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Press Information Bureau
Government of India

Ministry of Defence

Wed, 20 Jan 2021 7:39PM

DRDO inks framework MoU with MoRTH for Geo-hazard Management

Defence Research and Development Organisation (DRDO) has entered into a framework memorandum of understanding (MoU) with the Ministry of Road Transport & Highways (MoRTH) to strengthen collaboration in the field of technical exchange and co-operation on sustainable geohazard management. The MoU was signed today between Dr G Satheesh Reddy, Secretary DDR&D & Chairman DRDO and Shri Giridhar Aramane Secretary MoRTH. As per the agreement, DRDO and MoRTH will co-operate in various mutually beneficial areas related to geohazard management. The initiative will ensure safety against the adverse effects of landslides and other natural calamities on national highways in the country.

DRDO's Defence Geo-Informatics Research Establishment (DGRE) is working for the development of critical technologies for enhancing combat effectiveness in various kinds of terrains and avalanches. The expertise of DGRE in mapping, forecasting, control and mitigation of landslides and avalanches in Himalayan terrain will be utilized for designing national highways including tunnels. Terrain and modelling simulation is an important asset with DGRE, which will play an important role in planning and building robust road infrastructure in difficult terrains.

MoRTH is responsible for development & maintenance of National Highways across the country.

It has been agreed that the expertise of DRDO will be utilized in providing sustainable mitigation measures to damages caused by landslides, avalanche and other natural factors on various National Highways in the Country.

Some of the areas identified for collaboration include detailed investigation of the critical avalanches/geo hazards, planning, designing and formulation of sustainable mitigation measures for geo-hazards on national highways including tunnels, monitoring and supervision of mitigation measures etc.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1690517>

MoRTH, DRDO sign pact to collaborate in geo-hazard management

This initiative will ensure safety of road users on national highways in the country against the adverse effects of landslides and other natural calamities

New Delhi: The Ministry of Road Transport and Highways (MoRTH) on Wednesday entered into a pact with the Defence Research and Development Organisation (DRDO) to strengthen cooperation in the sustainable geo-hazard management, according to a statement.

The pact was signed by Road Transport and Highways Secretary Giridhar Aramane and DRDO Secretary Satieesh Reddy here, the ministry said in the statement.

"It has been agreed that MoRTH and DRDO will cooperate in the areas of mutual benefit, including conceptual planning of integrated avalanche/landslide protection schemes or all-weather connectivity in snow-bound areas of our country including pre-feasibility of tunnels and viaducts," the statement said.

They will also cooperate in planning and designing of various avalanche and landslide control structures, and association in preparation of proposals and detailed project reports for tunnels, it added.

This initiative will ensure safety of road users on national highways (NHs) in the country against the adverse effects of landslides and other natural calamities.

The Defence Geo Informatics Research Establishment (DGRE), a DRDO laboratory, is a leading entity in the development of critical technologies for enhancing combat effectiveness with focus on terrains and avalanches. Its role and charter include mapping, forecasting, monitoring, controlling and mitigating landslides and avalanches in the Himalayan terrain.

It has been agreed by both the organisations to utilise the expertise of DRDO (through DGRE) in providing sustainable mitigation measures to damages caused by landslides, avalanche and other natural factors on various NHs in the country.

<https://www.thehindu.com/news/national/morth-drdo-sign-pact-to-collaborate-in-geo-hazard-management/article33617912.ece>



The MoRTH and DRDO have signed a pact to ensure safety of road users on national highways in the country against the adverse effects of landslides and other natural calamities. Image used for representation purpose. | Photo Credit: M. GOVARTHAN

DRDO, MoRTH join hands for geo-hazard management on national highways

Scope include pre-feasibility study of tunnels and viaducts, planning and designing of various avalanche and landslide control structures

By Vijay Mohan

Chandigarh: Defence Research and Development Organisation (DRDO) and the Ministry of Road Transport & Highways (MoRTH) have joined hands to strengthen collaboration in the field of technical exchange and co-operation on sustainable geo-hazard management.

Both establishments will co-operate in the areas of mutual benefit, including, conceptual planning of integrated avalanche and landslide protection schemes for all weather connectivity in snow bound areas of the country.

The scope include pre-feasibility study of tunnels and viaducts, planning and designing of various avalanche and landslide control structures, association in preparation of proposals and detailed project reports for tunnels, undertaking geological, geotechnical and terrain modeling, as well as other related aspects of tunnel construction.



Photo for representation

A Memorandum of Understanding (MoU) in this regard was signed today by Sateesh Reddy, Chairman DRDO and Secretary MoRTH, Giridhar Aramane. This initiative will ensure safety of road users on national highways against the adverse effects of landslides and other natural calamities.

The areas of collaboration listed out in the MoU include detailed investigation of the existing critical avalanches and other geo hazards such as landslides, slope instability and sinking problems, planning, designing and formulation of sustainable mitigation measures for geo-hazards for national highways, and the supervision or monitoring during implementation of the mitigation measures.

Both establishments are also free to initiate any other services as may be required.

DRDO's Defence Geo-Informatics Research Establishment (DGRE) based at Chandigarh is the leader in the development of critical technologies for enhancing combat effectiveness of the armed forces with a focus on terrain and avalanches. The role and charter of this establishment is mapping, forecasting, monitoring, control and mitigation of landslides and avalanches in Himalayan terrain. DGRE was recently formed with the merger of two existing DRDO labs, the Defence Terrain Research Laboratory at New Delhi and the Snow and Avalanche Study Establishment at Chandigarh.

It has been agreed by DRDO and MoRTH to utilise the expertise of DGRE in providing sustainable mitigation measures to damages caused by landslides, avalanches and other natural factors on various national highways.

<https://www.tribuneindia.com/news/nation/drdo-morth-join-hands-for-geo-hazard-management-on-national-highways-201211>

Tejas: The inside story of how India designed the Light Combat Aircraft

Today, LCA Tejas is recognized for its state-of-the-art flight controls, which offer excellent and safe handling

By Air Chief Marshal Srinivasapuram Krishnaswamy (Retd)

The Narendra Modi-led Cabinet Committee on Security's approval for 83 Light Combat Aircraft (LCA) Tejas jets by Hindustan Aeronautics Limited (HAL) is welcome news.

Way back in 1983, a decision was taken by the government to design a new combat aircraft in India in a bid to reduce dependency on imports and encourage those aspiring for a career in aeronautics.

However, HAL, which had been absent from the scene for over 20 years, did not have the capacity to take on this task. As an alternative, under the Defence Research and Development Organisation (DRDO), the Aeronautical Development Agency (ADA) was created to design and develop the LCA, with the production to be undertaken by HAL.



A Tejas aircraft | PTI File Photo)

ADA was the brainchild of Dr VSR Arunachalam, then head of DRDO. With no designers and facilities, a nucleus was formed at ADA with 250 engineers drawn from HAL on 'deputation'. A new facility was built on an open plot behind HAL. Dr Kota Harinarayana, the Chief Residential Engineer of Directorate of Aeronautics at HAL, Nashik, was made the Programme Director of ADA. A bright and energetic aeronautical engineer, with a smile even under extraordinary circumstances, was suited for the job that would involve facing a series of challenges.

The roadblocks

A search was initiated for a suitable design for the LCA. Two designs from Germany were evaluated. They were unique but unfamiliar and did not generate enthusiasm in the Indian Air Force (IAF). The IAF was then in the process of procuring the Mirage-2000. The aircraft was test-flown by the IAF team, which was impressed by its design and performance.

The ADA invited M/s Dassault Aviation for design assistance in developing a lightweight combat aircraft (The Air Force had the Gnat in mind and was looking to replace the Mig-21s). Dassault agreed to support the Project Definition Phase (PDP) wherein the Indian engineers would participate. The aim was to come up with the basic design for the aircraft. The work was carried out in France, using the French facilities.

Similarly, L.M. Ericsson of Sweden was roped in for the PDP to develop the design of Air Interception (AI) Radar. The radar design that was presented did not meet the performance expectations of the Air Force.

The idea was dropped, and instead, it was decided the radar would be developed indigenously at HAL, Hyderabad, following the guidelines from the PDP. After working on it for a while, the HAL gave up. It was then decided that radars would be imported to equip the initial batch of aircraft and would be indigenously developed subsequently. The attempt to develop an indigenous engine, Kaveri, met a similar fate. A hunt for a suitable engine for the LCA culminated in the selection of the GE-F404 of General Electric from USA.

Building the best

The design that emerged looked very much like a mini-Mirage-2000 but there was nothing in common between the two aircraft. The performance projection for the LCA, deduced from the PDP, was found falling short in some areas.

To overcome doubts, it was decided that two “Technology Demonstrators” would be built. This decision eased the pressure and the Demonstrator programme provided an opportunity to refine and improve the design. Designing digital fly-by-wire controls was a difficult task and American help was sought. Extensive simulations were conducted in the US and Indian test pilots got the feel of it, flying in variable stability aircraft at Calspan, US.

The enthusiasm of the ADA silenced the naysayers. The ADA brought in IT engineers for the job. Flight control hardware was sourced from the US. The basic design of the LCA was even more unstable than the F-16 or the Gripen, which was being developed in Sweden. One of the Gripen prototypes crashed while landing (due to over-sensitive flight control close to the ground). This made the Indian designers a bit nervous; discussions were held with the Gripen team that cleared the doubts. Flight control laws of the LCA were made more robust.

Today, the LCA is recognized as having one of the best flight controls in the world—state-of-the-art, offering excellent and safe handling.

The body of the LCA was to be made of carbon-composites – first such attempt in India. Special sanction had to be obtained from the US for carbon fibre material and the production technology besides the GE-F404 engine.

When the HAL was about to start series production, the production drawings were not ready. The longer-than-expected delay resulted in cost overruns. But once the government committed to the project, there was no turning back.

Success and key learnings

Thirty-five years have gone by since the formation of the ADA. It would take a few years for the order for 83 aircraft to fructify. Currently, the programme is managed by a string of committees, the apex one being the ADA Governing Body, headed by the defence minister. The three organisations concerned with the development and production of the LCA are ADA, HAL and the Air Force. Each organisation works independently and is not directly accountable to the other—together, they function under the Ministry of Defence.

The ADA has come a long way. The LCA project has been an enormous learning experience for the Indian team and the industry. The biggest learning being that all participants must be integrated at all levels from day one.

The initial roadblocks have been overcome, but it is important to improve the organisational structure based on the lessons learnt. Strong supervision and directions are necessary to help the programme stay on course.

The nation is indeed proud of Tejas and looks forward to more impressive indigenous aircraft designs. The atmanirbhar principle has strengthened our determination.

(The author is a retired Air Chief Marshal, who was Chief of Staff, Indian Air Force, 2001-2004. Views are personal.)

<https://www.news18.com/news/opinion/tejas-the-inside-story-of-how-india-designed-the-light-combat-aircraft-3316367.html>



Press Information Bureau
Government of India

Ministry of Defence

Wed, 20 Jan 2021 04:15PM

5th India – Singapore Defence Ministers’ Dialogue, 20 January 2021

Joint Statement by Raksha Mantri Shri Rajnath Singh and Dr Ng Eng Hen, Minister for Defence of the Republic of Singapore

The 5th Defence Ministers' Dialogue (DMD) between India and Singapore was successfully held on 20 January 2021 through a video conference and continues the substantial increase in bilateral cooperation and defence partnership over the years. Defence and security engagements between India and Singapore have broadened significantly in scale and scope across all three Services of the Armed Forces as well as in the areas of defence technology and industry. Both countries have also found common ground on multilateral fora and engagements.

At this 5th DMD, both Ministers were pleased to witness the signing of the Implementing Agreement on Submarine Rescue Support and Cooperation between the two Navies. The Ministers also conveyed their full support towards the early conclusion of agreements to facilitate conduct of live firings and to establish reciprocal arrangements for the cross-attendance of military courses.

The Ministers further welcomed initiatives to expand bilateral defence cooperation including the implementing agreement on Humanitarian Assistance and Disaster Relief (HADR) cooperation in August 2020 for the two Armed Forces to have closer operational collaboration in response to disasters and capacity-building activities of mutual interest. The cyber agencies of both armed forces have also stepped up engagements.

During the dialogue, both Ministers exchanged views on the impact of the global COVID-19 pandemic on the defence and security engagements, including the best practices adopted by their Armed Forces. Shri Rajnath Singh conveyed gratitude for the role of the Singapore Armed Forces, in supporting foreign workers, many of whom were Indian Nationals, at the peak of pandemic. Dr Ng also complimented India's successes in bringing down the overall numbers despite challenges of scale in terms of geography and population.

Both Ministers noted the commitment of their senior officials in sustaining the momentum of annual dialogues during the ongoing pandemic through virtual meetings. This has kept bilateral defence cooperation on a positive trajectory and laid the foundations for further cooperation in 2021.

The Ministers were pleased that the Indian Navy and Republic of Singapore Navy successfully conducted the 27th edition of Singapore-India Maritime Bilateral Exercise (SIMBEX) and also participated in the second edition of the Singapore-India-Thailand Maritime Exercise (SITMEX);

both held in November 2020. These exercises enhance interoperability amongst the navies and underscore the shared responsibility of the countries to work together to keep sea lines of communications open.

Shri Rajnath Singh reaffirmed ASEAN centrality in the regional security architecture and pledged India's support to all endeavours of the ASEAN Defence Ministers' Meeting (ADMM)-Plus. Dr Ng expressed support for India's upcoming co-chairmanship of the ADMM-Plus Experts' Working Group on HADR.

Both Ministers were committed to further enhance bilateral defence ties between India and Singapore and supported multilateral initiatives to promote lasting peace and stability in the region.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1690391>



Press Information Bureau
Government of India

Ministry of Defence

Wed, 20 Jan 2021 3:38PM

5th India-Singapore Defence Ministers Dialogue between Raksha Mantri Shri Rajnath Singh and Minister of Defence, Singapore Dr Ng Eng Hen

Raksha Mantri Shri Rajnath Singh co-chaired the 5th India-Singapore Defence Ministers Dialogue along with Dr. Ng Eng Hen, Minister for Defence, Republic of Singapore on 20 January 2021. During their virtual interaction, both Ministers expressed satisfaction at the progress of ongoing defence cooperation engagements between the two countries despite limitations imposed by ongoing COVID 19 pandemic.

During the virtual interaction, Raksha Mantri conveyed his compliments on effectiveness of pandemic mitigation measures implemented in Singapore and the contribution of Singapore Armed Forces in restricting the spread of COVID-19. He also highlighted the role of our Armed Forces in combating COVID-19 and various missions undertaken to assist in repatriation of Indians stranded overseas. Dr. Ng Eng Hen, Minister for Defence, Singapore, reciprocated the compliments and exchanged views on the role of Armed Forces in the whole of Government's approach towards control of the pandemic.



Both Ministers also expressed satisfaction at the growing defence ties between the two countries. Both sides reviewed the progress of various bilateral defence cooperation initiatives being pursued over the last year and expressed commitment to further elevate the scale of engagements between the Armed Forces as well as in areas of defence technology and industry. During the dialogue both Ministers discussed new areas of potential cooperation and articulated their vision in this direction. The Ministers witnessed the Signing of the Implementing Agreement on Submarine Rescue Support and Cooperation signed between the Indian Navy and Republic of Singapore Navy.

Defence Secretary Dr. Ajay Kumar was present during the meeting.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1690378>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 20 Jan 2021 04:15PM

20 जनवरी 2021को भारत- सिंगापुर रक्षा मंत्रियों की 5वीं वार्ता, रक्षा मंत्रालयरक्षा मंत्री श्री राजनाथ सिंह और सिंगापुर के रक्षा मंत्री डॉ एनजी इंग हेन का संयुक्त वक्तव्य

भारत और सिंगापुर के रक्षा मंत्रियों के बीच 5वीं वार्ता (डीएमडी) 20 जनवरी, 2021 को एक वीडियो कॉन्फ्रेंस के माध्यम से सफलतापूर्वक आयोजित की गई और पिछले कुछ वर्षों में द्विपक्षीय सहयोग और रक्षा साझेदारी में मजबूती आई है। भारत और सिंगापुर के बीच रक्षा और सुरक्षा संबंधों में, सशस्त्र बलों की तीनों सेनाओं के साथ-साथ रक्षा प्रौद्योगिकी और उद्योग के क्षेत्रों में व्यापक स्तर पर बढ़ोतरी हुई है और संभावनाएं बढ़ी हैं। दोनों देशों को बहुपक्षीय मंचों और कार्यों पर भी समान आधार प्राप्त हुआ है।

दोनों देशों के मंत्री इस 5वें डीएमडी में दोनों देशों की नौसेनाओं के बीच पनडुब्बी बचाव सहायता एवं सहयोग पर हुए समझौतों पर हस्ताक्षर करके बहुत प्रसन्न हुए। मंत्रियों ने लाइव फायरिंग संचालन को सुगम बनाने के लिए और सैन्य पाठ्यक्रमों की क्रॉस-अटेंडेंस के लिए पारस्परिक व्यवस्था स्थापित करने के लिए, समझौतों को जल्द से जल्द पूरा करने की दिशा में अपना पूरा समर्थन भी प्रदान किया।

मंत्रियों द्वारा दोनों सशस्त्र बलों के लिए अगस्त 2020 में मानवीय सहायता और आपदा राहत (एचएडीआर) सहयोग पर समझौता सहित द्विपक्षीय रक्षा सहयोग का विस्तार करने वाली पहलों का स्वागत किया गया, जिससे आपसी हितों वाली आपदाओं के लिए प्रतिक्रिया और क्षमता निर्माण गतिविधियों का परिचालन करने में घनिष्ठ सहयोग प्रदान किया जा सके। दोनों सशस्त्र बलों की साइबर एजेंसियों ने भी अपना मेल-मिलाप बढ़ा दिया है।

बातचीत के दौरान, दोनों मंत्रियों ने वैश्विक रूप से फैले हुए कोविड-19 महामारी का रक्षा और सुरक्षा कार्यों पर पड़ने वाले प्रभावों पर अपने-अपने विचारों का आदान-प्रदान किया, जिसमें दोनों देशों के सशस्त्र बलों द्वारा अपनाई गई सर्वोत्तम प्रथाएं भी शामिल थीं। श्री राजनाथ सिंह ने महामारी के चरम पर होने के दौरान विदेशी श्रमिकों की मदद के लिए सिंगापुर के सशस्त्र बलों के प्रति आभार व्यक्त किया, जिनमें कई भारतीय नागरिक भी शामिल थे। डॉ. एनजी ने भौगोलिक और जनसंख्यात्मक चुनौतियां होने के बावजूद कोविड की समग्र संख्या में कमी लाने की दिशा में भारत की सफलताओं की सराहना की।

महामारी के दौरान वर्चुअल बैठकों के माध्यम से दोनों देशों के वरिष्ठ अधिकारियों द्वारा वार्षिक संवादों की गति को बरकरार रखने के लिए दिखाई गई प्रतिबद्धता को दोनों मंत्रियों ने सराहा। इससे द्विपक्षीय रक्षा सहयोग को सकारात्मक गति प्राप्त हुआ है और 2021 में और अधिक सहयोग की नींव तैयार हुई है।

मंत्रियों द्वारा इस बात पर प्रसन्नता व्यक्त की गई कि भारतीय नौसेना और सिंगापुर नौसेना ने सिंगापुर-भारत समुद्री द्विपक्षीय अभ्यास (सिम्बेक्स) के 27वें संस्करण का सफलतापूर्वक संचालन किया और सिंगापुर-भारत-थाईलैंड समुद्री अभ्यास (सिटनेक्स) के दूसरे संस्करण में भी हिस्सा लिया; दोनों अभ्यासों का आयोजन नवंबर 2020 में किया गया। ये अभ्यास नौसेनाओं के बीच पारस्परिकता को बढ़ावा

देते हैं और देशों के साझा जिम्मेदारी को रेखांकित करते हैं, जिससे संचार की समुद्री रेखाओं को खुला रखा जा सके।

श्री राजनाथ सिंह ने क्षेत्रीय सुरक्षा के लिए आसियान कोकेंद्र में रहने की पुष्टि की और आसियान रक्षा मंत्रियों की बैठक (एडीएमएम)-प्लस के सभी प्रयासों के लिए भारत का समर्थन प्रदान करने का वादा किया। डॉ. एनजी ने एचएडीआर पर एडीएमएम-प्लस विशेषज्ञों के कार्य समूह के लिए भारत की आगामी सह-अध्यक्षता के प्रति अपना समर्थन व्यक्त किया। दोनों मंत्रियों ने भारत और सिंगापुर के बीच द्विपक्षीय रक्षा संबंधों को और बढ़ावा देने के लिए अपनी प्रतिबद्धता दिखाई और इस क्षेत्र में स्थायी शांति और स्थिरता को बढ़ावा देने के लिए बहुपक्षीय पहलों की प्रतिबद्धता को दोहराया।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1690535>



पत्र सूचना कार्यालय
भारत सरकार
रक्षा मंत्रालय

Wed, 20 Jan 2021 3:38PM

रक्षा मंत्री श्री राजनाथ सिंह और सिंगापुर के रक्षा मंत्री डॉ. एनजी ईंग हेन के बीच 5वीं भारत-सिंगापुर रक्षा मंत्रियों की वार्ता

रक्षा मंत्री श्री राजनाथ सिंह ने 20 जनवरी, 2021 को सिंगापुर के रक्षा मंत्री डॉ. एनजी ईंग हेन के साथ 5वीं भारत-सिंगापुर रक्षा मंत्रियों वार्ता की सह-अध्यक्षता की। इस वर्चुअल संवाद के दौरान दोनों मंत्रियों ने कोविड-19 महामारी की वजह से आई बाधाओं के बावजूद दोनों देशों के बीच रक्षा सहयोग सहभागिताओं की प्रगति को लेकर संतोष व्यक्त किया।

वर्चुअल संवाद के दौरान रक्षा मंत्री ने सिंगापुर में लागू महामारी निवारण उपायों की प्रभावशीलता और कोविड-19 महामारी के संक्रमण को रोकने के लिए सिंगापुर सशस्त्र बलों के सहयोग की प्रशंसा की। इसके अलावा उन्होंने कोविड-19 से निपटने और विदेशों में फंसे भारतीयों की वापसी में सहायता करने को लेकर शुरू किए गए विभिन्न मिशनों के लिए अपने सशस्त्र बलों की भूमिका को भी रेखांकित किया। वहीं सिंगापुर के रक्षा मंत्री डॉ. एनजी ईंग हेन ने भी इनकी प्रशंसा की और महामारी के नियंत्रण की दिशा को लेकर सरकार की संपूर्ण दृष्टिकोण में सशस्त्र बलों की भूमिका पर विचारों का आदान-प्रदान किया।



दोनों मंत्रियों ने भारत और सिंगापुर के बीच बढ़ते रक्षा संबंधों पर भी संतोष व्यक्त किया। दोनों पक्षों ने पिछले वर्ष की विभिन्न द्विपक्षीय रक्षा सहयोग से संबंधित पहलों की प्रगति की समीक्षा की। इसके अलावा सशस्त्र बलों के साथ-साथ-साथ रक्षा प्रौद्योगिकी और उद्योग के क्षेत्रों में सहभागिता के स्तर को और अधिक ऊंचाई पर ले जाने की प्रतिबद्धता व्यक्त की। इस बातचीत के दौरान दोनों मंत्रियों ने संभावित सहयोग के नए क्षेत्रों पर चर्चा की और इस दिशा में अपने दृष्टिकोण को स्पष्ट किया। वहीं दोनों मंत्रियों के सामने भारतीय नौसेना और सिंगापुर की नौसेना के बीच पनडुब्बी बचाव सहायता एवं सहयोग के कार्यान्वयन समझौते पर हस्ताक्षर हुए।

रक्षा सचिव डॉ. अजय कुमार भी इस बैठक के दौरान उपस्थित थे।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1690551>

Thu, 21 Jan 2021

Standing Committee on Defence evaluates security preparedness in Arabian Sea

A sixteen-member Standing Committee on Defence (SCOD) headed by Bharatiya Janata Party (BJP) MP Jual Oram visited Goa Naval Area on Tuesday to evaluate operational preparedness in the Arabian Sea including coastal security

Panaji (Goa): A sixteen-member Standing Committee on Defence (SCOD) headed by Bharatiya Janata Party (BJP) MP Jual Oram visited Goa Naval Area on Tuesday to evaluate operational preparedness in the Arabian Sea including coastal security. The visit of the SCOD was part of its on-the-spot study on the 'State of present operational preparedness in the Arabian Sea including Coastal Security'. The delegation was received by the Flag Officer Commanding, Goa Naval Area and a briefing on the preparedness of the Indian Navy in the Arabian Sea was given by the Western Naval Command.



Representative image. Image Credit: ANI

On Wednesday, the committee visited Karwar Naval Base in Karnataka to view the development of Project Seabird. It was also briefed about the modernisation of Karwar naval ship repair yard and the capabilities of Indian Naval Ship Vikramaditya. The SCOD also watched a demonstration at the ship lift facility and made a field tour of the naval harbour for the assessment of marine infrastructure being developed as part of Project Seabird Phase II-A. (ANI)

(This story has not been edited by Devdiscourse staff and is auto-generated from a syndicated feed.)

<https://www.devdiscourse.com/article/law-order/1415630-standing-committee-on-defence-evaluates-security-preparedness-in-arabian-sea>

IAF Chief RKS Bhadauria flies sortie to mark 50 years of Air Force Academy

The CAS also unveiled a statue of the 'Eternal Pilot' which was presented to the academy by the pioneers of the 107 Pilots' Course -- the first course to undergo flying training at Air Force Academy

Hyderabad: The Air Force Academy (AFA) in Dundigal commemorated 50 years of its glorious existence on Tuesday. On the occasion, Air Chief Marshal and Chief of the Air Staff (CAS) RKS Bhadauria flew a sortie in the PC-7 Mk-II trainer with one of the qualified flying instructors, currently serving at the AFA, to mark the golden jubilee.

The CAS also unveiled a statue of the 'Eternal Pilot' which was presented to the academy by the pioneers of the 107 Pilots' Course -- the first course to undergo flying training at the AFA. He released an Indian Postal service Special Cover and Golden Jubilee medallion too.

The CAS addressed the trainees and instructors of the AFA at a training workshop held as part of the golden jubilee celebrations and complimented the academy for rendering yeoman services in imparting high quality training that provides the bedrock on which young flight cadets go on to become thorough professionals and military leaders.

Underscoring the requirements for the IAF's capability building, he urged the trainees to imbibe the force's ethos, train hard to prepare for challenges that lie ahead and develop tri-service domain knowledge to fight future wars. He asked the faculty of the AFA and the HQ Training Command to explore avenues for evolving new training methodologies, reshaping curriculum, and incorporating new-generation aids to make officers future-ready.

Since its inception in 1971, the AFA has added many feathers to its cap. With a team of experienced and highly qualified instructors, it conducts training for all branches of the IAF. It also imparts training to officers of the Navy, Coast Guard and friendly foreign countries.

<https://www.newindianexpress.com/states/telangana/2021/jan/20/iaf-chief-rks-bhadauria-flies-sortie-to-mark-50-years-of-air-force-academy-2252544.html>



Air Chief Marshal RKS Bhadauria, with a flying instructor, flies a PC-7 Mk-II trainer

Thu, 21 Jan 2021

IAF kickstarts 5-day mega air exercise with French air force in Jodhpur

The Indian Air Force on Wednesday kickstarted a five-day mega air exercise with French air and space force involving Rafale fighter jets near Rajasthan's Jodhpur on Wednesday

By Manjeet Negi

The Indian Air Force on Wednesday kickstarted a five-day mega air exercise with French air and space force involving Rafale fighter jets near Rajasthan's Jodhpur on Wednesday. The drill is taking place at a time the IAF has been keeping all its frontline bases across the country in a high state of operational readiness in view of the Sino-India border row in eastern Ladakh.

On Day 1 of this exercise, named 'Desert Knight-21', four French Rafale fighters landed in Jodhpur after flying directly for around four hours from the Djibouti airbase using their A-330 multirole tanker transport aircraft which also landed there.

Exercise Desert Knight-21 is being held at Jodhpur Air Force Station and will conclude on January 24.

The French air and space force is participating with Rafale, Airbus A-330 Multi-Role Tanker Transport (MRTT), A-400M Tactical Transport aircraft and approximately 175 personnel.

The Indian Air Force aircraft participating in the exercise include Mirage 2000, Su-30 MKI, Rafale, IL-78 Flight Refuelling Aircraft, AWACS and AEW&C aircraft. The exercise marks an important milestone in the series of engagements between the two Indian and the French air forces.

As part of Indo-French defence cooperation, the Indian Air Force and the French air and space force held six editions of air exercises named 'Garuda' -- the latest being in 2019 at Air Force Base Mont-de-Marsan in France. As measures to further the existing cooperation, the two forces have been gainfully utilising available opportunities to conduct 'hop-exercises'.

<https://www.indiatoday.in/india/story/iaf-kickstart-5-day-mega-air-exercise-with-french-air-force-in-jodhpur-1761162-2021-01-21>



Exercise Desert Knight-21 is being held at Jodhpur Air Force Station and will conclude on January 24.

Lt Gen CP Mohanty stresses on Army modernisation to deal with threats from Pak, China

Synopsis

Attending a function at Sainik School here, Mohanty said, "As of now, the major challenge before the Indian Army is to tackle both China and Pakistan at one time in the borders.

Bhubaneswar: Ahead of assuming charge as the next vice-chief of the Indian Army, Lt General Chandi Prasad Mohanty Wednesday said the force needs modernisation and further augmentation of its capability to simultaneously deal with threats from China and Pakistan.

Lt Gen Mohanty, who is currently the Southern Command chief, will take over from Lt Gen S K Saini after he retires on January 31.

Attending a function at Sainik School here, Mohanty said, "As of now, the major challenge before the Indian Army is to tackle both China and Pakistan at one time in the borders.

"Therefore, we have to expedite modernisation, achieve technological advancement and keep vigil on both the fronts simultaneously. For that reason, we have to do capability development, infrastructure development, procure better weapon systems and better communications."



Noting that nature of battlefields across the globe is changing fast, Mohanty said, one needs to constantly undertake modernisation works.

"Nowadays, we in the Indian Army, Indian Navy or the Indian Air-force, are not giving stress on expanding in terms of numbers, but emphasis is being given on infrastructure development and modernisation," he said.

After taking charge as the vice-chief of India Army, Lt General Mohantys prime responsibility will be to carry forward modernisation and capability development of the force, he said.

"China is modernising in a big way and also assisting Pakistan to modernise in a big way. We are also carrying out a lot of modernisation and capability enhancement. What is most important is that we are getting tremendous support from our Prime Minister and Defence Minister," Mohanty said.

Replying to a question on defence production in the country, Mohanty said, "You will be happy to know that we are totally looking at Atma Nirvar Bharat. Many local industries are are now coming up under Atma Nirvar Bharat. ... Indian Army is encouraging Indian industries. We would be proud to use indigenously produced weapons. Indian industries are doing a good job and will also export weapons in future."

Mohanty appealed to Odia youths to join the defence force and make the state proud.

Odia women should also join the Army, he said.

Replying to a question on Odishas demand for formation of Kalinga Regiment, Jagatsinghpur-born Mohanty said, "Since Independence, the Indian Army has set up only Naga Regiment and it has two battalions. Let us see what can be done for the raising of Kalinga Regiment".

Congratulating Lt Gen Mohanty on being appointed as the 42nd vice-chief of the Indian Army, Chief Minister Naveen Patnaik on Tuesday tweeted, "Indeed a proud moment for #Odisha. Wish the very best for the new responsibility."

<https://economictimes.indiatimes.com/news/defence/lt-gen-c-p-mohanty-stresses-on-army-modernisation-to-deal-with-threats-from-pak-china/articleshow/80369468.cms>

How the geniuses behind the 3 Idiots drone bagged a \$20 million UAV deal from the Indian Army

Back in 2008, Ankit Mehta, Rahul Singh and Ashish Bhat had been working on drone technology for fun. The 26/11 attacks, however, made them determined to develop UAVs that would help the defence forces in hostage and siege situations. Today, their company, ideaForge, has bagged a \$20 million contract from the Indian Army to supply high-altitude drones

By Priyanka Sahay

In 2008, Ankit Mehta and friends watched in horror as the Mumbai terror attacks played out on live television. The mass killing and plight of hundreds trapped inside hotels and the Jewish Chabad house spurred the team to develop unmanned aerial vehicles, better known as drones, to assist security forces during hostage situations.

Now, more than a decade later, their company, ideaForge, has bagged a \$20 million contract from the Indian Army to supply high-altitude drones. Their company was the only one that met the operations requirements of the Indian Army.

Mehta is the co-founder and CEO of ideaForge. The other three co-founders are Rahul Singh, VP, Engineering; Ashish Bhat, VP, R&D; and Vipul Joshi, VP, Operations.

Back in 2008, Mehta, Singh and Bhat, all IIT-Bombay graduates, had been working on drone technology for fun. The 26/11 attacks, however, helped them focus their efforts. In no time, they prepared a prototype for an unmanned drone, giving the world a glimpse of their creation in the critically acclaimed movie *3 Idiots*, in 2009.

Since then there has been no looking back. ideaForge, has signed numerous contracts with security agencies and defence forces, culminating with the recent, \$20-million deal with the Indian Army for high-altitude drones.

Born and brought up in Jodhpur, Mehta's family runs a business printing on export quality fabrics. In an interaction with *Moneycontrol*, he spoke about the decision to cater to sectors such as defence and security, about investor interest as well as the challenges in the Indian ecosystem. Edited Excerpts:

Tell us how you bagged the \$20 million deal with the Indian Army.

With the requirement for high-altitude surveillance heating up, the Indian Army fast-tracked the procurement of drones to ensure that our troops have real-time on-ground situational awareness. About a dozen domestic and international companies participated in the product trials organised by the Army. The trials lasted for three months and were conducted in the toughest of weather conditions and terrain, which tested the systems to their limits.

Ultimately, it was our SWITCH UAV that met all the operational requirements of the Indian Army and in fact, surpassed expectations. We have a best-in-class flight time of over 120 minutes and an operational range of 15 km. It is man-portable and has the highest time on target compared to any other UAV in its class.

Tell us about some of the features of your UAV.

It is a fully indigenously built system and features a fixed wing VTOL (Vertical Takeoff and Landing) hybrid configuration for terrain-independent deployment. Its robust build, 25x optical zoom and ability to operate at an altitude of 4,500 metres along with its class-leading flight time and range make it best-suited for day and night surveillance in Intelligence, Surveillance, and Reconnaissance (ISR) missions.



Ankit Mehta is the co-founder and CEO of ideaForge.

Take us back to the very beginning. How did it all start for you?

We were developing the base technology from 2004 till 2008 but the turning point was the 2008 Mumbai attack. We were working on a technology that could have been useful in that scenario, given that there was lack of visibility from the ground level into the buildings. A drone at the site could have helped to help these hostages. But we didn't have the tech ready at that time. However, it gave us the necessary direction. And we just started building these products for security and surveillance applications.

In 2009, we launched India's first fully autonomous drone. And you also saw an early prototype of ours in the movie *3 Idiots*. It wasn't the exact prototype that we launched as a product but an early prototype of ours because that was the need in the movie. We also launched our first fully autonomous drone in India, a quadcopter (with four rotors).

Since then we have been delivering these drones to various armed forces in the country, be it defence, be it homeland security besides State police for recurring surveillance applications. We also partnered with the DRDO (Defence Research and Development Organisation) to get the first set of our systems inducted in various processes. And we have started delivering these products for mapping applications as well to carry out survey-grade mapping. We are able to deliver drones for the SVAMITVA scheme, wherein we are required to map all the 650,000 villages in the country and give property cards to families.

Drones can be used for so many other things. Why did you choose the defence and security sector?

So, think about it. In 2008 the Mumbai attack happened. At that time drones were not even common knowledge even though we were building them since 2004. So, when we started, there was nothing like this. In fact, I can safely say that the consciousness of the country emerged around drones after the movie in that one scene. After that, for the first time, the market actually got introduced to the concept of a drone. And from the point of view of use cases at that time, security and surveillance were the need of the hour because we had just had the Mumbai attacks. And we wanted to create something that is useful. And at that time, nobody had any vision of what to do with these systems. So, that is basically the brief history of why we started in this.

You come from a conventional background. Why did you plunge into the startup space?

So, when we were students we had done so much technology work, unlike what is usual, typically progression to any engineering college where you are focused on coursework and all the extracurricular activities. For us the extracurricular activities were actually technology. So, we had participated in umpteen competitions. We even represented India in one of these competitions. And so we had done a lot of technology activity as a team. In fact, the idea of the drone was an idea that was pretty unique at that time, that we decided we will develop.

Technology was something in our DNA, and then it reflected in our journeys. It was very clear that it is not a privilege that anyone else has, to get invested in it as much as we have been invested in, to work on our own ideas, to get this freedom and confidence that you can develop any technology.

Did you reach out to the defence or police authorities?

We did. One of our first customers was the police force. In 2010, we made the first case for a fully integrated drone. That was to one of the State police forces. I can't disclose the details since they are not in the public domain. Thereafter, we delivered umpteen projects to the defence forces, and have delivered close to a thousand plus drones to various customers already. For security, surveillance and mapping applications. Close to half of the systems we have delivered have been to the defence forces.

ideaForge has a long history of working with India's defence and homeland security forces. The knowledge and experience gained so far has enabled us to develop products that cater to the most demanding requirements of the armed forces.

Was there just a sense of nationalism that prompted you to get into the defence sector? What about the commercial aspect?

Honestly for us, it was about solving problems, which were relevant. But ultimately your business has to be sustainable. I have a very simple philosophy: you need to be commercially viable because you want to continue developing more and more technology.

Defence is a very niche segment. What has been your experience so far and how do you see entrepreneurship in this area growing?

So, first of all, I think we don't look at defence as the only customer. We deliver to defence, we deliver to homeland security and we deliver to large enterprises. Now, defence is a unique business; it has its own challenges, but it has its own advantages as well. Your money may get delayed but it's secure. You will be looking at opportunities that come in a chunk, but when the chunk happens, it's a massive chunk. It is a relatively secure business in terms of the government being the customer.

The company raised an external round of funding sometime in 2016. Are you in talks to raise an external round as of now? How are venture capital firms looking at this sector?

We are always on the lookout for investors who are like-minded. Who want to leverage this unprecedented opportunity which the drone industry today presents anybody. This is the best time to actually go behind this industry and we are open to speak to investors who are like-minded.

So, currently what is the status? How are investors responding?

It is very early. But in one sense we just closed this deal with the defence forces.

But this is more like a commercial agreement and not an investment?

Exactly. And that's why it (the contract with the Indian Army) is such a transformative deal, because it makes the opportunity here. Drones have a very high potential opportunity for a really long time. It is early days, but there is (investor) interest. We will get to know a lot more about the depth of that interest in the next few weeks.

What are the challenges an entrepreneur faces while setting up a startup in this segment? What can be done by the government to ensure ease of doing business?

One of the areas that could be better in general for high-tech areas is the procurement process... While our systems are tuned towards very high efficiency of utilisation of public money, we are not cognisant of the efficacy of that expense... the factor of time impact. Efficiency is not just the factor of the cheapest price for a technology but also about whether you bought it in time or not.

<https://www.moneycontrol.com/news/business/how-the-geniuses-behind-the-3-idiots-drone-bagged-a-20-million-uav-deal-from-the-indian-army-6371761.html>

Thu, 21 Jan 2021

Indian Navy to rush in assets to help Singapore in case of submarine disasters

Indian Navy will rush in to help Singapore in case of a submarine disaster or emergency under the Implementing Agreement on Submarine Rescue Support and Cooperation signed between the two countries on Wednesday

By Abhishek Bhalla

Indian Navy will rush in to help Singapore in case of a submarine disaster or emergency under the Implementing Agreement on Submarine Rescue Support and Cooperation signed between the two countries on Wednesday.

India and Singapore have signed the agreement as part of enhancing defence cooperation.

At the Defence Minister's Dialogue held through video conference, Indian and Singaporean defence ministers witnessed the signing of the Implementing Agreement on Submarine Rescue Support and Cooperation between the two Navies, a joint statement said.



File image for representation: Reuters

The Indian Navy, now having the capability to rescue submarines that are in distress and are unable to come to the surface, will press into action its deep-sea submergence rescue vehicle (DSRV) if such a situation arises for the Singapore Navy.

The agreement is part of enhancing India's military diplomacy in the region and extend its outreach, officials said.

India had acquired two DSRVs in 2018 but till then it had an agreement with the United States for such emergencies.

The DSRV system consists of a Submarine Rescue Vessel, a Remote Operations Vehicle, Side Scan Sonar and associated equipment. The system can be rapidly mobilised by air or road to facilitate submarine rescue operations even at distant locations.

There are about 40 nations that operate submarines around world but only a few have any form of submarine rescue capability. The third-generation Indian Navy submarine rescue capability can, therefore, be called upon to assist during submarine contingencies of other navies in the Indian Ocean Region, the Indian Navy said.

The defence ministers also conveyed their full support towards the early conclusion of agreements to facilitate conduct of live firings and to establish reciprocal arrangements for the cross-attendance of military courses.

The ministers expressed pleasure on the two navies carrying out exercises together.

"Indian Navy and Republic of Singapore Navy successfully conducted the 27th edition of Singapore-India Maritime Bilateral Exercise (SIMBEX) and also participated in the second edition of the Singapore-India-Thailand Maritime Exercise (SITMEX); both held in November 2020. These exercises enhance interoperability amongst the navies and underscore the shared responsibility of the countries to work together to keep sea lines of communications open," the joint statement said.

Both ministers were committed to further enhance bilateral defence ties between India and Singapore and supported multilateral initiatives to promote lasting peace and stability in the region.

<https://www.indiatoday.in/india/story/indian-navy-to-rush-in-assets-to-help-singapore-in-case-of-submarine-disasters-1761169-2021-01-21>

Thu, 21 Jan 2021

How India May rely on its Navy to offset China

By Saurabh Joshi

- *India is considering the purchase of a third aircraft carrier*
- *Navy officials are leaning toward western aircraft in order to remain interoperable with allies in the Pacific*

An Indian confrontation with the Chinese People's Liberation Army (PLA) in the eastern Ladakh region could result in Indian naval acquisitions driving the growth of a domestic military aviation industry this decade.

PLA incursions into the Ladakh region in early 2020 and a deadly skirmish at Galwan Valley spurred a volley of missile tests and prompted India to invite a fourth partner to Exercise Malabar—the Royal Australian Navy—to join Japan and the U.S. The nation's focus on naval alliances coincides with a renewed debate in New Delhi about long-term defense expenditures, a conversation in which the navy has long received the smallest share of the budget.

A large part of the discussion concerns assets the Indian Navy should pursue—specifically, a third aircraft carrier and its associated aircraft. Naval aviation capabilities are key for India to dominate the Indian Ocean region along with its Quad (Quadrilateral Security Dialogue) partners: Australia, Japan and the U.S.

While any increase in Indian naval strength might be perceived as a move to become the region's gatekeeper, as a “net security provider,” navy chief Adm. Karambir Singh sees the service's role instead as a “preferred security partner.”

Regional security, including that of sea lines of communication, remains an important objective for the Indian Navy but is now more important than ever. India sees as imperative the need to offset the PLA across the Himalayas by controlling access to sea lanes across the Indian Ocean, from the Straits of Malacca to Hormuz and the Gulf of Aden. Since no navy can accomplish this on its own, India may opt to acquire platforms that offer a high level of interoperability with allies.

Wish List

The Indian Navy intends to have a fleet of 445 aircraft by 2030, with a number of acquisitions already planned: 57 fighters, 111 utility helicopters, 123 multirole helicopters and 24 Sikorsky MH-60R helicopters are on order. The list also includes additional Boeing OP-8I long-range maritime reconnaissance aircraft. The navy had an original requirement for 31 of the aircraft, of which nine are in service. Three more have been ordered, and a further six are expected to be ordered, though the service also has an increasing interest in unmanned platforms after the recent lease of two General Atomics MQ-9B UAVs.

Plans to purchase a new, third aircraft carrier are just one piece of that naval aviation expansion. The navy had already been contemplating spending about \$25 billion long before the eastern Ladakh crisis transformed earlier assumptions. The service has plans to build a twin-engine deck-based fighter (TEDBF) to enter service in the early 2030s.

The third aircraft carrier, a 65,000-ton catapult-assisted-takeoff, barrier-arrested-recovery (Catobar) flat-deck (priced at \$6.15 billion), which envisages the launch of fixed-wing reconnaissance aircraft in addition to fighters, is the only one of the lot that has yet to be approved. The battle within the defense ministry over the purchase of a third aircraft carrier is likely to be fought over the next year or two.



The Indian Navy is discussing how a third aircraft carrier and its associated aircraft would help the nation and its partners dominate the Indian Ocean region.

Maritime Pivot

It is no secret that Indian defense acquisitions have lagged on both money and time. But even amid the COVID-19 pandemic, the new decade signals prioritization for an area traditionally lower on the list for the nation's land-focused defense planners.

Indian Navy Fleet 2021 and 2030

| Type | Sub-Mission | 2021 Fleet | Fleet by 2030 |
|--|-----------------------------|------------|---------------|
| FIGHTERS | | | |
| Mikoyan MiG-29K (9.41) | Multirole (Ship-Based) | 32 | 32 |
| Mikoyan MiG-29KUB (9.47) | Training Version | 10 | 10 |
| LIGHT COMBAT AIRCRAFT | | | |
| Hindustan Aeronautics Ltd. (HAL) Tejas | Light Fighter | 2 | 2 |
| TRAINERS | | | |
| HAL Hawk Mk. 132 | Advanced Jet Trainer | 17 | 17 |
| Pipistrel Virus SW 80 | Introductory Flight Trainer | 12 | 12 |
| MARITIME | | | |
| Boeing P-8I | Patrol (ASW) | 9 | 18 |
| Dornier Do 228 | Surveillance | 38 | 38 |
| Ilyushin IL-38N | Patrol | 4 | 0 |
| ShinMaywa US-2 | SAR | 0 | 12 |
| ROTARY WING (MARITIME) | | | |
| Airbus SA.316B | General | 9 | 0 |
| HAL SA.316B Chetak | General | 32 | 0 |
| HAL Dhruv (ALH Mk. I) | SAR | 8 | 8 |
| HAL Dhruv (ALH Mk. III) | General | 0 | 12 |
| Kamov Ka-28 | General | 8 | 0 |
| Kamov Ka-31 | AEW (RW) | 10 | 16 |
| Leonardo Sea King Mk. 42 | ASW | 24 | 0 |
| Sikorsky UH-3H | General | 6 | 0 |
| Sikorsky MH-60R | ASW | 0 | 24 |
| India Naval Multi-Role Helicopter Requirement | ASW | 0 | 123 |
| India Naval Utility Helicopter Requirement | General | 0 | 111 |
| UAVs | | | |
| Israel Aerospace Industries (IAI) Searcher II | Sigint | 6 | 6 |
| General Atomics Aeronautical Systems MQ-9B | ISR-Strike | 2 | 12 |
| IAI Heron 1 | Maritime Patrol | 5 | 5 |
| Aeronautical Development Establishment Lakshya | Target Drone | 3 | 3 |
| GRAND TOTAL | | 237 | 461 |

Indian Navy Fighter replacement program assessed to now start deliveries after 2030.

ASW = Anti-Submarine Warfare

SAR = Synthetic Aperture Radar

AEW = Airborne Early Warning (Radar Warning)

Source: Aviation Week's Fleet Discovery Database

Adm. (ret.) Arun Prakash, former navy chief and the chair at India's Naval War College, says some of these contingencies have already been contemplated by the navy in prior planning. "But these plans were made in a strategic vacuum, at the national level, at the time. It is ironic that for the first time the importance of the maritime domain has been driven home to decision-makers because of the confrontation in the Himalayas," he says. "The 'hardware versus strategy'

conundrum, where we have been thinking about strategy only after acquiring hardware, is a process that needs to be reversed.”

Vice Adm. (ret.) Shekhar Sinha, former head of India’s Western Naval Command, sees a growing realization of the importance of India’s naval capabilities. “India has traditionally had a continental mindset and thought of defense in terms of land-centric warfare. This is an inherently defensive strategy leaving few options when the [PLA] invades your territory,” he says. “This is why people are now beginning to understand the options naval power offers India for defending its northern borders.”

The Pentagon’s 2020 annual report to Congress on Chinese military power notes: “The [People’s Republic of China] has the largest navy in the world, with an overall battle force of approximately 350 ships and submarines, including over 130 major surface combatants.” The report adds that China is the top producer of ships by tonnage and is increasing its shipbuilding prowess in all classes. Meanwhile, as of early 2020, the U.S. Navy’s battle force was approximately 293 ships.

“The third carrier and naval aviation will be essential for the time when the Chinese begin to assert themselves in the Indian Ocean region,” Sinha says.

Australia, Japan and the U.S. all announced plans in 2020 for significant expenditures to counter Chinese military capabilities in the Indo-Pacific region.

Prakash puts the acquisition plans in perspective. “Although these seem like large acquisition plans, in reality many of these are filling long-standing voids in capability and not enhancing it,” he says. “But a third aircraft carrier and the planned 57 new fighters are what will constitute a substantive accretion.”

Singh told news media in December that the navy intends to make its case for the third aircraft carrier to the government, pending responses to outstanding requests for information. “As a navy, we are absolutely clear of the utility of the third aircraft carrier, because air operations are absolutely integral to naval operations—air power at sea is absolutely required. And it is required here and now, that kind of air power,” he said.

Industry Boost

Still, these programs represent a capability-focused strategy, driving acquisition planning with the objective of boosting domestic industry commensurate to the size of the market.

“Both the naval helicopter programs are strategic partnership programs. That means most of them have to be built in India,” Sinha says. “The third aircraft carrier would be built here, as well. Add on the TEDBF development program, and all this taken together offers a lot of scope not only as a market but, more importantly, to jump-start industry in India.”

Strategic Partnership programs under Chapter 7 of India’s Defense Acquisitions Procedure mandate that the prime be an Indian company, requiring collaborations with foreign OEMs. The declared objective of the model is “to enable participation of private Indian firms in Make in India in defense.”

Prakash sees scope for industry in building the capability required by the navy. “This crisis can represent an opportunity in the coming decade and beyond for providing India with viable options and for boosting industry here,” he says. But he also offers a caveat: “There needs to be clarity about our objectives in terms of the ends we want to achieve: Decide what we need and how we will pay for it, even in these straitened economic circumstances, or look to build alliances that will serve this purpose. If that means a third aircraft carrier, then find the money for it. After all, the first charge upon the state’s exchequer must be national security.”

Western Shift

Something else that stands out is that Western equipment are the likeliest choices in all these programs. The Boeing F/A-18 Super Hornet and the Dassault Rafale M are preferred over the in-service Mikoyan MiG-29K. The F/A-18 conducted ski-jump tests in August to prove operability with India’s existing short-takeoff, barrier-arrested-recovery carrier operability requirement.

“To replace the MiG-29s, we’ve taken up a case for the [57 multirole carrier-borne fighters] we are trying to do along with the Indian Air Force,” Singh said in December. The MiG-29K is not Catobar-capable, also a requirement for the Indian Navy.

Airbus has offered the AS565 Panther and the H225M for the two helicopter programs, while Sikorsky has offered the S-76 and MH-60R. A navalized version of the Russian Kamov Ka-226T is not perceived as a serious contender, in part because of the height of the aircraft due to the coaxial rotors. While the P-8I and MQ-9B are foreign products, a third carrier and the TEDBF programs would be indigenous.

These programs paint a seascape of almost exclusively Western platforms wearing the navy roundel over the Indian Ocean. This will inevitably enhance the scope of interoperability with Western navies, with which India has conducted a growing number of engagements. These include increasingly complex exercises, coordinated patrols, intelligence sharing and exchange of supplies via logistics agreements.

“There is no question that these plans, as they stand, will represent a long-overdue shift away from poorly supported Russian toward Western platforms and systems,” Prakash says. “The naval air arm is showing the way in this regard.”

Sinha adds: “This shift toward Western kit is not only about high-tech platforms, but also about partnering with democracies with a convergence of strategic interests.”

<https://aviationweek.com/defense-space/aircraft-propulsion/how-india-may-rely-its-navy-offset-china>



Thu, 21 Jan 2021

Exclusive: China plans to construct 600 ‘Border Defence Villages’ close to Indian border, security agencies concerned

As per reports, Chinese Communist Party (CCP) cadres will be stationed in these Border Defence Villages to counter “infiltration by hostile forces”

By Manish Shukla, Edited Tanweer Azam

The historically independent nation of Tibet was annexed by Chinese troops more than 60 years ago and China has continued its brutal occupation of the region till this day. To create an “impenetrable security barrier” between occupied Tibet and the outside world, China has adopted a strategy of creating “Border Defence Villages”. As per reports, Chinese Communist Party (CCP) cadres will be stationed in these Border Defence Villages to counter “infiltration by hostile forces”. One of the key focus areas of this plan is developing connectivity infrastructure. In 2019, the Chinese government constructed a major tunnel and bridge that would connect Tibet’s capital Lhasa to the Chinese province of Sichuan through a rail link. This new rail link is of great strategic importance to China and is located close to India.

The development of these border villages has serious implications for India’s defence. These Border Defence Villages will change the demography of the border areas over time. The construction of these border villages is especially worrisome for India following the 2017 stand-off between India and Chinese troops on the Doklam Plateau. The Plateau is only 9 kilometers away from Yadong county, Tibet. This reason is considered strategically sensitive due to its location and its relative proximity from the Indian border.



“ If China was to increase its influence over the region , It would allow Chinese forces to access the Siliguri Corridor , Known as the “Chicken’s Neck”. If Chinese forces can exert influence over the “Chicken’s Neck” from Yadong, this would be a great opportunity for China to cut off India’s access to the North East completely in times of war or disputes.” a source familiar of these developments said to Zee News.

Chinese President Xi Jinping has stated that the frontiers of the nation must be governed well to be able to aptly administer to the whole country. Wu Yingjie, the CCP Chief of the Tibet Autonomous Region (TAR) has stated that Tibet is a special frontier ethnic region and therefore is extremely important to the national security of China and forms an ecological security barrier. The plan to create Border Defence Villages in Tibet, near the Indian border is outlined in the “Plan for the Construction of Well-Off Villages in the Border Areas of the Tibet Autonomous Region (2017-2020).” The plan was issued back in 2017 and according to it, China would be creating more than 600 of these Border Defence Villages.

CCP cadres are to be stationed in these villages, and their primary goal is repelling any attempted infiltrations by ‘hostile forces’ such as the Tibetans loyal to His Holinesses Dalai Lama. By placing faithful cadres at these villages, the CCP hopes that villages will follow or align with Chinese objectives. These border villages are constructed on the routes that were in the past used by Tibetan’s to escape the CCP’s oppressive regime into Nepal and then into India. Another important role for the residents of these villages is to keep tabs on the movement of population and activities on the other side of the border.” Most of the Border Defence Villages are being constructed in key border areas such as Nyingtri/ Niyngchi. The region borders the Indian state of Arunachal Pradesh.

The Border Defence Villages also serve as a center for CCP’s ideological campaigns. The villages conduct intensive political education sessions in border areas. These political education sessions include the training of monks in Nyingtri. Through this method, the monks are taught to go against the Dalai Lama’s influence. Penpa Lhamo, deputy head of the Contemporary Studies Institute of Tibet Academy of Science has stated that Nyingtri is vital to Chinese counter espionage operations because of the presence of many military sites in the region. As per Li Wei, an anti-terrorism expert with the China Institute of Contemporary International Relations, the temples in Tibet have always been the focus of the Chinese government’s plan as they are essential in maintaining the stability of Tibet.

The infrastructure that is closest to the actual border is known as “first-line” construction. As per Chinese state media, the majority of Border Defence Villages have been constructed on the ‘first line’ while around 200 Border Defence Villages have been constructed on slightly farther ‘second line’. Chinese state media has also revealed that Tibetans are often forcibly relocated and resettled in the border villages.

Zhu Hong, head of the organization department of the Gar County committee while talking about a new Border Defence Village called Demchog in the Gar County has stated that the goal is to turn these villages into “party building position and an indestructible battle fortress”. He added that these villages would hold demonstration on the border as well as keep the motherland (Chinese mainland). In addition to passive security roles, these Border Defence Villages also act as outposts that try to identify “secessionist” elements. Chinese media has reported that the amenities available in these villages like- well constructed houses, paved roads, electricity, TV and internet meant to be seen as attractive to those on the other side of the border.

The construction and development of these Border Defence Villages have been praised by President Xi Jinping. In a letter to two sisters from a Tibetan herding family , Xi stated that he wished for the girls to “set down roots” in the new village, as well as safeguard Chinese territory . Xi also added that he wished for the Tibetan settlers to “develop their hometown”. The Chinese have invested vast sums of the developments of these Border Defence Villages. According to M. Taylor Fravel , the Director of the Security Studies Program at the Massachusetts Institute of Technology , the local budget for the construction of these border defence villages is approximately 30 billion Yuan or \$4.6 billion. Zhuangyan, Deputy Party Secretary, TAR Executive

Chairman and the Chief Commander of the Construction Work Headquarters of Xiaokang Villages in March 2018 stated that the primary goal of the construction of these villages is to ensure consolidation of the border areas and to guarantee border security. In these senses, these border villages are similar to Xinjiang Production and Construction Corps farms. They offer the same benefits to China of increasing border control as well as consolidation.

Beijing and the CCP have long believed that it was much easier to control an unruly population when they are settled in and placed in well connected villages. Through the use of modern technology like surveillance cameras and mobile phones, the action of 'resettled' villages can be effectively monitored and controlled. The Chinese government finds it much easier to control these settled Tibetans than keeping track of them while they pursue their nomadic lifestyle.

Construction of these 'Border Defence Villages' is intended for Chinese encroachment of lands of sovereign nations in its neighboring countries. These unilateral actions of the expansionist Chinese President Xi Jinping are in clear violation of the international norms. China has perhaps chosen this time of global health adversary as an 'opportunity' to push forward its expansionist ideology by accelerating works on setting up 'Border Defence Villages' seemingly assuming that it would go unnoticed.

<https://www.dnaindia.com/india/report-china-under-president-xi-jinping-plans-new-conspiracy-against-india-details-inside-2869280>



Thu, 21 Jan 2021

Pakistan test-fires nuclear-capable surface-to-surface ballistic missile

The missile is capable of carrying nuclear and conventional warheads to a range of 2,750 kms, the statement said

Islamabad: Pakistan said on Wednesday that it successfully test-fired a nuclear-capable surface-to-surface ballistic missile which can strike targets up to 2,750 kilometres.

The launch of Shaheen-III missile was "aimed at revalidating various design and technical parameters of weapon system," said a statement issued by the media wing of the Pakistani army - the Inter-Services Public Relations (ISPR).

The missile is capable of carrying nuclear and conventional warheads to a range of 2,750 kms, the statement said.

President Arif Alvi, Prime Minister Imran Khan and top army generals congratulated scientists and engineers on the successful test of the missile.

<https://www.newindianexpress.com/world/2021/jan/20/pakistan-test-fires-nuclear-capable-surface-to-surface-ballistic-missile-2252773.html>

Thu, 21 Jan 2021

Scientists gain an unprecedented view of irradiated nuclear fuel

By Christina Nunez

In a feat requiring perseverance, world-leading technology, and no small amount of caution, scientists have used intense X-rays to inspect irradiated nuclear fuel. The imaging, led by researchers at Purdue University and conducted at the U.S. Department of Energy's (DOE) Argonne National Laboratory, revealed a 3-D view of the fuel's interior structure, laying the groundwork for better nuclear fuel designs and models.

Until now, examinations of uranium fuel have been limited to mostly surface microscopy or to various characterization techniques using mock versions that possess little radioactivity. But scientists want to know at a deeper level how the material changes as it undergoes fission inside a nuclear reactor. The resulting insights from this study, which the *Journal of Nuclear Materials* published in August 2020, can lead to nuclear fuels that function more efficiently and cost less to develop.

To get an interior view of the uranium-zirconium fuel studied, the researchers sectioned off a bit of used fuel small enough to be handled safely—a capability developed only within the last seven years. Then, to see inside this tiny metallic sample, they turned to the Advanced Photon Source (APS), a DOE Office of Science User Facility located at Argonne.

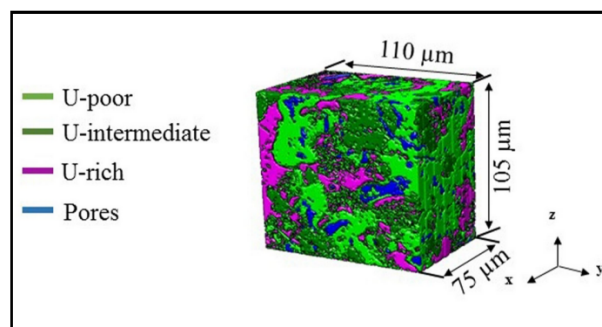
A study decades in the making

Before the researchers could approach the formidable task of isolating a fuel sample and placing it under an X-ray beam, they needed to find the right specimen. Exploring fuels archived at DOE's Idaho National Laboratory (INL), they identified a uranium-zirconium fuel that spent a total of two years at full power in the Fast Flux Test Facility in Hanford, Washington, and was removed from the reactor in the early 1990s.

"We had to wait decades for this fuel to radiologically cool or decay," said Maria Okuniewski, assistant professor of materials engineering at Purdue University and the paper's lead author. "It was literally the coolest specimen that we could remove based on the permissible safety guidelines at both INL and APS."

Even the coolest available spent fuel specimen was still too hot, radiologically speaking, at its original size. Taken from a larger fuel pin, the sample was less than a quarter of an inch high, but it measured 1,200 millirem per hour from a distance of 30 centimeters—a radiation level 240 times larger than the allowable limit at the APS.

To reduce the radioactivity, the researchers used a focused ion beam with scanning electron microscopy at INL to create a much smaller sample. The tool allowed them to pinpoint an area of interest and deploy a stream of ions that essentially milled out a cube of material. The resulting sample was roughly 100 microns across, no larger than the diameter of a human hair.



3-D image reconstruction of a sample of irradiated fuel, showing the three thresholded uranium phases co-existing with pores. Credit: Maria Okuniewski / Purdue University

(APS), a DOE Office of Science User Facility

"We've come a long way with this new instrumentation that allows us to obtain samples that are small enough to be safe and easily handled," said Okuniewski.

The miniscule sample was mounted on a pin, encased in a double-walled tube, and sent to Argonne, with multiple radiation checks to ensure safety along the way.

At Argonne, the Purdue research team worked with scientists at beamline 1-ID-E, a high-brilliance X-ray source at the APS, to examine the sample. The goal: To see what uranium-zirconium fuel looks like on the inside after it has been bombarded with neutrons for two years.

"We are really talking about a piece of dust that you can barely see with the naked eye—it's that small," said Peter Kenesei, a physicist with Argonne's X-ray Science Division and study co-author. "But this is also very dense material, so you need a sufficient intensity of high-energy X-rays to penetrate and study it."

The technique used, micro-computed tomography, detects at high resolution the X-ray beam as it emerges on the other side of the sample. From multiple images taken as the fuel was rotated, computers could reconstruct its internal features based on how it altered the incoming beam, similar to a medical CT scan.

"The 1-ID-E beamline's flexibility, along with Argonne's expertise in safely handling nuclear materials, allows us to design and conduct a unique experiment like this one," Kenesei said.

Closer look at fuel swelling

In particular, Okuniewski and her colleagues were interested in the phenomenon of swelling. Nuclear fuel generates energy by taking one uranium atom and splitting it into two, and this fission process generates byproducts such as the gas xenon and metals like palladium and neodymium. As atoms split and fission products accumulate, the fuel grows in volume.

The safety and longevity of any given nuclear fuel depends on being able to predict how much it will swell. Too much swelling can cause the uranium to react with, and possibly fracture, its protective outer layer, called a cladding. To prevent that from happening, engineers rely on fuel performance codes, which are computer models that simulate various aspects of a fuel's behavior in a reactor, such as how hot in temperature it will get and how its constituents redistribute in space.

"In every single fuel type, swelling is an issue," Okuniewski said. "These fuels are designed so that the inner core is free to expand to a specific level before it touches the cladding."

In addition to providing a clearer, localized picture of the fuel structure and the different material phases that developed over time, the study at the APS revealed evidence that the release of fission gases might continue to occur beyond the thresholds assumed in previous analyses. This type of data can help strengthen fuel performance codes, which in turn would help lower the cost of fuel development, since reliable computer simulations can minimize the number of expensive irradiation tests needed.

"We're always striving within the nuclear community to figure out ways that we can improve the fuel performance codes," Okuniewski said. "This is one way to do that. Now we have three-dimensional insight that we previously didn't have at all."

More information: Jonova Thomas et al. The application of synchrotron micro-computed tomography to characterize the three-dimensional microstructure in irradiated nuclear fuel, *Journal of Nuclear Materials* (2020). DOI: [10.1016/j.jnucmat.2020.152161](https://doi.org/10.1016/j.jnucmat.2020.152161)

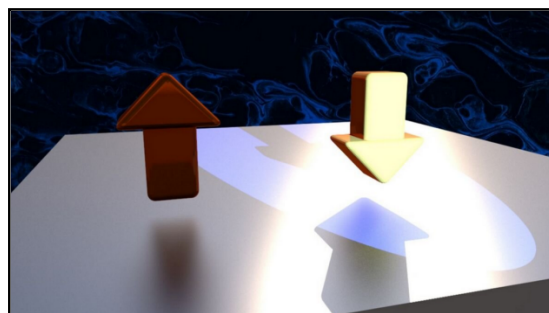
<https://phys.org/news/2021-01-scientists-gain-unprecedented-view-irradiated.html>

Storing information with light

New photo-ferroelectric materials allow storage of information in a non-volatile way using light stimulus. The idea is to create energy efficient memory devices with high performance and versatility to face current challenges. The study has been published in *Nature Communications* by Josep Fontcuberta and co-workers and opens a path towards further investigations on this phenomenon and to neuromorphic computing applications.

Can you imagine controlling the properties of a material by just shining light on it? We are used to seeing that the temperature of materials increases when exposed to the sun. But light may also have subtler effects. Indeed, light photons can create pairs of free charge carriers in otherwise insulating materials. This is the basic principle of the photovoltaic panels we use to harvest electrical energy from sun.

In a new twist, a light-induced change of materials' properties could be used in memory devices, allowing more efficient storage of information and faster access and computing. This, in fact, is one of our society's current challenges: being able to develop high-performance commercially available electronic devices which are, at the same time, energy efficient. Smaller electronic devices having lower energy consumption and high performance and versatility are the goal.



A photon reverses the binary 0/1 state of a memory device. Credit: ICMAB

Non-volatile memory storage

Now, researchers from the Multifunctional Thin Films and Complex Structures (MULFOX) group at ICMAB have studied photoresponsive ferroelectric materials integrated in devices exploiting nanotechnologies and quantum effects. Memory elements have been engineered to store non-volatile information in distinct resistance states (ON/OFF). It has been discovered that, when properly designed, their electrical resistance can be modulated by pulsed light. This means that they can switch from a low-resistance to a high-resistance state just by the application of light pulses.

"Materials that show changes of resistance under illumination are abundant, although the effect is typically volatile and the material recovers its initial state after some dwell time," says ICMAB researcher Ignasi Fina, co-author of the study. "For devices to be used in computing and data storage, non-volatile optical control of electrical resistance is of potential interest," and adds "for non-volatile, we mean that the information can be retained and stored in the device, even when the power is off."

Two-in-one: photo-ferroelectric materials

Currently two different devices are required to use optical signals for non-volatile data storage: an optoelectronic sensor and a memory device. The ICMAB study features these properties combined in one single material able to modulate its resistance by pulsed light: a photo-ferroelectric material.

Ferroelectric materials have electrically switchable spontaneous non-volatile electric polarization. In ferroelectric ultrathin films of such material sandwiched between appropriate metals, a quantum mechanical phenomenon effect appears called the tunneling current. This effect allows a charge current flow across the ferroelectric layer, which is genuinely insulating, in an amount that depends on the direction of its polarization.

In the devices in question, first an electric field is used once to write the ON/OFF states, and it is combined with the optical stimulus to promote the ON/OFF change of states, and reversibly modulate the resistance (from high to low, and vice versa).

Energy efficient devices and applications

These devices are energy efficient for two main reasons: firstly, the energy consumption is reduced when the memory state is written, as it does not need any charge current flow. Secondly, as the information is stored in a non-volatile manner, the state is preserved and there is no need to refresh the information (re-writing) as is continuously done in current RAM memories of all computers, for example.

The observed optical switch is not restricted to the studied materials and thus opens a path towards further investigations on this phenomenon.

As for future applications, Ignasi Fina envisions the following: "The studied devices combine light sensor and memory functions. In addition, as shown in the study, the device behaves like a memristor. A memristor is a device that can display multiple resistance states according to the stimulus it has received, and is one of the basic devices for the development of neuromorphic computing systems. Therefore, the developed device opens a path to be explored in relation to its integration into neuromorphic vision systems, where the system learns to recognize images."

The study has been published in *Nature Communications*.

More information: Xiao Long et al. Non-volatile optical switch of resistance in photoferroelectric tunnel junctions, *Nature Communications* (2021). DOI: [10.1038/s41467-020-20660-9](https://doi.org/10.1038/s41467-020-20660-9)

Journal information: [Nature Communications](https://phys.org/news/2021-01-storing-information-with-light.html)
<https://phys.org/news/2021-01-storing-information-with-light.html>



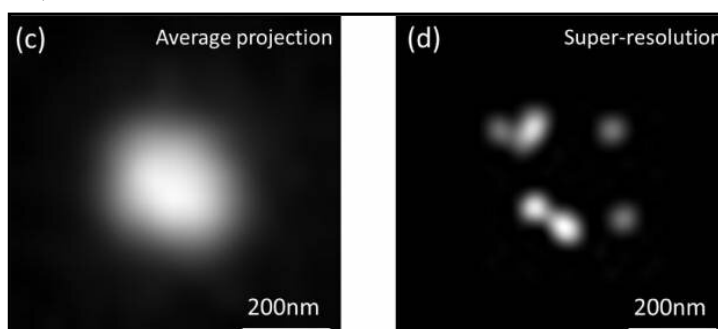
Thu, 21 Jan 2021

Tiny structures generate powerful beams for enhanced optical imaging

By Catherine Graham

Even the smallest molecule can tell a big story. For instance, observing a single molecule can throw light on underlying biological processes in the human body. In fact, molecular imaging procedures—which are noninvasive and painless—are being used to diagnose and manage the treatment of COVID-19, cancer, heart disease, and other serious health conditions.

One of the more promising techniques for single molecule imaging is surface-enhanced Raman spectroscopy, or SERS. By focusing a laser beam on the sample, SERS detects changes in molecules based upon how they scatter light, and can identify specific molecules through their unique Raman spectra: a sort of molecular fingerprint. An advantage of SERS is that it is nondestructive and requires minimal sample preparation, as it does not require added chemicals or modifications to take measurements.



The image on the left (C) shows diffraction-limited imaging that is too blurry to capture plasmonic hotspots required to conduct single-molecule SERS analysis. On the right (D) is super-resolution imaging of the same plasmonic hotspots using DNA-STROBE, which is clear enough to allow for single-molecule SERS analysis. Credit: Johns Hopkins University

In a study recently published in *Advanced Materials*, engineers from Johns Hopkins Whiting School of Engineering describe a novel nanomaterial that enables fast and highly sensitive single molecule detection using SERS. Their invention could pave the way for rapid and more accurate diagnostic testing.

To create their new material, called DNA-Silicified Template for Raman Optical Beacon or DNA-STROBE, a team led by Ishan Barman, an associate professor of mechanical engineering, engineered optical cavities of only a few nanometers or fewer. In SERS imaging, these plasmonic cavities "trap" beams of light by converting their electromagnetic radiation into electron waves. The Barman team's tiny plasmonic nanocavities exponentially increase the density of this trapped electromagnetic energy, potentially enabling quantitative biomolecular imaging at ultralow concentrations.

"The effectiveness of SERS measurements depends on the architecture and reproducibility of the nanoscale probes. If successfully designed and realized, our DNA-STROBE structures offer real-time, single molecule, label-free optical sensing that is almost impossible to achieve with any existing platforms," said Barman, the paper's corresponding author.

Study co-authors include Le Liang and Peng Zheng, both postdoctoral fellows in Johns Hopkins Whiting School of Engineering.

According to Barman, SERS measurements can offer unprecedented insights at the nanoscale, which remains a challenging endeavor for conventional imaging methods. The intensity of the SERS signal depends on the size of the nanoscale gaps, known as "hotspots." Because these nanocavities confine light energy, the smaller the gaps, the higher the SERS signal. However, nanocavities of this small size are extremely difficult (and expensive) to fabricate in a programmable and reproducible manner, he explained.

The research team turned to DNA nanotechnology to find an answer. Using DNA as scaffolds, the team built synthetic nanocavities that are the perfect size to become hotspots. But given the elastic nature of DNA, especially its propensity to fold and bend, the size of the formed DNA-STROBE structures could change, potentially weakening the SERS signal. Thus, the team encapsulated the DNA-STROBE structures with a protective ultrathin silica shell to prevent such fluctuations.

The study reported two significant findings. First, the researchers showed they could fabricate ultra-small nanocavities with well-controlled and large electromagnetic enhancement of the SERS signal. Second, their approach allows for single molecule studies even in biological samples with high molecule concentrations—a roadblock in prior research.

"We were excited to observe that DNA-STROBE enhanced the Raman signal, and it was strong enough to permit real-time sensing and super-resolution imaging. This will certainly open up new avenues for use of SERS analysis, particularly in sensing and imaging applications where adding contrast agents and dyes is not desirable or practical," said Liang.

The next step, the researchers say, will be to develop a set of tailored DNA-STROBE-derived analytical tools for a range of applications. For example, the team believes their approach offers a state-of-the-art platform for ultrasensitive detection of circulating cancer biomarkers.

"With suitable customization, the DNA-STROBE could enable progress in a wide variety of fields ranging from clinical diagnostics and basic biomedical research to environmental sensing and single molecule manipulation," adds Barman.

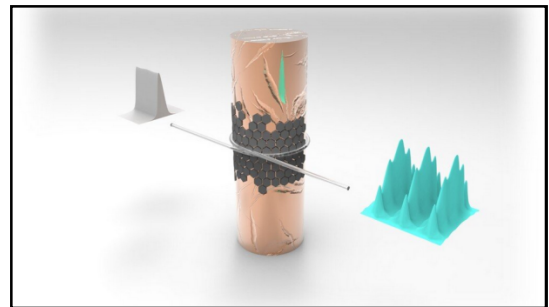
More information: Le Liang et al. A Programmable DNA-Silicification-Based Nanocavity for Single-Molecule Plasmonic Sensing, *Advanced Materials* (2021). [DOI: 10.1002/adma.202005133](https://doi.org/10.1002/adma.202005133)

Journal information: [Advanced Materials](https://phys.org/news/2021-01-tiny-powerful-optical-imaging.html)
<https://phys.org/news/2021-01-tiny-powerful-optical-imaging.html>

Optical data transmission speed increased by a factor of at least 10,000

Pulsed lasers repeatedly emit light for a short period of time as if blinking. They have the advantage of focusing more energy than a continuous wave laser, whose intensity is kept unchanged over time. If digital signals are loaded in a pulsed laser, each pulse can encode one bit of data. In this respect, the higher the repetition rate, the more the amount of data that can be transmitted. However, conventional optical-fiber-based pulsed lasers have typically had a limitation in increasing the number of pulses per second above the MHz level.

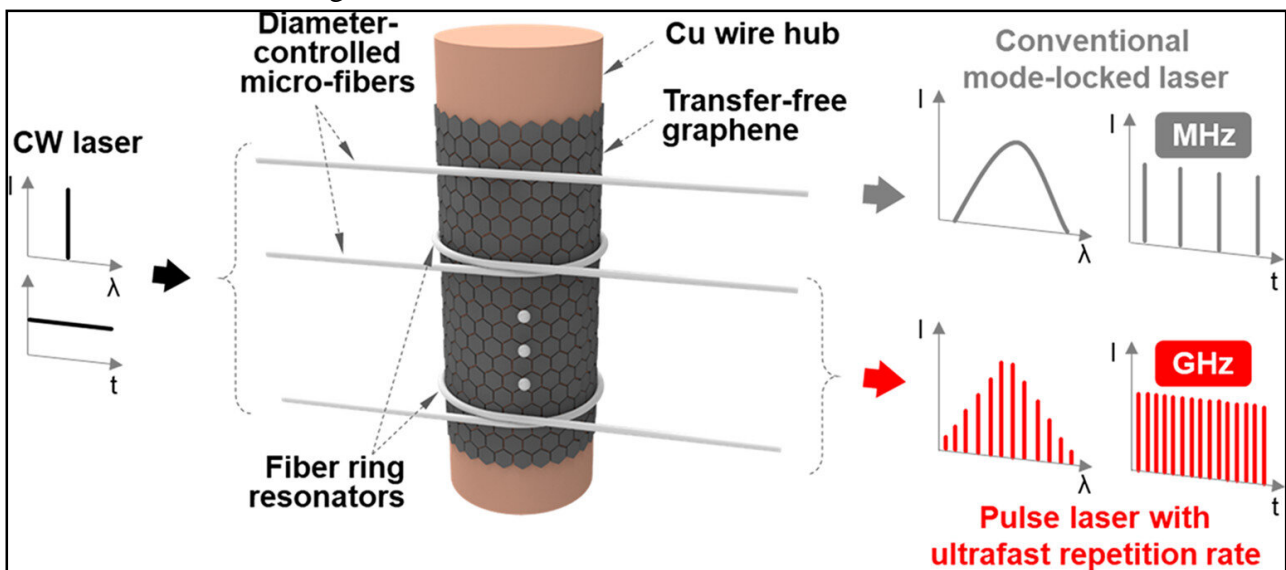
The Korea Institute of Science and Technology (KIST) announced that the research team led by Senior Researcher Dr. Yong-Won Song at the Center for Opto-Electronic Materials and Devices was able to generate laser pulses at a rate at least 10,000 times higher than the state of the art. This achievement was accomplished by inserting an additional resonator containing graphene into a fiber-optic pulsed-laser



Abstract Illustration. Credit: Korea Institute of Science and Technology(KIST)

oscillator that operates in the domain of femtoseconds (10^{-15} seconds). The data transmission and processing speeds are expected to increase significantly by applying this method to data communications.

The KIST research team noted that the characteristics of the wavelength and intensity of laser light that change over time are correlated (Fourier transform). If a resonator is inserted into the laser oscillator, the wavelength of the pulsed laser is periodically filtered, thereby modifying the pattern of laser intensity change. Based on this background research, Principal Researcher Song synthesized graphene, which has the characteristics of absorbing and eliminating weak light and amplifying the intensity by passing only strong light into the resonator. This allows the laser intensity change to be accurately controlled at a high rate, and thus the repetition rate of pulses could be increased to a higher level.



Graphene(Gf) was synthesized directly on the surface of a Cu wire that acted as a hub for diameter-controlled micro-fibers(DCMFs) to form the ring resonator. The Gf layer physically contacted with the DCMFs for the nonlinear interaction with fully minimized damage. Conventional Gf mode-locking scheme without a ring resonator is compared with the proposed scheme. Also, scalability toward multichannel operation is described. Credit: Korea Institute of Science and Technology (KIST)

Furthermore, graphene is typically synthesized onto the surface of a catalytic metal, and then the product is separated from the catalyst and transferred to the surface of a desired substrate. In this process, there has been typically the issue that graphene is damaged or impurities are introduced. The aforementioned KIST research team solved the problem of reduced efficiency occurring during the manufacturing process by forming graphene directly onto the surface of a copper wire, which is easily obtainable, and further covering the wire with an optical fiber for its use as a resonator.

As a result, it was possible to obtain a repetition rate of 57.8 GHz, thereby overcoming the limitations of pulsed lasers in terms of repetition rate, typically constrained to MHz. In addition, the characteristic of graphene such that heat is locally generated when the laser is absorbed, was exploited to tune the characteristics of the graphene resonator by applying an additional laser to the device.

Researcher Seong-Jae Lee at KIST said, "In the current scenario, in which the demand for data traffic is increasing exponentially, ultra-fast pulsed lasers operating at ultra-high speed and admitting tuning characteristics are expected to provide a new approach to adapt to this rapidly changing data-processing scenario." Principal Researcher Song, who has led this research, added: "We expect that the development of ultra-fast pulsed lasers based on resonators and graphene will bring our lead in technology development and related market within the field of nanomaterial-based optical information devices."

More information: Sungjae Lee et al, Graphene Self-Phase-Lockers Formed around a Cu Wire Hub for Ring Resonators Incorporated into 57.8 Gigahertz Fiber Pulsed Lasers, *ACS Nano* (2020). [DOI: 10.1021/acsnano.0c07355](https://doi.org/10.1021/acsnano.0c07355)

Journal information: [ACS Nano](https://phys.org/news/2021-01-optical-transmission-factor.html)
<https://phys.org/news/2021-01-optical-transmission-factor.html>

Loss of smell may be best predictor of Covid-19, research confirms

The research found that only around half of patients with a loss of smell got their sense of smell back after forty days

Loss of smell may be the best predictor of COVID-19 among patients with symptoms of respiratory diseases, according to new research.

The findings of two new international studies, published in the journal *Chemical Senses*, show that there is frequent loss of smell in COVID-19 patients which often lasts for a long time.

Over 4,500 COVID-19 patients from a total of 23 nationalities responded to the researchers' questionnaire.

The studies found that the average loss of the sense of smell was 79.7 on a scale from 0-100, indicating a large to complete sensory loss.

"This emphasises how important it is to be aware of this symptom, as it may be the only symptom of the disease," said Alexander Wieck Fjaeldstad from Aarhus University in Denmark. The research found that only around half of patients with a loss of smell got their sense of smell back after forty days.



Representational image (Unsplash)

"This differs from the picture we see with other viral infections and causes long-term discomfort for patients, both in relation to food and social contact, while at the same time causing them worry," Fjaeldstad said.

The researchers also found that the sense of taste was also significantly reduced, to 69.0 on a scale from 0-100, adding the remaining sense of feeling in the mouth was also reduced to 37.3 on a scale from 0-100.

"While the loss of smell in itself removes the ability to sense the aroma of food, the simultaneous loss of the other senses make it difficult to register what you're eating. Putting food in your mouth can therefore become a decidedly unpleasant experience," Fjaeldstad added.

The study is of interest both to patients suffering sensory loss as well as clinicians and researchers who work with diagnostics and following-up on COVID-19, the researchers said.

"It shows that the loss of smell is specific to COVID-19, which is both relevant in relation to recognising the infection, and because it indicates that the sense of smell is closely linked to how SARS-CoV-2 infects the body," Fjaeldstad said.

Previously, researchers have based the correlation between COVID-19 and the loss of the chemical senses on smaller studies. The new studies collected large amounts of data from countries all over the world.

"The results are in line with our own national studies and pave the way for future studies on risk factors for permanent sensory loss, along with a better understanding of the consequences of these sensory losses for the patients," Fjaeldstad said.

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

<https://www.hindustantimes.com/lifestyle/health/loss-of-smell-may-be-best-predictor-of-covid-19-research-confirms-101611131267170.html>

