 km, the enhanced version of Mark-1 tested on Wednesday has a range of 45 km and some key additional features.

DRDO has also developed and successfully tested the Mk-II and guided variants of the Pinaka, which has a range of around 60 km, while the Guided Pinaka system has a range of 75 km and has integrated navigation, control and guidance system to improve the end accuracy and enhance the range. The navigation system of Guided Pinaka missile is also aided by the Indian Regional Navigation Satellite System (IRNSS).

"A total of six rockets were launched in quick succession and the tests met complete mission objectives. Rockets tested have been manufactured by M/s Economic Explosives Limited, Nagpur,

to whom the technology has been transferred. All the flight articles were tracked by range instruments such as telemetry, radar and Electro-Optical Tracking Systems which confirmed the flight performance,” read a DRDO statement about the test.

The test on Wednesday comes months after the Ministry of Defence (MoD) announced that its acquisition wing signed contracts with three Indian private companies for supply of six regiments of Pinaka Rocket System, to be deployed along borders with Pakistan and China. The MoD has said that the induction would be completed by 2024. These six Pinaka Regiments would comprise 114 Launchers with Automated Gun Aiming and Positioning System (AGAPS), 45 command posts and 330 vehicles.

<https://indianexpress.com/article/india/drdo-test-fires-pinaka-rocket-system-6946881/>



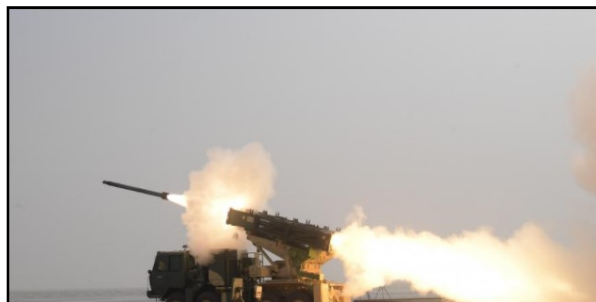
Thu, 05 Nov 2020

India successfully test-fires enhanced range Pinaka rocket

Pinaka is the first indigenous rocket system designed, developed, and produced by DRDO with the help of private industries

Bhubaneswar: Continuing the weapon testing spree amid a face-off with China along the LAC, India on Wednesday successfully test-fired an extended range version of indigenously developed Pinaka rocket from a test facility off Odisha coast.

Developed by the Pune-based Armament Research and Development Establishment (ARDE) and High Energy Materials Research Laboratory (HEMRL), the rocket was test-fired from a multi-barrel rocket launcher (MBRL) at the Integrated Test Range (ITR).



The enhanced range version of Pinaka rocket being test-fired from ITR off Odisha coast (Photo | EPS)

The enhanced range version of the weapon can destroy targets at a distance beyond 45 km. “Six rockets were launched in quick succession and the tests met all the mission objectives. All the flight articles were tracked by range instruments, including telemetry, radar, and electro-optical tracking systems, confirming the successful performance,” said a defence official.

The development of an enhanced Pinaka system was taken up to achieve longer range performance compared to an earlier design with a reduced length. The new rocket would replace the existing Pinaka Mk-I rockets, which are currently under production.

The quick reaction time and high rate of fire of the system will give an edge to the armed forces during a low-intensity conflict situation. The rockets flight-tested have been manufactured by Economic Explosives Limited, Nagpur to which the technology has been transferred.

Pinaka is the first indigenous rocket system designed, developed, and produced by DRDO with the help of private industries. Carrying different types of warheads it can be deadly for the enemy as it has the capability to destroy their solid structures and bunkers.

This rocket system has both guided and unguided versions. The trials were conducted with some improvements in the system making it more lethal. The unguided rocket system can neutralise large areas with rapid salvos.

Earlier on the day, the Indian Air Force (IAF) successfully test-fired an air-to-air missile over the Bay of Bengal against an aerial target mimicking an enemy aircraft. The Russian missile fired

from frontline fighter aircraft Sukhoi 30 MKI destroyed an expendable pilotless target aircraft. The trial conducted as part of user training exercise validated the weapon's launch envelop.

<https://www.newindianexpress.com/nation/2020/nov/04/india-successfully-test-fires-enhanced-range-pinaka-rocket-2219340.html>



Thu, 05 Nov 2020

India test-fires long range Pinaka rocket system, will be deployed to counter China

Pinaka rockets are part of the multi-barrel rocket launcher systems which are already being used by the Army and have been successfully deployed in operations in both China and Pakistan
By Shishir Gupta

India on Wednesday successfully flight-tested the enhanced version of Pinaka multi-barrel rocket system (MRLS). Indigenously developed by the Defence Research and Development Organisation (DRDO), the enhanced Pinaka along with guidance Pinaka will cover the range between 60 to 90 kilometres and will be deployed by the Indian Army.

The test-flight was carried out from Integrated Test Range (ITR) in Chandipur, off the coast of Odisha.

The DRDO said that this new rocket system has a longer range with reduced length compared to the earlier variant (Mk-1), which will now be phased out. The design and development has been carried out by Pune-based laboratories of DRDO, Armament Research & Development Establishment (ARDE) and High Energy Materials Research Laboratory (HEMRL).



The enhanced variant of Pinaka rocket system being test-fired on Wednesday. (Pic: DRDO)

“A total of six rockets were launched in quick succession and the tests met complete mission objectives,” the DRDO said after the test-fire.

All the flight articles were tracked by range instruments such as telemetry, radar and Electro Optical Tracking Systems (EOTS) which confirmed the flight performance, it further said.

The enhanced version of the Pinaka rocket would replace the existing Pinaka Mk-1 rockets. While Mk-1 had a range of 36 km, this enhanced variant can hit a target 45 to 60 km away and has been developed as per requirements of the Indian Army.

The DRDO had last year tested guided Pinaka rocket system which has a range of 70-90 km, but this improved version of Mk-1, which was test-fired today, can fill a critical gap of hitting targets that are not so far away. The guided Pinaka is more of a missile that can be pin-pointed on the target.

“The enhanced Pinaka has been developed to counter the People’s Liberation Army threat in East Ladakh with the Chinese deploying large number of rocket regiments in support of artillery guns. The rocket regiments are central to Chinese war fighting for saturation bombardment of the targets. The enhanced Pinaka and guided Pinaka have both been cleared for deployment on the borders,” said a senior DRDO official.

<https://www.hindustantimes.com/india-news/india-successfully-test-fires-enhanced-version-of-pinaka-rocket-system/story-waLts08Nqlq01cwHhACqjN.html>

India adds more muscle to its armed forces, successfully test fires advanced version of Pinaka rocket

The enhanced version of the Pinaka rocket would replace the existing Pinaka Mk-I rockets which are currently under production

By Siddhant Sibal

In a major boost for the armed forces, India on Wednesday successfully test fired the extended range of Pinaka rocket from Integrated Test Range (ITR) Chandipur off the coast of Odisha. It successfully achieved a range beyond 45 km.

A total of six rockets were launched in quick succession that hit the target and the tests met complete mission objectives. The development of Enhanced Pinaka system was taken up to achieve longer range performance compared to an earlier design with a reduced length.

The enhanced version of the Pinaka rocket would replace the existing Pinaka Mk-I rockets which are currently under production. The rocket has been developed by Defence Research and Development Organisation (DRDO) and was flight tested on November 4.



The design and development have been carried out by Pune based DRDO laboratories, namely Armament Research and Development Establishment, ARDE and High Energy Materials Research Laboratory, HEMRL.

Rockets tested have been manufactured by M/s Economic Explosives Limited, Nagpur, to whom the technology has been transferred. All the flight articles were tracked by Range instruments such as telemetry, radar and Electro-Optical Tracking Systems which confirmed the flight performance.

On October 19, India had successfully testfired the Stand-off Anti-tank (SANT) Missile off the coast of Odisha. Developed by Defence Research and Development Organisation (DRDO) for the Indian Air Force, the SANT missile will have both Lock-on after Launch and Lock-on Before Launch capability, sources said.

India test fired SANT missile just a day after a successful test of the naval version of BrahMos supersonic cruise missile. The BrahMos missile was test-fired on Sunday from an indigenously-developed Indian Navy's stealth destroyer INS Chennai. BrahMos as 'prime strike weapon' will ensure the invincibility of INS Chennai by engaging naval surface targets at long ranges, said DRDO. It added that the successful test-firing of BrahMos will make INS Chennai another lethal platform of Indian Navy.

Notably, BrahMos has been jointly designed, developed and produced by India and Russia.

<https://www.dnaindia.com/india/report-india-adds-more-muscle-to-its-armed-forces-successfully-test-fires-advanced-version-of-pinaka-rocket-2854450>

DRDO test fires enhanced version of PINAKA Rocket System; Here's everything you need to know

The enhanced version of the rocket tested which was tested today is expected to replace the existing Pinaka-Mk-1 rockets which are under production currently

By Huma Siddiqui

To achieve range in excess of 45 km, the enhanced PINAKA rocket, which has been developed by the Defence Research and Development Organisation (DRDO), was successfully tested on Wednesday (Nov 4, 2020).

According to an official note issued by the DRDO, the test of the Enhanced Pinaka was carried from the Integrated Test Range, Chandipur off the coast of Odisha. This rocket has been designed and developed by the Pune based DRDO laboratories, ARDE and HEMRL.

The enhanced version of the rocket tested which was tested today is expected to replace the existing Pinaka-Mk-1 rockets which are under production currently.

More about the Enhanced Pinaka Rocket System

In today's test six rockets were launched in quick succession.

The tests carried out met complete mission objectives.

These rockets have been manufactured by M/s Economic Explosives Limited, Nagpur. According to DRDO, the technology has been transferred to this company.

All the flight articles were tracked by Range instruments. These included telemetry, radar and Electro-Optical Tracking Systems which confirmed the flight performance.

What is Pinaka?

As has been reported by Financial Express Online, this is all-weather, indirect fire, free flight artillery rocket system.

It has the capability to provide a unique capability which helps to deliver accurately a lethal and responsive fire.

This could be against different targets — exposed enemy troops, armoured and soft skin vehicles, communication centres, air terminal complexes, fuel and ammunition dumps.

According to DRDO, this weapon system has Rocket, Battery Command Post, Loader cum Replenishment Vehicle, Replenishment Vehicle and Digicora MET Radar and Multi Barrel Rocket launcher.

The Made in India system has been using a new guided rocket with an Israeli designed Trajectory Control System (TCS). This was tested in 2013 and had a range of 65 km at that time.

The DRDO is keen on achieving a 120 km range and had in 2019 after several tests reached 90 km.

<https://www.financialexpress.com/defence/drdo-test-fires-enhanced-version-of-pinaka-rocket-system-heres-everything-you-need-to-know/2121061/>

DRDO ने चांदीपुर में किया एडवांस पिनाका रॉकेट का सफल परीक्षण, तबाह होंगे दुश्मनों के मंसूबे

Pinaka Missile System Developed By DRDO: पूरी तरह स्वदेशी तकनीक से निर्मित पिनाका गाइडेड रॉकेट लांच सिस्टम के अपग्रेड संस्करण का ओडिशा के समुद्री तट पर शुक्रवार को भी सफल परीक्षण किया गया। इस दौरान परीक्षण के लिए तय किए गए सभी मानक सफलतापूर्वक हासिल किए गए।

By Abhishek Shukla

हाइलाइट्स:

- चांदीपुर में किया एडवांस पिनाका रॉकेट का सफल परीक्षण
- टेलीमेट्री, रडार और इलेक्ट्रो-ऑप्टिकल ट्रैकिंग सिस्टम जैसे रेंज इंस्ट्रूमेंट्स द्वारा ट्रैक किया गया
- अपग्रेडेड संस्करण मौजूदा पिनाका एमके-1 रॉकेटों की जगह लेगा

नई दिल्ली: गलवान घाटी में धोखेबाजी करने वाले चीन (China) को सबक सिखाने के लिए भारत हर स्तर पर तैयार है। लाइन ऑफ एक्चुअल कंट्रोल (LAC) पर अतिरिक्त जवानों की तैनाती से लेकर हिंद महासागर में नौसेना के बेड़े को बढ़ाने तक, जल-थल और नभ में भारत ने जिस तरह अपनी शक्ति को स्थापित किया है। उससे पार पाना भी चीन के लिए बिल्कुल आसान नहीं होगा। इसी तर्ज पर पूरी तरह स्वदेशी तकनीक से निर्मित पिनाका गाइडेड रॉकेट लांच सिस्टम के अपग्रेड संस्करण का ओडिशा के समुद्री तट पर शुक्रवार को भी सफल परीक्षण किया गया। इस दौरान परीक्षण के लिए तय किए गए सभी मानक सफलतापूर्वक हासिल किए गए।

दरअसल पिनाका सिस्टम की एक बैटरी में छह लॉन्च वेहिकल होते हैं, साथ ही लोडर सिस्टम, रडार और लिंक विद नेटवर्क सिस्टम और एक कमांड पोस्ट होती है। पिनाका के सफल परीक्षण के साथ, भारत ने अब तक दो महीनों से भी कम समय में 11 मिसाइलों का परीक्षण कर लिया है। इन मिसाइलों का परीक्षण ऐसे समय में किया जा रहा है जब पूर्वी लद्दाख में वास्तविक नियंत्रण रेखा पर भारत और चीन के बीच करीब पांच महीनों से भी ज्यादा समय से तनातनी जारी है।



सभी उड़ान लेखों को टेलीमेट्री, रडार और इलेक्ट्रो-ऑप्टिकल ट्रैकिंग सिस्टम जैसे रेंज इंस्ट्रूमेंट्स द्वारा ट्रैक किया गया था। पिनाका रॉकेट का ये अपग्रेडेड संस्करण मौजूदा पिनाका एमके-1 रॉकेटों की जगह लेगा जो वर्तमान में उत्पादन में हैं।

भगवान शिव के धनुष की तर्ज पर रखा गया नाम

इस रॉकेट के इसी साल मार्च में राजस्थान की पोखरण टेस्ट रेंज में भी तीन सफल परीक्षण किए गए थे। अब यहां भी परीक्षण की सफलता को सेना की आर्टिलरी क्षमता बढ़ाने की दिशा में अहम कदम माना जा रहा है। भगवान शिव के धनुष 'पिनाक' के नाम पर डेवलप किए गए इस मिसाइल सिस्टम को भारत और पाकिस्तान से लगी सीमाओं पर तैनात करने के मकसद से बनाया गया है।

<https://navbharattimes.indiatimes.com/india/drdo-successfully-tests-advanced-pinaka-rocket-in-chandipur/articleshow/79040961.cms>

Extended version of Pinaka rocket system test-red successfully

Bengaluru: India on Wednesday successfully test-red an enhanced version of Pinaka rocket system.

According to Ministry of Defence, the Pinaka rocket system developed by the Defence Research and Development Organisation (DRDO) was flight-tested from the Integrated Test Range, Chandipur off the coast of Odisha.

Six rockets were launched in quick succession and all the tests met complete mission objectives.

"We are happy with the results. The flight data from each ring will be now analysed to see the progress we have made in this new version," an official said.

All the flight articles were tracked by range instruments such as telemetry, radar and electro optical tracking systems, confirming various flight performances.

Enhanced version of the Pinaka rocket would replace the existing Pinaka Mk-I rockets which are currently under production.



DRDO took up the development of enhanced Pinaka system to achieve longer range performance compared to earlier design with

The design and development has been carried Armament Research and Development Establishment and High Energy Materials Research Laboratory, both based out of Pune.

MoD said the rockets tested today were manufactured by Economic Explosives Limited based out of Nagpur, to whom the technology has been transferred.

In August this year, the MoD had signed contracts worth Rs 2,580 crore with multiple companies for supply of Pinaka regiments to the Indian Army, giving a renewed push to the self-reliance initiatives.

Accordingly, separate pacts were inked Bharat Earth Movers Ltd., Tata Power Company Ltd and Larsen & Toubro for the supply of six Pinaka regiments. These regiments comprise 114 launchers with Automated Gun Aiming & Positioning System, 45 Command Posts and 330 vehicles.

MoD said that the regiments will be operationalised along the northern and eastern borders to enhance the operation preparedness of our armed forces.

As per the current plan, the induction of these regiments will be completed by 2024.

"Several new systems are on board the enhanced version making it more lethal weapon. There will be more tests lined up to test some of the advanced features as well," an official said.

The rocket takes its name from Lord Shiva's bow.

DRDO Chairman Dr G Satheesh Reddy had told Onmanorama early this year in an interview that his team is committed to the vision of Prime Minister Narendra Modi.

"The PM has given the mandate of defence export of \$5 billion in the next five years. We have taken several steps to reduce the important content in defence manufacturing by looking at various means to boost the indigenous contribution," Dr Reddy had said.

In the last one month alone, DRDO test-fired over a dozen missiles, catching up with the time lost this year following the COVID-19 outbreak.

<https://www.onmanorama.com/news/nation/2020/11/04/extended-version-of-pinaka-rocket-system-test-fired-successfully.html>

Defence News

Defence Strategic: National/International



Thu, 05 Nov 2020

Indian Army's imported extreme cold weather clothing seen in action

The Indian Army had received the first batch of the extreme cold weather clothing from the US on Tuesday

By Vishnu Som, Edited By Divyanshu Dutta Roy

New Delhi: Indian soldiers are all set to brave the harsh winter in eastern Ladakh with the latest in extreme cold weather clothing imported from the US as the standoff with China shows no sign of easing.

A photo released by defence sources to news agency ANI on Wednesday showed a soldier of the Indian army wearing the all-white attire along with a recently acquired SIG Sauer assault rifle.

The army is providing new habitats and clothing to soldiers to help beat winters during deployment along the China border, ANI reported.

The Indian Army had received the first batch of the extreme cold weather clothing from the US on Tuesday, reports had said.

The Indian Army maintains a stock of 60,000 of these extreme cold weather clothing sets for troops deployed in the entire Ladakh region including both western fronts in Siachen and Eastern Ladakh sector, sources told ANI.

This year, there was a need for an additional 30,000 of these sets as close to 90,000 troops are posted in the region to counter Chinese aggression along the Line of Actual Control or LAC.

The delivery of the American gear comes days after a visit by the US Secretary of State Mike Pompeo and Defence Secretary Mark T Esper for crucial talks to boost defence and security ties between the two countries.

With strong words for China, Mr Pompeo said the US "stands with India to deal with any threat".

The tension between India and China in eastern Ladakh peaked in June this year in a clash that left 20 Indian soldiers dead and an unspecified number of Chinese casualties.

The two countries have moved tens of thousands of troops and weapons into the high-altitude region since March and several rounds of talks have failed to significantly ease tensions.

<https://www.ndtv.com/india-news/indian-armys-imported-extreme-cold-weather-clothing-seen-in-action-2320672>

Second batch of Rafale aircraft arrives in India, Defence Minister congratulates IAF

Three more French-made Rafale fighter aircraft arrived in India on Wednesday and will soon be inducted into the IAF and operationalised. "The IAF pilots brought home the second batch of three Rafale aircraft today after flying non-stop from France," Defence Minister Rajnath Singh said

IAF said in a tweet that the second batch of Rafale aircraft arrived in India on Wednesday. "Second batch of IAF #Rafale aircraft arrived in India at 8:14 pm on 04 Nov 20 after flying non-stop from France," the Indian Air Force (IAF) stated.

This second batch of three Rafale aircraft took off from a French airbase and reached India after three mid-air refuelling en route. The Rafale aircraft covered the distance from France to India in a span of eight hours, showcasing the IAF's long-range operational capability.

"Another flight in strategic partnership: Next batch of #Rafale jets landed safely in India after non stop flight from France with multiple mid air refueling," the Indian Embassy in France said in a tweet.



Second batch of Rafale aircraft photographed on Wednesday (Picture Courtesy: Twitter @Indian_Embassy)

Sharing a video of the second batch of Rafale aircraft landing in India, Defence Minister Rajnath Singh said in a tweet, "The IAF pilots brought home the second batch of three Rafale aircraft today after flying non-stop from France in a ferry that lasted for over 8 hours. RM @rajnathsingh congratulates @IAF_MCC for successfully accomplishing a highly complex mission in a professional & safe manner."

The first batch of five Rafale jets arrived in India on July 28 and was inducted into the IAF on September 10. With the arrival of the second batch, the IAF now has a total of eight Rafale fighter aircraft.

Sources in the central government told India Today earlier that the second batch of three Rafale jets will be operationalised within a few days in light of the ongoing military standoff in eastern Ladakh.

<https://www.indiatoday.in/india/story/second-batch-of-rafale-aircraft-arrives-in-india-defence-minister-congratulates-iaf-1738056-2020-11-04>

GRSE looking forward to engaging countries in eastern and western worlds: Chairman

Synopsis

The defence PSU will play a very crucial role in the country's defence export target of five billion dollars by 2024-25, Rear Admiral V K Saxena told PTI in an interview.

Kolkata: Garden Reach Shipbuilders and Engineers Ltd (GRSE NSE -0.21 %) is looking at engaging customers both in the eastern and western worlds to export and manufacture defence platforms, its chairman Rear Admiral V K Saxena said.

The defence PSU will play a very crucial role in the country's defence export target of five billion dollars by 2024-25, Saxena told PTI in an interview.

GRSE, which has a strong order book of Rs 26,544 crore from Indian Navy and Coast Guard, is in talks with countries like Philippines in the east and some in the western region as well, he said.

"GRSE is working very hard towards the export initiative. You might hear some good news in the next few months in regards to the export as indications are very positive", Saxena said.

"We are in conversation and interactions through our missions in Philippines and other countries on the eastern side. We are also engaged on the western side," he said but declined to elaborate either about the countries or the projects.

Asked about possible collaborations with Bangladesh, he said GRSE is hopeful of getting contracts of making bailey bridges for its army.

"We already have an MOU with Khulna shipyard, where there is a possibility of working together. We are also in touch through our high commission there ... We may get some orders of bailey bridges for the Bangladesh army. There are some platforms on which they (Bangladesh) have shown interests," he said.

On the ongoing projects of GRSE, Saxena said the warship maker has three major contracts and a strong order book of Rs 26,455 crore.

"In case we have orders from Navy or Coast Guard the order book is going to get stronger," he said.

The three major ongoing contracts of GRSE consist of three P17A stealth frigates, four survey vessels (large), eight anti-submarine warfare shallow water crafts. The GRSE will be delivering the last in the series of landing craft utility (LCU) L-58 by the year end which is on trial mode now, Saxena said.

GRSE has reported a 48 per cent increase in net profit to Rs 49.69 crore during the quarter ended March 2020, despite a fall in its income in the period, he said.

On the modernisation of GRSE Saxena said apart from stressing on research and design, the company is also planning to increase its building capacity to 24 ships from 20 ships.

"Presently we can build 20 ships concurrently, eight large and 12 medium ships. We want to increase the capacity to 24 ships in three-four years," he said.



Chief of the Army Staff, General Manoj Mukund Naravane with Vice Adm Atul Kumar Jain FOC-in-C, ENC, Rear Adm Vipin Kumar Saxena (Retd), CMD, GRSE Kolkata, and Cdr Sandeep Singh Commanding Officer, INS Kavaratti

Speaking on the MoU with Elbit Systems of Israel to manufacture multi-role unmanned surface vessels (USV) which can offer an interim solution to Navy's shortage of mine sweepers, Saxena said the Request for Information (RFI) was responded to by the Indian Navy and GRSE is waiting for Request for Proposal from it.

USV is capable of detecting and neutralising naval mines, he said adding, "We are hopeful of getting some contracts from the Navy in the future".

On P17A stealth frigates manufactured by GRSE, Saxena said once inducted it is going to be the most potent frontline warship of the Indian Navy as the Brahmos missile system can be fitted into it.

Saxena said that the lockdown has impacted the production of GRSE as the sector is workforce intensive.

The company has taken steps as per the COVID-19 protocol and has adopted techniques to keep up with the production while keeping the pandemic at bay, he added.

<https://economictimes.indiatimes.com/news/defence/grse-looking-forward-to-engaging-countries-in-eastern-and-western-worlds-chairman/articleshow/79041491.cms>

The Tribune

Thu, 05 Nov 2020

Military proposes pension cut, increase in retirement age of armed forces officers

In the ongoing fiscal ending March 31, 2021, the pension bill stands at 28 per cent of the overall budget

By Ajay Banerjee

New Delhi: In a path-breaking move, the Department of Military Affairs has initiated a twin-move: one to 'review'--cut down--the pension for those officers opting for premature retirement and the second to increase the retirement age of officers of the Indian armed forces.

The issue has come under severe criticism as the pension formula will change in a manner which could impact the financial position of those retiring now. A senior lawyer, who deals in the subject of military law, said "the DMA has no locus standi to alter pension formula and it will be challenged in court".

The DMA, headed by General Bipin Rawat, is the newly created entity under the Ministry of Defence (MoD) and is tasked for HR and coordination issues between the Army, Navy and the Indian Air Force (IAF).

A letter sent out by the DMA office on October 29 says a draft of the Government Sanction Letter (GSL) is being readied by November 10 for review by General Rawat, who is the Secretary of the DMA and also the Chief of Defence Staff.

This letter proposes to increase the retirement age of Colonels, Brigadiers and Maj Generals to 57 years, 58 years and 59 years, respectively. The same will apply to officers of similar ranks in the Navy and the IAF. The existing retirement age for Colonels, Brigadiers and Maj Generals is 54 years, 56 years and 58 years, respectively.



Photo for representation only.

The core issue is the pension formula which is now suggested to be in a format that increases the emoluments with years of service.

As per the proposal, an officer with 20-25 years of service will get 50 per cent of 'entitled pension'. The existing entitled pension is 50 per cent of the last pay drawn. In other words the pension will be halved.

An officer serving for 26-30 years would get 60 per cent of entitled pension; those doing 30-35 years of service will get 75 per cent of entitled pension. Only those who do more than 35 years of service will be entitled for full pension, that is 50 per cent of the last pay drawn.

A functionary pointed out that, only those who get commissioned by 22 years of age will be eligible for full pension after serving for 35 years as they could retire at Colonel's at 57 years of age.

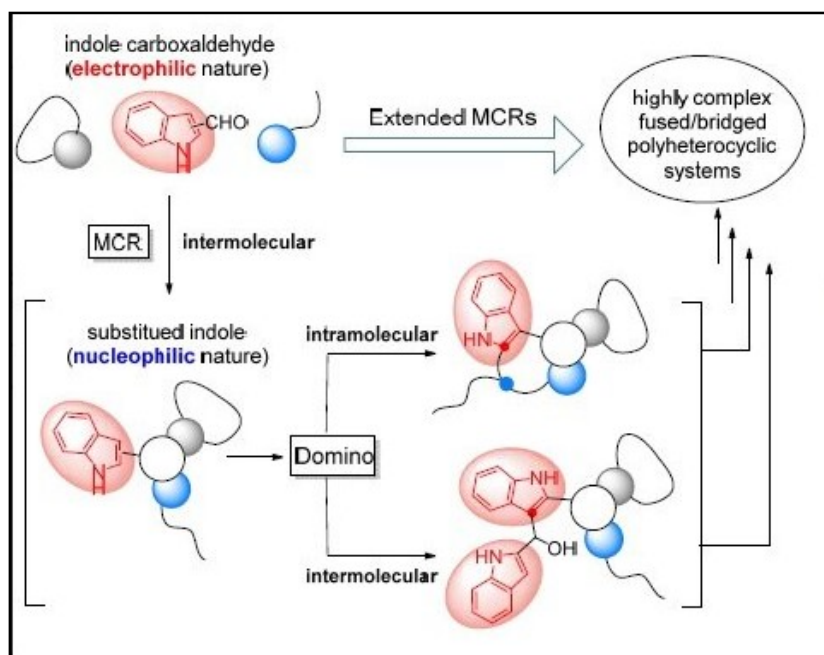
There has been an ongoing debate on rising pension bill of the MoD since the 'One rank, one pension' was implemented. In the ongoing fiscal ending March 31, 2021, the pension bill stands at Rs 1,33,819 crore, which is 28 per cent of the overall budget of the MoD at Rs 4,71,372 crore.

<https://www.tribuneindia.com/news/nation/military-proposes-pension-cut-increase-in-retirement-age-of-armed-forces-officers-165910>

New multicomponent reaction frontiers

The synthesis of complex molecules such as drugs, requires a process that sometimes involves several phases that increase its cost and restrict access to the product. Now, a team at the University of Barcelona has designed a new methodological approach that combines multicomponent reactions with domino type processes—continuous transformations on a single compound—to ease the synthesis of high structural complex molecules.

The study, published in the journal *Angewandte Chemie International Edition*, is led by Professor Rodolfo Lavilla, from the Faculty of Pharmacy and Food Sciences and the Institute of Biomedicine (IBUB) of the University of Barcelona. The study, whose first signatories are researchers Ouldouz Ghasghaei and Marina Pedrola (UB-IBUB), counts on the participation of experts from Masaryk University (Czech Republic) and the Leibniz Research Institute for Environmental Medicine (Germany).



The experts create a main principle by which the polarity change of a reactive in a multicomponent process unchains domino reactions. Credit: *Angewandte Chemie International Edition*

Multicomponent reactions: More simplicity and efficiency

Multicomponent reactions are protocols that ease the chemical synthesis of new high complexity and structural diversity compounds. These reactions can form several bonds and generate new molecules with a minimum amount of three reagents. These processes are very direct and help obtain molecules in a quick and efficient way (simplicity, atom economy, etc.) compared to traditional processes. Also, these are also the most sustainable synthetic pathways from an environmental perspective (saving resources, less waste, etc.).

In the study, the experts create a main principle by which the polarity change of a reactive in a multicomponent process unchains domino reactions that enable the access to a complex connectivity. This principle would explain many transformations and would ease the design of new processes in the field of synthetic chemistry.

According to Lavilla, the new principle has been developed "with indole nuclei, a heterocycle present in many natural molecules, and particularly in drugs. Also, the compounds that were prepared with this methodology present a high structural variability (linear and angular fused rings, rigid or flexible compounds, etc.)." In the biological field, most of the products the researchers synthesized "present a powerful activity as ligands of the aryl hydrocarbon receptor," he adds, "a

molecule with a determining role in several biological processes that is regarded as a potential pharmacological target for the development of new drugs."

So far, only a few specific cases of multicomponent reactions associated with a domino process had been described. "Both domino and multicomponent reactions are very complex at a mechanistic scale. There are many bonds, and many elemental phases, reaction intermediates, and so on," notes the researcher. He adds that by merging these two reaction families into an only process "we increase the synthetic complexity extraordinarily. Therefore, we consider the description of these processes to be an advance to generalize them and expand them into combinations in synthetic chemistry."

Technology for a greener chemistry

Multicomponent reactions eased the development of new molecules of pharmaceutical and biomedical interest (biological probes, fluophores, complex [molecules](#)). These techniques are getting more exploited by other industrial sectors every day.

"However, there are very few general multicomponent reactions -about a dozen compared to the hundreds of biomolecular reactions-, and this limits its applicability. In this sense, a great scientific activity is being carried out in this field to ease the access to this type of general connectivity through these reactions, and enable its application to the development of all types of organic compounds at a large scale (drugs, plastics, fertilizers, etc.)," concludes the researcher.

More information: Rodolfo Lavilla et al, Extended Multicomponent Reactions with Indole Aldehydes. Access to Unprecedented Polyheterocyclic Scaffolds, Ligands of the Aryl Hydrocarbon Receptor, *Angewandte Chemie International Edition* (2020). DOI: [10.1002/anie.202011253](https://doi.org/10.1002/anie.202011253)

Journal information: [Angewandte Chemie International Edition](#)
<https://phys.org/news/2020-11-multicomponent-reaction-frontiers.html>



Thu, 05 Nov 2020

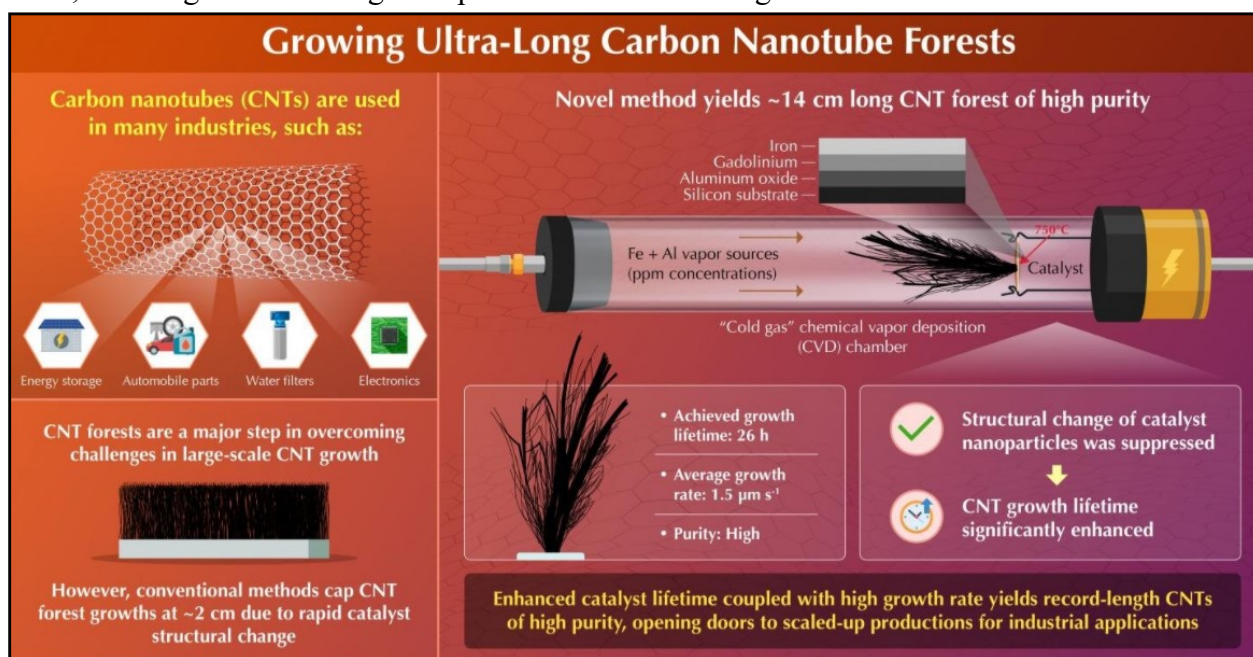
Scientists grow carbon nanotube forest much longer than any other

Today, a multitude of industries, including optics, electronics, water purification, and drug delivery, innovate at an unprecedented scale with nanometer-wide rolls of honeycomb-shaped graphite sheets called carbon nanotubes (CNTs). Features such as light weight, convenient structure, immense mechanical strength, superior thermal and electrical conductivities, and stability put CNTs a notch above other material alternatives. However, to supply their rising industrial demand, their production must be constantly scaled up, and therein lies the main challenge to using CNTs.

While scientists have been able to grow individual CNTs approximately 50 cm in length, when they attempt arrays, or forests, they hit a ceiling at around 2 cm. This is because the catalyst, which is key to CNT growth occurring, deactivates and/or runs out before CNTs in a forest can grow any longer, driving up monetary and raw-material costs of CNT production and threatening to cap its industrial use.

Now, a ceiling-breaking strategy has been devised by a team of scientists from Japan. In their study published in *Carbon*, the team presents a novel approach to a conventional technique that yields CNT forests of record length: ~14 cm—seven times greater than the previous maximum. Hisashi Sugime, Assistant Professor at Waseda University, who led the team, explains, "In the conventional technique, the CNTs stop growing due to a gradual structural change in the catalyst, so we focused on developing a new technique that suppresses this structural change and allows the CNTs to grow for a longer period."

The team created a catalyst based on their findings in a previous study to begin with. They added a gadolinium (Gd) layer to the conventional iron-aluminum oxide (Fe/Al₂O_x) catalyst coated onto a silicon (Si) substrate. This Gd layer prevented the deterioration of the catalyst to a certain extent, allowing the forest to grow up to around 5 cm in length.



Scientists from Japan have proposed a way to ensure longer catalyst lifetime and higher growth rate, creating a CNT forest that is a record seven times longer than any existing CNT array. Credit: Waseda University

To further prevent catalyst deterioration, the team placed the catalyst in their original chamber called the cold-gas chemical vapor deposition (CVD) chamber. There, they heated it to 750°C and supplied it with small concentrations (parts-per-million) of room temperature Fe and Al vapors.

This kept the catalyst going strong for 26 hours, in which time a dense CNT forest could grow to 14 cm. Various analyses to characterize the grown CNTs showed that they were of high purity and competitive strength.

This achievement not only overcomes hurdles to the widespread industrial application of CNTs but it opens doors in nanoscience research. "This simple but novel method that drastically prolongs catalyst lifetime by supplying ppm-level vapor sources is insightful for catalyst engineering in other fields such as petrochemistry and nanomaterial crystal growth," Sugime says. "The knowledge herein could be pivotal to making nanomaterials a ubiquitous reality."

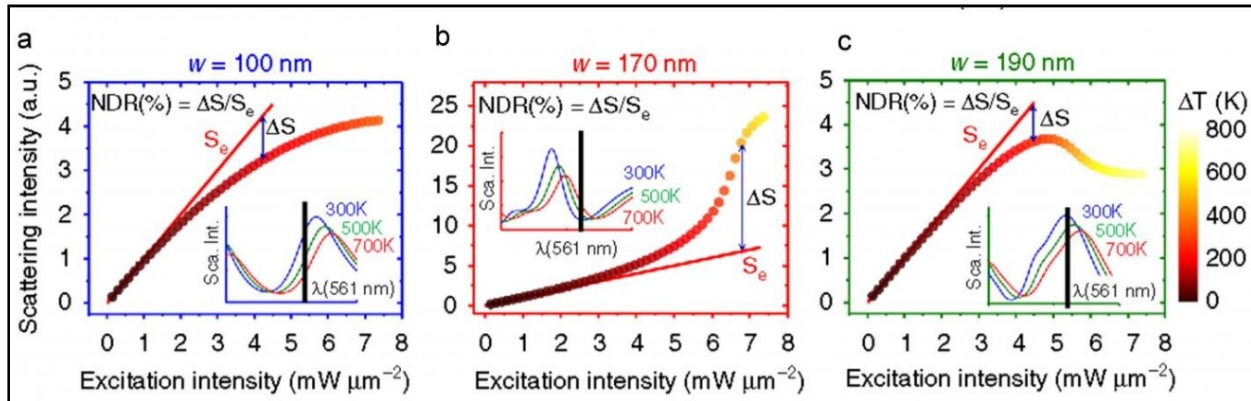
More information: Hisashi Sugime et al, Ultra-long carbon nanotube forest via in situ supplements of iron and aluminum vapor sources, *Carbon* (2020). DOI: [10.1016/j.carbon.2020.10.066](https://doi.org/10.1016/j.carbon.2020.10.066)

Journal information: [Carbon](https://doi.org/10.1016/j.carbon.2020.10.066)

<https://phys.org/news/2020-11-scientists-carbon-nanotube-forest-longer.html>

A one hundred thousand-fold enhancement in the nonlinearity of silicon

A team of researchers led by Osaka University and National Taiwan University created a system of nanoscale silicon resonators that can act as logic gates for light pulses. This work may lead to the next generation of silicon-based computer processors that bridge the gap between electronic and optical signals.



Light scattering intensity in a silicon Mie resonator as a function of the excitation strength with resonator sizes of 100, 170, and 190 nm. The solid red lines show the corresponding linear responses. Credit: Osaka University

Silicon is among the abundant elements on our planet—and is the basis for all modern computing. That is, from smartphones to mainframes, all computation happens based on electrical signals coursing through silicon transistors. Making switches and logic gates from electronic signals is easy, since voltages can control the flow of current in other wires. However, data on the internet is primarily sent as light pulses over fiber optic cables. The ability to control both data and logic completely with light on silicon could lead to much faster devices.

The challenge is that particles of light, called photons, hardly interact with each other, so pulses cannot switch each other on or off to perform logical tasks. Nonlinear optics is the field of study that works to find materials in which beams of light interact in some way. Unfortunately, the nonlinearity of single crystal silicon is extremely weak, so in the past, it was necessary to use very intense lasers.

Now, scientists at Osaka University and National Taiwan University have increased the nonlinearity of silicon 100,000 times by creating a nano-optical resonator, so that all-optical switches can be operated using a continuous low-power laser. They accomplished this by fabricating tiny resonators from blocks of silicon less than 200 nm in size. Laser light with a wavelength of 592 nm can become trapped inside and rapidly heat the blocks, based on the principle of Mie resonance. "A Mie resonance occurs when the size of a nanoparticle matches a multiple of the light wavelength," author Yusuke Nagasaki says.

With a nanoblock in a thermo-optically induced hot state, a second laser pulse at 543 nm can pass with almost no scattering, which is not the case when first laser is off. The block can cool with relaxation times measured in nanoseconds. This large and fast nonlinearity leads to potential applications for GHz all-optical control at the nanoscale. "Silicon is expected to remain the material of choice for optical integrated circuits and optical devices," senior author Junichi Takahara says.

The current work allows for optical switches that take up much less space than previous attempts. This advance opens the way for direct on-chip integration as well as super-resolution imaging.

More information: Yi-Shiou Duh et al, Giant photothermal nonlinearity in a single silicon nanostructure, *Nature Communications* (2020). DOI: [10.1038/s41467-020-17846-6](https://doi.org/10.1038/s41467-020-17846-6)

Journal information: [Nature Communications](https://www.nature.com)
<https://phys.org/news/2020-11-thousand-fold-nonlinearity-silicon.html>



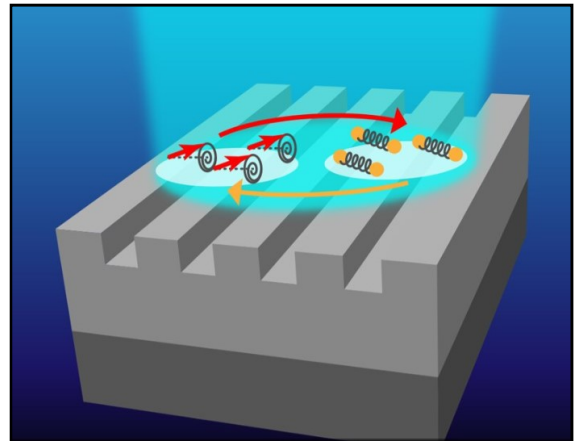
Thu, 05 Nov 2020

Observing magnon-polarons using a nanopatterned magnetic structure lit by short laser pulses

By Bob Yirka

A team of physicists from Germany, Russia, Ukraine and the United Kingdom has found a new way to observe magnon-polarons by using a nanopatterned magnetic structure lit with short laser pulses. In their paper published in the journal *Physical Review B*, the group describes extending prior research involving magnon-polarons to develop a better method for observing magnon polarons.

Magnons are quantized spin waves that carry information, but because they are difficult to manipulate, there have been no practical applications. Polarons are quasiparticles that have been used by researchers to study interactions between atoms and electrons in solid materials. Both magnons and polarons are the subject of research efforts aimed at packing more information into smaller spaces (for computers, smartphones, etc.) Some of that research has involved using phonons (lattice deformations) to excite magnons. In such work, energy is transferred in just one direction. In more recent work, researchers have produced mutual interactions that result in the formation of magnon-polarons, hybrid quasiparticles that are no longer either phonons or magnons.



In a nanopatterned magnetic structure illuminated by a short laser pulse, magnons and photons couple to form quasiparticles called magnon-polarons. Credit: APS/Alan Stonebraker/ Physics

Devices capable of working with magnon-polarons remained elusive until last year, when a team at Lawrence Berkeley National Laboratory used a nanomagnet to observe a magnon-polaron. This is believed to be a necessary step for creating a device that could make use of them. In this new effort, the researchers have built on that effort by developing a more sophisticated apparatus that allowed them to view a magnon-polaron for a longer period of time and in more detail.

The new apparatus was made by first carving grooves into a thin film made of Gallium. The grooves on the surface of the film served as a means for impacting the spatial distribution of phonons and magnons. The team then used a pump probe to observe magnons and phonons as they interacted during formation of magnon-polarons. A secondary pulse probe was then applied as a means of measuring reflectivity. The final step was applying a magnetic field to tune the frequency of the mode of the magnon. In addition to allowing the researchers an opportunity to watch as magnon-polarons formed, the apparatus allowed them to tune the hybrids as they were formed to create a stronger hybridization between them.

More information: F. Godejohann et al. Magnon polaron formed by selectively coupled coherent magnon and phonon modes of a surface patterned ferromagnet, *Physical Review B* (2020). DOI: [10.1103/PhysRevB.102.144438](https://doi.org/10.1103/PhysRevB.102.144438)



Thu, 05 Nov 2020

Using quantum properties of light to transmit information

By Bob Marcotte

Researchers at the University of Rochester and Cornell University have taken an important step toward developing a communications network that exchanges information across long distances by using photons, mass-less measures of light that are key elements of quantum computing and quantum communications systems.

The research team has designed a nanoscale node made out of magnetic and semiconducting materials that could interact with other nodes, using laser light to emit and accept photons.

The development of such a quantum network—designed to take advantage of the physical properties of light and matter characterized by quantum mechanics—promises faster, more efficient ways to communicate, compute, and detect objects and materials as compared to networks currently used for computing and communications.

Described in the journal *Nature Communications*, the node consists of an array of pillars a mere 120 nanometers high. The pillars are part of a platform containing atomically thin layers of semiconductor and magnetic materials.

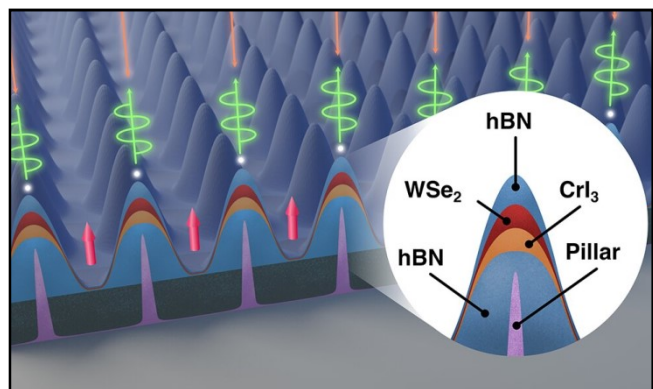
The array is engineered so that each pillar serves as a location marker for a quantum state that can interact with photons and the associated photons can potentially interact with other locations across the device—and with similar arrays at other locations. This potential to connect quantum nodes across a remote network capitalizes on the concept of entanglement, a phenomenon of quantum mechanics that, at its very basic level, describes how the properties of particles are connected at the subatomic level.

"This is the beginnings of having a kind of register, if you like, where different spatial locations can store information and interact with photons," says Nick Vamivakas, professor of quantum optics and quantum physics at Rochester.

Toward 'miniaturizing a quantum computer'

The project builds on work the Vamivakas Lab has conducted in recent years using tungsten diselenide (WSe₂) in so-called Van der Waals heterostructures. That work uses layers of atomically thin materials on top of each other to create or capture single photons.

The new device uses a novel alignment of WSe₂ draped over the pillars with an underlying, highly reactive layer of chromium triiodide (CrI₃). Where the atomically thin, 12-micron area



This illustration of a nanoscale node created by the lab of Nick Vamivakas, professor of quantum optics and quantum physics, shows a closeup of one of an array pillars, each a mere 120 nanometers high. Each pillar serves as a location marker for a quantum state that can interact with photons. A novel alignment of tungsten diselenide (WSe₂) is draped over the pillars with an underlying, highly reactive layer of chromium triiodide (CrI₃). Where the atomically thin, 12-micron area layers touch, the CrI₃ imparts an electric charge to the WSe₂, creating a "hole" alongside each of the pillars. Credit: University of Rochester illustration / Michael Osadciw

layers touch, the CrI3 imparts an electric charge to the WSe2, creating a "hole" alongside each of the pillars.

In quantum physics, a hole is characterized by the absence of an electron. Each positively charged hole also has a binary north/south magnetic property associated with it, so that each is also a nanomagnet

When the device is bathed in laser light, further reactions occur, turning the nanomagnets into individual optically active spin arrays that emit and interact with photons. Whereas classical information processing deals in bits that have values of either zero or one, spin states can encode both zero and one at the same time, expanding the possibilities for information processing.

"Being able to control hole spin orientation using ultrathin and 12-micron large CrI3, replaces the need for using external magnetic fields from gigantic magnetic coils akin to those used in MRI systems," says lead author and graduate student Arunabh Mukherjee. "This will go a long way in miniaturizing a quantum computer based on single hole spins."

Still to come: Entanglement at a distance?

Two major challenges confronted the researchers in creating the device.

One was creating an inert environment in which to work with the highly reactive CrI3. This was where the collaboration with Cornell University came into play. "They have a lot of expertise with the chromium triiodide and since we were working with that for the first time, we coordinated with them on that aspect of it," Vamivakas says. For example, fabrication of the CrI3 was done in nitrogen-filled glove boxes to avoid oxygen and moisture degradation.

The other challenge was determining just the right configuration of pillars to ensure that the holes and spin valleys associated with each pillar could be properly registered to eventually link to other nodes.

And therein lies the next major challenge: finding a way to send photons long distances through an optical fiber to other nodes, while preserving their properties of entanglement.

"We haven't yet engineered the device to promote that kind of behavior," Vamivakas says. "That's down the road."

More information: Arunabh Mukherjee et al. Observation of site-controlled localized charged excitons in CrI3/WSe2 heterostructures, *Nature Communications* (2020). DOI: [10.1038/s41467-020-19262-2](https://doi.org/10.1038/s41467-020-19262-2)

Journal information: [Nature Communications](https://www.nature.com/articles/s41467-020-19262-2)
<https://phys.org/news/2020-11-quantum-properties-transmit.html>

Lung damage in COVID dead may shed light on ‘long COVID’: study

The team discovered “really vast destruction of the architecture of the lungs”, with healthy tissue “almost completely substituted by scar tissue”

London: A study of the lungs of people who have died from COVID-19 has found persistent and extensive lung damage in most cases and may help doctors understand what is behind a syndrome known as ‘long COVID’, in which patients suffer ongoing symptoms for months.

Scientists leading the research said they also found some unique characteristics of SARS-CoV-2, the virus that causes COVID-19, which may explain why it is able to inflict such harm.

“The findings indicate that COVID-19 is not simply a disease caused by the death of virus-infected cells, but is likely the consequence of these abnormal cells persisting for long periods inside the lungs,” said Mauro Giacca, a professor at Kings College London who co-led the work.

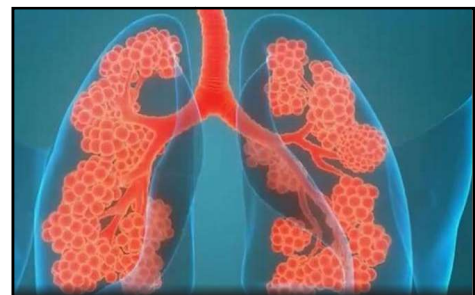


Photo: Twitter/@HospitalsApollo

The research team analysed samples of tissue from the lungs, heart, liver and kidneys of 41 patients who died of COVID-19 at Italy's University Hospital of Trieste between February and April 2020.

In a telephone interview, Giacca said that, while his research team found no overt signs of viral infection or prolonged inflammation in other organs, they discovered “really vast destruction of the architecture of the lungs”, with healthy tissue “almost completely substituted by scar tissue”.

“It could very well be envisaged that one of the reasons why there are cases of long COVID is because there is vast destruction of lung (tissue),” he told *Reuters*. “Even if someone recovers from COVID, the damage that is done could be massive.”

Growing evidence from around the world suggests that a small proportion of people who have had COVID-19 and recovered from their initial infection can experience a range of ongoing symptoms including fatigue, brain fog and shortness of breath. The condition is often called “long COVID”.

Giacca said almost 90% of the 41 patients had several characteristics unique to COVID-19 compared to other forms of pneumonia.

One was that patients had extensive blood clotting of the lung arteries and veins. Another was that some lung cells were abnormally large and had many nuclei - a result of the fusion of different cells into single large cells in a process known as syncytia.

The research, published in the journal *Lancet eBioMedicine*, also found the virus itself was still present in many types of cells.

“The presence of these infected cells can cause the major structural changes observed in lungs, which can persist for several weeks or months and could eventually explain ‘long COVID’,” Giacca said.

<https://www.thehindu.com/sci-tech/science/lung-damage-in-covid-dead-may-shed-light-on-long-covid-study/article33019642.ece>

Serum Institute to roll out COVID-19 vaccine in India by January 2021: Adar Poonawalla

COVID-19 vaccine update: Based on the success of the trials and regulatory approvals, we can expect vaccine to be available in India by January 2021, only if its proven immunogenic and efficacious, says SII CEO Adar Poonawalla

By Chitranjan Kumar

The COVID-19 vaccine being developed by Oxford University and British firm AstraZeneca may be available in India by January 2021, chief executive of Pune-based Serum Institute of India (SII) Adar Poonawalla said on Wednesday. The vaccine, dubbed as Covishield for Indian market, is currently undergoing Phase 2 and 3 trials in the country.

"Based on the success of the trials in India and the United Kingdom, and if approvals from regulatory bodies are in place in time, then we can expect the vaccine to be available in India by January 2021, only if its proven immunogenic and efficacious," SII CEO Adar Poonawalla told Mint.

On ongoing clinical trails, the 39-year-old CEO said that the present data indicates that there are no immediate concerns related to Covishield. "So far, thousands of people have had it in India and abroad with no safety concerns," he said.

Serum Institute, the world's largest vaccine manufacturer by volume, is currently conducting the Phase 3 trial of Oxford-AstraZeneca's COVID-19 vaccine candidate in India. It is anticipated that Covishield will be one of the first to secure regulatory approval, along with vaccine candidates from US-based Pfizer and Moderna Inc, as scientists across the world try to find a vaccine against novel coronavirus.

As many as 150 potential vaccines are being developed and tested globally, with 38 in human trial stage. Early development of vaccine will be a game-changer in the battle against the COVID-19 outbreak, which has killed millions of people around the planet and turned lives upside down for billions.

Poonawalla said that his company aims to initially manufacture about 60-70 million doses, and expand it up to 100 million doses of the vaccine per month, adding that "we should be able to reach there over the next few months."

Homegrown pharma company Bharat Biotech is also planning to launch its vaccine for COVID-19 in the second quarter next year if it gets the requisite approvals from the Indian regulatory authorities, according to a top company official. The company's vaccine candidate - Covaxin - has been developed in collaboration with the Indian Council of Medical Research (ICMR) and National Institute of Virology (NIV) using inactivated Sars-Cov-2, and is undergoing Phase 3 trials in the country.

<https://www.businesstoday.in/sectors/pharma/coronavirus-vaccine-to-be-available-in-india-by-january-2021-serum-institute-ceo-poonawalla/story/421101.html>



COVID-19 vaccine may be available in India by January 2021, says SII CEO Adar Poonawalla

