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INDIA TODAY

Tue, 24 Aug 2021

Defence Minister Rajnath Singh to present consignment of indigenously made grenades to Indian Army

Defence minister Rajnath Singh will hand over a consignment of indigenously made multi mode grenades to the Indian Army this week in Nagpur on the occasion of the production of one lakh such grenades

By Manjeet Negi

New Delhi: Defence minister Rajnath Singh will hand over a consignment of indigenously made multi mode grenades to the Indian Army this week in Nagpur on the occasion of the production of one lakh such grenades.

Defence minister Rajnath Singh will hand over a consignment of indigenously made multi mode grenades to the Indian Army this week in Nagpur. (Photo: File)

The consignment is part of the Army's order for ten lakh multi mode grenades developed by the Defence Research and Development Organisation and produced by Economic Explosives Ltd in Nagpur.

"The Defence minister will present a consignment of these grenades to the Indian Army. Army chief General Manoj Mukund Naravane will receive the consignment on behalf of the force," army officials said.

Public-private partnership, Made in India

The Ministry of Defence had signed a contract with Economic Explosives Ltd for the supply of 10,00,000 multi mode hand grenades to the Indian Army at an approximate cost of Rs 409 crores. This grenade will replace the hand grenade design from World War II that is still used by the Indian Army.

The multi mode hand grenade has been designed by DRDO and Terminal Ballistic Research Laboratories. The grenade has a distinctive design, in that it can be used in both offensive and defensive modes. This project also showcases the public-private partnership under the Government of India that has enabled 'Atma Nirbharta' in ammunition technology in India.

https://www.indiatoday.in/india/story/defence-minister-rajnath-singh-consignment-grenades-indigenous-indian-army-1844451-2021-08-24

The Hitavada

Tue, 24 Aug 2021

Defence Minister, Army Chief in city today

To attend handing over of Multi Mode Hand Grenade produced by Economic Explosives Ltd as per transfer of technology from TBRL

Tuesday will be an important date in the history of the country. For, the Multi Mode Hand Grenade (MMHG) produced by a city-based company as per transfer of technology from Defence Research and Development Organisation (DRDO) laboratory will be handed over to the Indian Army. This is significant as for the first time, a private company has manufactured ammunition for the Armed Forces. Though no official programme was released regarding the development, sources said that Rajnath Singh, Defence Minister; General M M Naravane, PVSM, AVSM, SM, VSM, ADC, Chief of Army Staff; Dr G Satheesh Reddy, Secretary, Department of Defence R&D and Chairman, DRDO; Lt Gen A K Samantara, Director General (Infantry); and a host of top dignitaries will be attending the programme. As per the information, the Defence Minister, the Army chief and others shall attend the programme in which MMHG handing over will take place. Rajnath Singh, Gen M M Naravane, Dr G Satheesh Reddy and others are scheduled to pay a visit to DRDO facility.

Rajnath Singh, Defence Minister | General M M Naravane, Army Chief | Dr G Satheesh Reddy, DRDO Chairman

Rajnath Singh, who is a senior leader of Bharatiya Janata Party, is also expected to visit Smruti Mandir, Reshimbagh, where he is likely to meet top brass of Rashtriya Swayamsevak Sangh. Late on Monday night, Defence Minister's office tweeted that he would also be visiting IAF Maintenance Command. As far as MMHG is concerned, Economic Explosives Ltd -- a subsidiary of Nagpur-based Solar Industries India Ltd -- has established its production as per the transfer of technology from Terminal Ballistics Research Laboratory (TBRL), which is an important DRDO laboratory. Last year, Economic Explosives Limited had got the contract for manufacturing 10 lakh high-quality grenades worth Rs 400 crore for the Indian Army. The first consignment of 40,000 MMHG will replace the British-era vintage M 356 hand grenades, which are still in use by the Indian Army. As per the procedure, a pre-delivery inspection of the consignment was done and way was paved for material dispatch.

As per the details, MMHG offers 'numerous advantages' to the soldier in terms of 'safety, dual mode capability, and lethality'. The dual mode capability indicates use in 'defensive' as well as 'offensive' mode through quick change. In 'defensive' mode, the grenade is assembled with its fragmenting sleeve. This particular mode is used 'while the soldier is in a shelter and the enemy is in the open'. In 'offensive' mode, the MMHG is without fragmenting sleeve and is used for 'low intensity conflict' as it offers 'stunning effect only'. The MMHG has 3,800 numbers of fragments with uniform fragmentation pattern for higher lethality, read a description on the website of the Solar Group.

https://www.thehitavada.com/Encyc/2021/8/24/Defence-Minister-Army-Chief-in-city-today.html

THE TIMES OF INDIA

Tue, 24 Aug 2021

Rajnath to hand over Nagpur-made grenades to Army

Nagpur: Defence minister Rajnath Singh will be on a visit to the city on Tuesday. He would pay a visit to key defence establishments like the Headquarters Maintenance Command of the Indian Air Force (IAF), and Brahmos Aerospace unit in Butibori.

Singh is also expected to visit the RSS headquarters, said sources.

The minister is also scheduled to hand over the first batch of multimodal hand grenades made by Economic Explosives Limited (EEL), headed by city businessman Satyanarayan Nuwal, to the Army.

These are the first ever hand grenades made by a private company in the country. The multimodal grenades are set to replace the World War-II-make M36 grenades used by the Army at present. The M36 were made by ordnance factories, which are also working on a new grenade.

The latest grenades have both defensive and offensive use for soldiers. EEL has made the weapon based on the design by Terminal Ballistics Laboratory Limited (TBRL), a part of the Defence Research and Development Organisation.

EEL, which is part of Solar Industries Limited, was the first to bag the order for making these grenades for the Army. The order worth Rs409 crore involves making 10 lakh grenades over a period of time.

The development assumes importance in the light of government's decision to corporatize Ordnance Factory Board (OFB), throwing it open to competition with private sector.

https://timesofindia.indiatimes.com/city/nagpur/rajnath-to-hand-over-nagpur-made-grenades-to-army/articleshow/85578904.cms

JAGRAN Josh

Tue, 24 Aug 2021

ARMY-2021: DRDO to showcase India's Defence technology in Moscow – All you need to know

DRDO is participating in the International Military-Technical Forum 'ARMY-2021' at Kubinka, Moscow, from August 22 to 28, 2021. Read all you need to know

By Roopashree Sharma

The Defence Research and Development Organization (DRDO) is participating in the International Military-Technical Forum 'ARMY-2021' at Kubinka, Moscow, from August 22 to 28, 2021.

DRDO at ARMY-2021, Moscow, Source: PTI

At the forum ARMY-2021, DRDO will showcase its indigenously built fighter aircraft LCA Tejas, Arjun Main Battle Tank (MK1A), Anti-Tank Guided Missiles among other products at the India Pavillion during the event.

Dr NK Arya, Director, Directorate of Public Interface (DPI), DRDO said, "India has a huge potential in terms of export of Defence systems."

What is ARMY-2021?

- The International Military-Technical Forum 'ARMY-2021' is organized by the Ministry of Defence of the Russian Federation that offers the opportunity for exhibition and demonstration of military equipment.
- ARMY-2021 is the 7th International Military-Technical Forum that will be held from August 22 to 28, 2021, at Kubinka, Moscow.
- The Forum ARMY-2021 is a platform for India to showcase its state-of-art Defence technology by DRDO at India Pavilion during the event.

ARMY-2021: Aim of DRDO

- Dr NK Arya, Director, Directorate of Public Interface (DPI), DRDO stated that following explaining the aim of DRDO at the ARMY-2021:
- Defence exports from India have a huge potential to grow further. DRDO has been developing most of the indigenous Defence systems in India and it is imperative that it should showcase to the world.
- DRDO has been developing several indigenous advanced Defence technologies and systems such as missiles, multi-barrel rocket launchers, light combat aircraft, missile-based Air Defence systems, main battle tanks, life science, and naval systems-related products.
- The participation of DRDO at ARMY 2021 will further create the awareness that India is capable of exporting state-of-the-art Defence technology.

ARMY-2021: Defence technology for export at India Pavilion

- DRDO will be showcasing advanced Defence technologies and systems along with the Indian Defence Industries namely Bharat Earth Movers Limited (BEML), Ordnance Factories, and Goa Shipyard Limited (GSL) at India Pavilion in the ARMY-2021.
- Eleven products by DRDO which can be exported will be on display at Indian Pavilion:
  1. Beyond Visual Range Air to Air Missile (BVRAAM) 'ASTRA'
  2. Anti-Tank Guided Missile (ATGM)-NAG and HELINA
  3. Surface to Air Missile (SAM) 'Akash'
  4. Light Combat Aircraft (LCA)-Tejas
  5. Airborne Early Warning and Control System (AEW&C)
  6. Identification of Friend and Foe (IFF)
  7. Advanced Towed Artillery Gun System (ATAGS)
  8. Joint Venture Protective Carbine (JVPC)
  9. Arjun Main Battle Tank MK1A
  10. Rohini Radar
  11. Air Defence Fire Control Radar (ADFCR)-Atulya Radar

https://www.jagranjosh.com/current-affairs/army2021-drdo-to-showcase-indias-defence-technology-in-moscow-all-you-need-to-know-1629719308-1

THE FREE PRESS JOURNAL SINCE 1928

Tue, 24 Aug 2021

Bhopal: DRDO looking at state industrialists for Rs 1.7L cr engineering jobs: Minister

DRDO Chief will visit MP in September

Bhopal: Defence Research and Development Organisation (DRDO) is looking at state industrialists for engineering work order worth Rs 1,70,000 crore, said medium small and micro enterprises minister Om Prakash Saklecha while addressing road foundation laying programme at Govindpura Industrial Association (GIA) office on Monday.

MSME minister Om Prakash Saklecha addressing a programme at Govindpura Industrial Association (GIA) | FP photo

Asking industrialists to prepare for the big opportunity, he said that DRDO chief was likely to visit the state in September. During the visit, he would meet industrialists of Jabalpur, Bhopal and Indore. He said that Govindpura Industrial Area would witness a major boost if industrialists joined hands with the DRDO.

The state government was ready to provide Rs 20 crore for high end medical equipments manufacturing unit in the Govindpura sector, he announced. The minister said that DRDO with a network of 50 laboratories was engaged in developing defence technologies covering various disciplines, like aeronautics, armaments, electronics, combat vehicles, engineering systems, instrumentation, missiles, advanced computing and simulation, special materials, naval systems, life sciences, training, information systems and agriculture.

Medical education minister Vishwas Sarang castigated Digvijaya Singh led state government for working for the benefit of a select few industrialists. MLA Krishna Gour recalled former chief minister Babulal Gour, who worked hard to establish the industrial sector, “Govindpura was Babu’s dream project, which is touching new height every day”. She urged the minister that the area needs approach road to reach Govindpura, as the present road was not sufficient.

https://www.freepressjournal.in/bhopal/bhopal-drdo-looking-at-state-industrialists-for-rs-17l-cr-engineering-jobs-minister

COVID 19: DRDO's Contribution

दैनिक भास्कर

Tue, 24 Aug 2021

तीसरी लहर की तैयारी: शहर में 5 प्लांट शुरू, हर मिनट मिलेगी 4200 ली. ऑक्सीजन

जयपुर: राजधानी में जून माह में शुरू होने वाले ऑक्सीजन प्लांट अगस्त में शुरू हो गए। ये ऑक्सीजन प्लांट हर मिनट में 4,200 लीटर ऑक्सीजन का उत्पादन करेंगे। जनाना और एसएमएस अस्पताल में दूसरे ऑक्सीजन प्लांट के शुरू होने पर इनकी क्षमता बढ़कर 6,200 लीटर प्रति मिनट हो जाएगी।

प्रताप नगर कैंसर अस्पताल को छोड़कर सभी अस्पतालों में प्रति मिनट 1 हजार लीटर ऑक्सीजन का उत्पादन होगा।

तीसरे लहर की आशंका के तहत राजधानी में केंद्र सरकार के माध्यम से करीब 8 अस्पतालों में डीआरडीओ और एनएचएआई के तहत ऑक्सीजन प्लांट लगाने थे। इसमें से पांच अस्पतालों में लग चुके हैं। ईएसआईसी, गणगौरी, प्रताप नगर स्थित कैंसर अस्पताल, एसएमएस, जेके लॉन अस्पताल में ऑक्सीजन प्लांट शुरू हो चुके हैं। प्रताप नगर कैंसर अस्पताल को छोड़कर सभी अस्पतालों में प्रति मिनट 1 हजार लीटर ऑक्सीजन का उत्पादन होगा।

3 प्लांट जल्द शुरू होंगे

केंद्र सरकार के तहत डीआरडीओ के माध्यम से राजधानी में आठ ऑक्सीजन प्लांट लगने थे। इसमें से पांच से ऑक्सीजन उत्पादन शुरू हो गया है। बाकी का सिविल काम पूरा हो चुका। प्लांट लगना बाकी है।
- अजय आर्य, प्रोजेक्ट डायरेक्टर, एनएचएआई

https://www.bhaskar.com/local/rajasthan/jaipur/news/5-plants-started-in-the-city-4200-liters-will-be-available-every-minute-oxygen-128846751.html

नईदुनिया

Tue, 24 Aug 2021

अस्पतालों में आक्सीजन प्लांट की तैयारी

कोरोना की तीसरी लहर से पहले जिला अस्पताल, सिविल अस्पताल सुपेला और चंदूलाल चंद्राकर मेडिकल कालेज में आक्सीजन प्लांट की स्थापना की जा रही है। प्लांट लगने से जिला अस्पताल परिसर स्थित मातृ- शिशु अस्पताल में प्रति मिनट 960 लीटर आक्सीजन की आपूर्ति होगी।

दुर्ग: कोरोना की तीसरी लहर से पहले जिला अस्पताल, सिविल अस्पताल सुपेला और चंदूलाल चंद्राकर मेडिकल कालेज में आक्सीजन प्लांट की स्थापना की जा रही है। प्लांट लगने से जिला अस्पताल परिसर स्थित मातृ-शिशु अस्पताल में प्रति मिनट 960 लीटर आक्सीजन की आपूर्ति होगी। प्लांट बनाकर तैयार करने वाली कंपनी द्वारा शिशु वार्ड के लगभग 100 बेड में पाइप लाइन बिछाने का काम किया जा रहा है।दो दिन पहले ही आक्सीजन प्लांट लगाने के लिए टैंक के साथ ही अन्य उपकरण जिला अस्पताल पहुंचे थे।

जिला अस्पताल के सिविल सर्जन डा.पी बालकिशोर ने बताया कि पीएम केयर्स फंड की पहल पर लगभग एक करोड़ रुपये की लागत से डीआरडीओ ने आक्सीजन प्लांट लगाने की जिम्मेदारी ट्राइडेंट कंपनी को सौंपी थी। कंपनी से आए इंजीनियर दिन-रात काम में लगे थे। सोमवार को प्लांट करीब-करीब बनकर तैयार हो गया। कंपनी अब ट्रायल करने जा रही है। साथ ही आक्सीजन प्लांट को संचालित करने के लिए अस्पताल के स्टाफ को भी ट्रेनिंग दी जाएगी। प्लांट से मातृ-शिशु अस्पताल में बनाए गए चिल्ड्रन वार्ड में आक्सीजन सप्लाई के लिए पाइप लाइन बिछाई जा रही है।

सिविल सर्जन ने बताया कि पीएसए आक्सीजन जनरेशन प्लांट से एक मिनट में 960 लीटर आक्सीजन उपलब्ध होगी। तीसरी लहर से निपटने लगभग सभी प्रकार की तैयारियां की जा रही है।जिला प्रशासन और पीडब्लूडी द्वारा प्लांट को 24 घंटे बिजली की सुविधाएं प्रदान करने के लिए भी तैयारी की जा रही है। पीएसए प्लांट अस्पताल परिसरों में ही आक्सीजन तैयार कर देता है इससे सिलेंडर की जरूरत ही नहीं होती है।

इस तरह के प्लांट में प्रेशर स्विंग एडजार्ब्शन तकनीक का इस्तेमाल किया जाता है। यह इस सिद्धांत पर काम करता है कि उच्च दबाव में गैस सालिड सरफेस की तरफ आकर्षित होते हैं और अवशोषित हो जाते हैं। पीएसए प्लांट में हवा से ही आक्सीजन बनाने की अनूठी तकनीक होती है। इसमें एक चैम्बर में कुछ एड्जार्बेट डालकर उसमें हवा को गुजारा जाता है। जिसके बाद हवा का नाइट्रोजन एडजार्बेट से चिपककर अलग हो जाता है और आक्सीजन बाहर निकल जाती है। इस कान्सेंट्रेट आक्सीजन की ही अस्पताल को आपूर्ति की जाती है। इसके लिए दबाव काफी उच्च रखना होता है। एड्जार्बेट मटेरियल के रूप में जियोलाइट, एक्टिवेटेड कार्बन, मालिक्यूलर सीव्स आदि का इस्तेमाल किया जाता है। तो जब किसी चैम्बर या वेसल से हवा को उच्च दबाव से गुजारा जाता है और उसमें जियोलाइट जैसे कुछ एड्जार्बेट डाल दिए जाते हैं तो वे आक्सीजन की जगह नाइट्रोजन को ज्यादा आकर्षित करते हैं। इस तरह नाइट्रोजन वेसल के पेड़ में चिपका रह जाता है और हवा में आक्सीजन बचा रहता है। इस तरह की प्रक्रिया कई बार करके आक्सीजन से भरी हवा को बाहर निकाल दिया जाता है।

https://www.naidunia.com/chhattisgarh/durg-preparation-of-oxygen-plant-in-hospitals-7009770

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Mon, 23 Aug 2021 7:25PM

Standing Committee on Defence visits INS Chilka on 23 Aug 21

The Parliamentary Standing Committee on Defence (SCOD) visited the prestigious ab-initio sailors training establishment of Indian Navy, INS Chilka on 23 Aug 21.

The Parliamentary Standing Committee on Defence (SCOD) is a Department Related Standing Committee (DRSC) of selected members of parliament for legislative oversight of the defence policies and decision making of the Ministry of Defence (MOD).

INS Chilka is the only ab-initio training establishment of the Indian Navy, which trains more than 6600 raw recruits annually to make them able bodied sailors.

The Committee headed by Shri Jual Oram, Hon'ble Chairman of the SCOD & Hon'ble Members of Parliament were given a presentation to apprise the SCOD on the revamping of training for Defence personnel in the light of latest technological advancements.

The presentation was followed by discussion of the Committee members with Rear Admiral Kapil Moahan Dhir, Joint Secretary (Navy), MoD and Rear Admiral TVN Prasanna, VSM, Chief Staff Officer (Training), Headquarters Southern Naval Command, Kochi along with Commodore NP Pradeep, Commanding Officer INS Chilka. The SCOD members appreciated the training methodology and the efforts taken by the Indian Navy.

The SCOD members paid respects to fallen sailors at 'Prerna Sthal' the war memorial in remembrance of the illustrious alumni of INS Chilka, who made the supreme sacrifice, by laying down their lives for the motherland. They later visited various training facilities, and accommodation blocks of the trainees.

https://pib.gov.in/PressReleasePage.aspx?PRID=1748330

Press Information Bureau
Government of India

Ministry of Defence

Mon, 23 Aug 2021 2:18PM

Indian Army grants time scale Colonel rank to women officers

A Selection Board of the Indian Army cleared the way for the promotion of five women officers to Colonel (Time Scale) rank, post completion of 26 years of reckonable service. This is the first time that women officers serving with the Corps of Signals, Corps of Electronic and Mechanical Engineers (EME) and the Corps of Engineers have been approved to the rank of Colonel. Previously, promotion to the rank of Colonel was only applicable for women officers in the Army Medical Corps (AMC), Judge Advocate General (JAG) and the Army Education Corps (AEC).

The widening of promotion avenues to more branches of the Indian Army is a sign of increasing career opportunities for women officers. Combined with the decision to grant permanent commission to women officers from a majority of branches of the Indian Army, this step defines the Indian Army's approach towards a gender-neutral Army.

The five women officers selected for Colonel Time Scale rank are Lt Col Sangeeta Sardana from the Corps of Signals, Lt Col Sonia Anand and Lt Col Navneet Duggal from the Corps of EME and Lt Col Reenu Khanna and Lt Col Ritcha Sagar from the Corps of Engineers.

https://pib.gov.in/PressReleasePage.aspx?PRID=1748215

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Mon, 23 Aug 2021 2:18PM

भारतीय सेना ने महिला सैन्य अधिकारियों को पदोन्नत कर उन्हें टाइम स्केल कर्नल रैंक प्रदान किया

भारतीय सेना के चयन बोर्ड ने सेना में 26 साल की मानद सेवा पूरी करने के बाद पांच महिला अधिकारियों को कर्नल (टाइम स्केल) के पद पर पदोन्नत करने का निर्णय लिया है। ऐसा पहली बार हो रहा है जब कॉर्प्स ऑफ सिग्नल्स, कॉर्प्स ऑफ इलेक्ट्रॉनिक एंड मैकेनिकल इंजीनियर्स (ईएमई) और कॉर्प्स ऑफ इंजीनियर्स में सेवारत महिला अधिकारियों को कर्नल के पद पर पदोन्नत करने को मंजूरी दी गई है। इससे पहले, कर्नल के पद पर पदोन्नति केवल सैन्य चिकित्सा सेवा इकाई (एएमसी), जज एडवोकेट जनरल (जेएजी) और सैन्य शिक्षा कोर (एईसी) में कार्यरत महिला अधिकारियों के लिए ही लागू होती थी।

भारतीय सेना की अधिक से अधिक शाखाओं में पदोन्नत होने का विस्तार करना महिला अधिकारियों के लिए इस क्षेत्र में करियर के बढ़ते अवसरों का संकेत है। भारतीय सेना की अधिकांश शाखाओं से महिला अधिकारियों को स्थायी कमीशन देने के निर्णय के साथ ही यह फैसला सैन्य सेवाओं में लैंगिक समानता के प्रति भारतीय सेना के सकारात्मक दृष्टिकोण को परिभाषित करता है।

जिन पांच महिला सैन्य अधिकारीयों का कर्नल टाइम स्केल रैंक के लिए चयन किया गया है, वे हैं कॉर्प्स ऑफ सिग्नल्स से लेफ्टिनेंट कर्नल संगीता सरदाना, कॉर्प्स ऑफ ईएमई से लेफ्टिनेंट कर्नल सोनिया

आनंद और लेफ्टिनेंट कर्नल नवनीत दुग्गल तथा कॉर्प्स ऑफ इंजीनियर्स से लेफ्टिनेंट कर्नल रीनू खन्ना और लेफ्टिनेंट कर्नल ऋचा सागर।

https://pib.gov.in/PressReleasePage.aspx?PRID=1748312

Press Information Bureau
Government of India

Ministry of Defence

Mon, 23 Aug 2021 7:19PM

Maritime partnership exercise between Indian Navy and the Philippine Navy – 23 August 2021

Two ships of the Indian Navy, namely INS Ranvijay (Guided Missile Destroyer, D55) and INS Kora (Guided Missile Corvette, P61), on deployment to the Western Pacific, carried out a Maritime Partnership Exercise with BRP Antonio Luna (Frigate, FF 151) of the Philippine Navy on 23 Aug 21 in the West Philippine Sea.

The joint evolutions conducted during the exercise included several operational manoeuvers and the participating ships of both navies were satisfied with the consolidation of interoperability achieved through this operational interaction at sea.

The Indian naval ships are currently deployed to the Western Pacific with an aim to strengthen maritime security collaboration with partner nations. The interaction with BRP Antonio Luna was, therefore, an enriching opportunity for the Indian Navy to consolidate its bilateral relations with the Philippine Navy. In compliance with the prevailing pandemic guidelines, the exercise was conducted in contactless manner and all necessary health and safety protocols were strictly observed. After the exercise, the Indian naval ships are scheduled to call at Manila Port for replenishment.

India and The Philippines share a very robust defence and security partnership built over several years and spanning across all domains. Both navies remain committed to further strengthening bilateral collaboration in the maritime domain towards a collective aim of ensuring a stable, peaceful and prosperous Indo-Pacific.

https://pib.gov.in/PressReleasePage.aspx?PRID=1748328

THE HINDU

Tue, 24 Aug 2021

Russia to deliver first stealth frigate by mid-2023

Delivery of two Krivak class vessels delayed by COVID

By Dinakar Peri

Moscow: The first of two additional Krivak class stealth frigates being built by Russia is expected to be delivered to India in the middle of 2023, according to the head of United Shipbuilding Corporation (USC) of Russia.

File Photo. | Photo Credit: Vladimir Radyuhin

"Due to COVID we had delays in execution of some of the stages of construction. There was an approximately eight month delay. The first ship should be delivered in the middle of 2023," said Alexey Rakhmanov, Chief Executive Officer of USC at the ongoing Army 2021 exhibition.

In October 2016, India and Russia signed an Inter-Governmental Agreement (IGA) for four Krivak or Talwar class stealth frigates — two to be procured directly from Russia and two to be built by the Goa Shipyard Limited (GSL) — after which a $1-billion deal was signed for the direct purchase.

On the construction at GSL, Mr. Rakhmanov said they would soon be inviting Indian technicians for the ongoing construction of two frigates at the Yantar shipyard to familiarise themselves with the specificity of the equipment and the construction. In the second stage, substantial work would be done at GSL including technology transfer, he stated.

Mr. Rakhmanov added that the frigates were being built to operate both Indian and Russian equipment.

The basic structures of two frigates are already ready at the Yantar shipyard in Russia which are now being completed.

The keel for the first ship to be built at GSL was laid in January and for the second ship in June this year. Keel laying is a major milestone in shipbuilding symbolising formal commencement of the construction process.

The Navy had recently stated that the first of these ships would be delivered in 2026 and the second six months later.

In November 2018, GSL had signed a $500 million deal with Rosoboronexport of Russia for material, design and specialist assistance to locally manufacture the two frigates and in January 2019 the contract was signed between the Ministry of Defence and the GSL.

The engines for the ships are supplied by Zorya Nashproekt of Ukraine. Four gas turbine engines, gear boxes and specialist support will cost around $50 million per ship, as reported by *The Hindu* earlier.

Indian Navy currently operates six Krivak class frigates weighing around 4,000 tonnes procured in two different batches.

https://www.thehindu.com/news/national/russia-to-deliver-first-stealth-frigate-by-mid-2023/article36062179.ece

Hindustan Times

Tue, 24 Aug 2021

Will begin delivery of S-400 missile system to India by year end: Russian firm

"I can confirm that we will deliver [the S-400 system to India] by the end of 2021 in accordance with the schedule and contractual obligations of the Russian side," Vyacheslav Dzirkaln, deputy CEO of the air and space defense concern Almaz-Antey, said while interacting at International Military-Technical Forum "ARMY-2021".

Moscow: The deputy CEO of the air and space defense concern Almaz-Antey, Vyacheslav Dzirkaln on Monday said Russia will begin to deliver surface-to-air missile defence system (SAM) S-400 by end of the year 2021.

In October 2018, India had signed a USD 5.43 billion deal with Russia for five S-400

"I can confirm that we will deliver [the S-400 system to India] by the end of 2021 in accordance with the schedule and contractual obligations of the Russian side," Dzirkaln said while interacting at International Military-Technical Forum "ARMY-2021".

He also said that at the present Indian military personnel training is underway in operating the S-400.

"As for the training, the first group of Indian specialists have completed the training. The second group is undergoing training. I would not talk about the number of people but it is a sufficient number for the Indian armed forces to effectively operate our equipment. I would like to say that the results shown by the first group of Indian specialists after the training were very high. I would like to note the [high] level of training of Indian specialists," the deputy CEO said.

In October 2018, India had signed a USD 5.43 billion deal with Russia for five S-400 regiments.

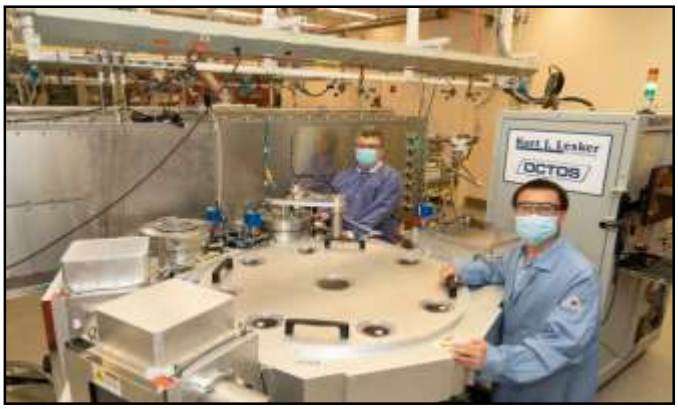
https://www.hindustantimes.com/india-news/will-begin-delivery-of-s-400-missile-system-to-india-by-year-end-russian-firm-101629772577572.html

PHYS.ORG

Tue, 24 Aug 2021

Layered graphene with a twist displays unique quantum confinement in 2D

Scientists studying two different configurations of bilayer graphene—the two-dimensional (2D), atom-thin form of carbon—have detected electronic and optical interlayer resonances. In these resonant states, electrons bounce back and forth between the two atomic planes in the 2D interface at the same frequency. By characterizing these states, they found that twisting one of the graphene layers by 30 degrees relative to the other, instead of stacking the layers directly on top of each other, shifts the resonance to a lower energy. From this result, just published in *Physical Review Letters*, they deduced that the distance between the two layers increased significantly in the twisted configuration, compared to the stacked one. When this distance changes, so do the interlayer interactions, influencing how electrons move in the bilayer system. An understanding of this electron motion could inform the design of future quantum technologies for more powerful computing and more secure communication.



Staff scientist Jurek Sadowski (left) and postdoc Zhongwei Dai at the Quantum Material Press (QPress) facility at the Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory. The large circular piece is the central QPress robot, with various modules attached on the sides for sample annealing, film deposition, plasma cleaning, and sample libraries. The full QPress system, still under development, will automate the stacking of 2-D materials into layered structures with exotic properties for quantum applications. Credit: Brookhaven National Laboratory

"Today's computer chips are based on our knowledge of how electrons move in semiconductors, specifically silicon," said first and co-corresponding author Zhongwei Dai, a postdoc in the Interface Science and Catalysis Group at the Center for Functional Nanomaterials (CFN) at the U.S. Department of Energy (DOE)'s Brookhaven National Laboratory. "But the physical properties of silicon are reaching a physical limit in terms of how small transistors can be made and how many can fit on a chip. If we can understand how electrons move at the small scale of a few nanometers in the reduced dimensions of 2D materials, we may be able to unlock another way to utilize electrons for quantum information science."

At a few nanometers, or billionths of a meter, the size of a material system is comparable to that of the wavelength of electrons. When electrons are confined in a space with dimensions of their wavelength, the material's electronic and optical properties change. These quantum confinement effects are the result of quantum mechanical wave-like motion rather than classical mechanical motion, in which electrons move through a material and are scattered by random defects.

For this research, the team selected a simple material model—graphene—to investigate quantum confinement effects, applying two different probes: electrons and photons (particles of light). To probe both electronic and optical resonances, they used a special substrate onto which the graphene could be transferred. Co-corresponding author and CFN Interface Science and Catalysis Group scientist Jurek Sadowski had previously designed this substrate for the Quantum Material Press

(QPress). The QPress is an automated tool under development in the CFN Materials Synthesis and Characterization Facility for the synthesis, processing, and characterization of layered 2D materials. Conventionally, scientists exfoliate 2D material "flakes" from 3D parent crystals (e.g., graphene from graphite) on a silicon dioxide substrate several hundred nanometers thick. However, this substrate is insulating, and thus electron-based interrogation techniques don't work. So, Sadowski and CFN scientist Chang-Yong Nam and Stony Brook University graduate student Ashwanth Subramanian deposited a conductive layer of titanium oxide only three nanometers thick on the silicon dioxide substrate.

"This layer is transparent enough for optical characterization and determination of the thickness of exfoliated flakes and stacked monolayers while conductive enough for electron microscopy or synchrotron-based spectroscopy techniques," explained Sadowski.

In the Charlie Johnson Group at the University of Pennsylvania—Rebecca W. Bushnell Professor of Physics and Astronomy Charlie Johnson, postdoc Qicheng Zhang, and former postdoc Zhaoli Gao (now an assistant professor at the Chinese University of Hong Kong)—grew the graphene on metal foils and transferred it onto the titanium oxide/silicon dioxide substrate. When graphene is grown in this way, all three domains (single layer, stacked, and twisted) are present.

Then, Dai and Sadowski designed and carried out experiments in which they shot electrons into the material with a low-energy electron microscope (LEEM) and detected the reflected electrons. They also fired photons from a laser-based optical microscope with a spectrometer into the material and analyzed the spectrum of light scattered back. This confocal Raman microscope is part of the QPress cataloger, which together with image-analysis software, can pinpoint the locations of sample areas of interest.

"The QPress Raman microscope enabled us to quickly identify the target sample area, accelerating our research," said Dai.

Their results suggested that the spacing between layers in the twisted graphene configuration increased by about six percent relative to the non-twisted configuration. Calculations by theorists at the University of New Hampshire verified the unique resonant electronic behavior in the twisted configuration.

"Devices made out of rotated graphene may have very interesting and unexpected properties because of the increased interlayer spacing in which electrons can move," said Sadowski.

Next, the team will fabricate devices with the twisted graphene. The team will also build upon initial experiments conducted by CFN staff scientist Samuel Tenney and CFN postdocs Calley Eads and Nikhil Tiwale to explore how adding different materials to the layered structure impacts its electronic and optical properties.

"In this initial research, we picked the simplest 2D material system we can synthesize and control to understand how electrons behave," said Dai. "We plan to continue these types of fundamental studies, hopefully shedding light on how to manipulate materials for quantum computing and communications."

More information: Zhongwei Dai et al, Quantum-Well Bound States in Graphene Heterostructure Interfaces, *Physical Review Letters* (2021). DOI: 10.1103/PhysRevLett.127.086805

Journal information: *Physical Review Letters*

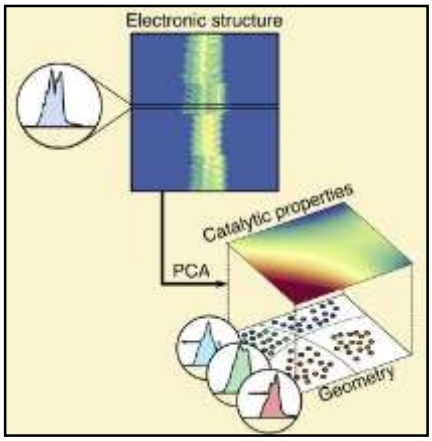
https://phys.org/news/2021-08-layered-graphene-unique-quantum-confinement.html

PHYS.ORG

Tue, 24 Aug 2021

Machine learning links material composition and performance in catalysts

In a finding that could help pave the way toward cleaner fuels and a more sustainable chemical industry, researchers at the University of Michigan have used machine learning to predict how the compositions of metal alloys and metal oxides affect their electronic structures.



Credit: University of Michigan

The electronic structure is key to understanding how the material will perform as a mediator, or catalyst, of chemical reactions.

"We're learning to identify the fingerprints of materials and connect them with the material's performance," said Bryan Goldsmith, the Dow Corning Assistant Professor of Chemical Engineering.

A better ability to predict which metal and metal oxide compositions are best for guiding which reactions could improve large-scale chemical processes such as hydrogen production, production of other fuels and fertilizers, and manufacturing of household chemicals such as dish soap.

"The objective of our research is to develop predictive models that will connect the geometry of a catalyst to its performance. Such models are central for the design of new catalysts for critical chemical transformations," said Suljo Linic, the Martin Lewis Perl Collegiate Professor of Chemical Engineering.

One of the main approaches to predicting how a material will behave as a potential mediator of a chemical reaction is to analyze its electronic structure, specifically the density of states. This describes how many quantum states are available to the electrons in the reacting molecules and the energies of those states.

Usually, the electronic density of states is described with summary statistics—an average energy or a skew that reveals whether more electronic states are above or below the average, and so on.

"That's OK, but those are just simple statistics. You might miss something. With principal component analysis, you just take in everything and find what's important. You're not just throwing away information," Goldsmith said.

Principal component analysis is a classic machine learning method, taught in introductory data science courses. They used the electronic density of states as input for the model, as the density of states is a good predictor for how a catalyst's surface will adsorb, or bond with, atoms and molecules that serve as reactants. The model links the density of states with the composition of the material.

Unlike conventional machine learning, which is essentially a black box that inputs data and offers predictions in return, the team made an algorithm that they could understand.

"We can see systematically what is changing in the density of states and correlate that with geometric properties of the material," said Jacques Esterhuizen, a doctoral student in chemical engineering and first author on the paper in *Chem Catalysis*.

This information helps chemical engineers design metal alloys to get the density of states that they want for mediating a chemical reaction. The model accurately reflected correlations already observed between a material's composition and its density of states, as well as turning up new potential trends to be explored.

The model simplifies the density of states into two pieces, or principal components. One piece essentially covers how the atoms of the metal fit together. In a layered metal alloy, this includes whether the subsurface metal is pulling the surface atoms apart or squeezing them together, and the number of electrons that the subsurface metal contributes to bonding. The other piece is just the number of electrons that the surface metal atoms can contribute to bonding. From these two principal components, they can reconstruct the density of states in the material.

This concept also works for the reactivity of metal oxides. In this case, the concern is the ability of oxygen to interact with atoms and molecules, which is related to how stable the surface oxygen is. Stable surface oxygens are less likely to react, whereas unstable surface oxygens are more reactive. The model accurately captured the oxygen stability in metal oxides and perovskites, a class of metal oxides.

More information: Jacques A. Esterhuizen et al, Uncovering electronic and geometric descriptors of chemical activity for metal alloys and oxides using unsupervised machine learning, *Chem Catalysis* (2021). DOI: 10.1016/j.checat.2021.07.014

https://phys.org/news/2021-08-machine-links-material-composition-catalysts.html

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Tue, 24 Aug 2021

Mathematicians build an algorithm to 'do the twist'

Mathematicians at the Center for Advanced Mathematics for Energy Research Applications (CAMERA) at Lawrence Berkeley National Laboratory (Berkeley Lab) have developed a mathematical algorithm to decipher the rotational dynamics of twisting particles in large complex systems from the X-ray scattering patterns observed in highly sophisticated X-ray photon correlation spectroscopy (XPCS) experiments.

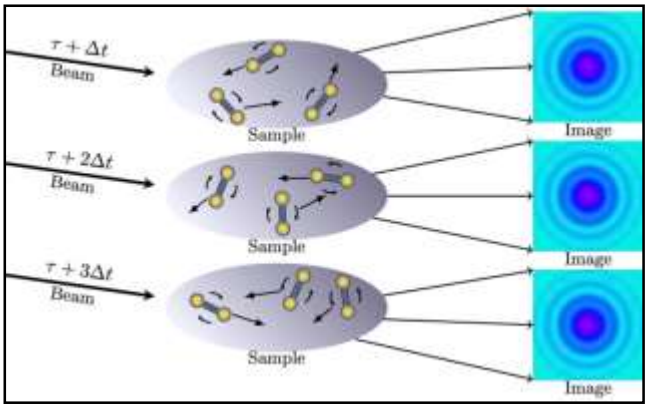

Illustration of the XPCS experiments. The translation and rotation of the particles within the scattering volume leads to variation of the speckle patterns shown on the right. While the grainy, noise-like texture makes these images appear visually similar, the MTECS algorithm is able to detect and analyze tiny variations between patterns. Credit: Zixi Hu, UC Berkeley

These experiments—designed to study the properties of suspensions and solutions of colloids, macromolecules, and polymers—have been established as key scientific drivers to many of the ongoing coherent light source upgrades occurring within the U.S. Department of Energy (DOE). The new mathematical methods, developed by the CAMERA team of Zixi Hu, Jeffrey Donatelli, and James Sethian, have the potential to reveal far more information about the function and properties of complex materials than was previously possible.

Particles in a suspension undergo Brownian motion, jiggling around as they move (translate) and spin (rotate). The sizes of these random fluctuations depend on the shape and structure of the materials and contain information about dynamics, with applications across molecular biology, drug discovery, and materials science.

XPCS works by focusing a coherent beam of X-rays to capture light scattered off particles in suspension. A detector picks up the resulting speckle patterns, which contain several tiny fluctuations in the signal that encode detailed information about the dynamics of the observed system. To capitalize on this capability, the upcoming coherent light source upgrades at Berkeley

Lab's Advanced Light Source (ALS), Argonne's Advanced Photon Source (APS), and SLAC's Linac Coherent Light Source are all planning some of the world's most advanced XPCS experiments, taking advantage of the unprecedented coherence and brightness.

But once you collect the data from all these images, how do you get any useful information out of them? A workhorse technique to extract dynamical information from XPCS is to compute what's known as the temporal autocorrelation, which measures how the pixels in the speckle patterns change after a certain passage of time. The autocorrelation function stitches the still images together, just as an old-time movie comes to life as closely related postcard images fly by.

Current algorithms have mainly been limited to extracting translational motions; think of a Pogo stick jumping from spot to spot. However, no previous algorithms were capable of extracting "rotational diffusion" information about how structures spin and rotate—information that is critical to understanding the function and dynamical properties of a physical system. Getting to this hidden information is a major challenge.

Twisting the light away

A breakthrough came when experts came together for a CAMERA workshop on XPCS in February 2019 to discuss critical emerging needs in the field. Extracting rotational diffusion was a key goal, and Hu, a UC Berkeley math graduate student; Donatelli, the CAMERA Lead for Mathematics; and Sethian, Professor of Mathematics at UC Berkeley and CAMERA Director, teamed up to tackle the problem head on.

The result of their work is a powerful new mathematical and algorithmic approach to extract rotational information, now working in 2D and easily scalable to 3D. With remarkably few images (less than 4,000), the method can easily predict simulated rotational diffusion coefficients to within a few percent. Details of the algorithm were published August 18 in the *Proceedings of the National Academy of Sciences*.

The key idea is to go beyond the standard autocorrelation function, instead seeking the extra information about rotation contained in angular-temporal cross-correlation functions, which compare how pixels change in both time and space. This is a major jump in mathematical complexity: Simple data matrices turn into 4-way data tensors, and the theory relating the rotational information to these tensors involves advanced harmonic analysis, linear algebra, and tensor analysis. To relate the desired rotational information to the data, Hu developed a highly sophisticated mathematical model that describes how the angular-temporal correlations behave as a function of the rotational dynamics from this new complex set of equations.

"There were lots of layered mysteries to unravel in order to build a good mathematical and algorithmic framework to solve the problem," said Hu. "There was information related to both static structures and to dynamic properties, and these properties needed to be systematically exploited to build a consistent framework. Taken together, they present a wonderful opportunity to weave together many mathematical ideas. Getting this approach to pick up useful information out of what seems at first glance to be awfully noisy was great fun."

However, solving this set of equations to recover the rotational dynamics is challenging, as it consists of several layers of different types of mathematical problems that are difficult to solve all at once. To tackle this challenge, the team built on Donatelli's earlier work on Multi-Tiered Iterative Projections (M-TIP), which is designed to solve complex inverse problems where the goal is to find the input that produces an observed output. The idea of M-TIP is to break a complex problem into subparts, using the best inversion/pseudoinversion you can for each subpart, and iterate through those subsolutions until they converge to a solution that solves all parts of the problem.

Hu and his colleagues took these ideas and built a sister method, "Multi-Tiered Estimation for Correlation Spectroscopy (M-TECS)," solving the complex layered set of equations through systematic substeps.

"The powerful thing about the M-TECS approach is that it exploits the fact that the problem can be separated into high-dimensional linear parts and low-dimensional nonlinear and nonconvex

parts, each of which have efficient solutions on their own, but they would turn into an exceedingly difficult optimization problem if they were instead to be solved for all at once," said Donatelli.

"This is what enables M-TECS to efficiently determine rotational dynamics from such a complex system of equations, whereas standard optimization approaches would run into trouble both in terms of convergence and computational cost."

Opening the door to new experiments

"XPCS is a powerful technique that will feature prominently in the ALS upgrade. This work opens up a new dimension to XPCS, and will allow us to explore the dynamics of complex materials such as rotating molecules inside water channels," said Alexander Hexemer, Program Lead for Computing at the ALS.

Hu, who won UC Berkeley's Bernard Friedman Prize for this work, has joined CAMERA—part of Berkeley Lab's Computational Research Division—as its newest member. "This sort of mathematical and algorithmic co-design is the hallmark of good applied mathematics, in which new mathematics plays a pivotal role in solving practical problems at the forefront of scientific inquiry," said Sethian.

The CAMERA team is currently working with beamline scientists at the ALS and APS to design new XPCS experiments that can fully leverage the team's mathematical and algorithmic approach to study new rotational dynamics properties from important materials. The team is also working on extending their mathematical and algorithmic framework work to recover more general types of dynamical properties from XPCS, as well as apply these methods to other correlation imaging technologies.

This work is supported by CAMERA, which is jointly funded by the Office of Advanced Scientific Computing Research and the Office of Basic Energy Sciences, both within the U.S. Department of Energy's Office of Science.

More information: Zixi Hu et al, Cross-correlation analysis of X-ray photon correlation spectroscopy to extract rotational diffusion coefficients, *Proceedings of the National Academy of Sciences* (2021). DOI: 10.1073/pnas.2105826118

Journal information: *Proceedings of the National Academy of Sciences*

https://phys.org/news/2021-08-mathematicians-algorithm.html

THE TIMES OF INDIA

Tue, 24 Aug 2021

Good nasal bacteria could make Covid less severe: Research

By Neha Madaan

Pune: The existing good bacteria in the nasal environment of a Covid-positive person can influence the severity of the infection, a study by the city-based National Centre for Cell Science (NCCS) and B J Medical College has revealed. Scientists say this could also explain why certain individuals infected with SARS-COV-2 are asymptomatic - the concept being somewhat like the presence of good bacteria in the gut helping one's immunity to fight infections.

The study has also observed higher abundance of specific opportunistic pathogens in those infected with Covid-19, suggesting that the inflammatory environment caused by the infection causes an increase in bacterial pathogens that may result in secondary infection. A secondary infection can occur when a different infection, known as the primary infection, makes a person more susceptible to disease.

"The increase in pathogenic bacteria in the nasal microbiome (the micro-organisms in a particular environment) of Covid-19 patients is due to the accumulation of mucus, known to favour the growth of these organisms, and a hyper-inflammatory environment (extensive inflammation in the body) that supports their growth," said Avinash Sharma, scientist, NCCS, who led the study.

Sharma told that the increase in various opportunistic pathogens in the nasal environment might also promote the entry of the virus via the route. "There was a reduction in good bacteria, known to have a positive impact on the immune system, in the nasal region of Covid-19 patients. This, in turn, causes opportunistic pathogens to colonise the site. The study is significant as it can help determine how the virus actually promotes increase in opportunistic pathogens, which may enhance the severity of other diseases."

As part of the study, researchers collected nasopharyngeal swabs from clinically suspected patients of SARS-CoV-2 infection and their family contacts.

https://timesofindia.indiatimes.com/home/science/good-nasal-bacteria-could-make-covid-less-severe-research/articleshow/85580731.cms