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Wed, 04 Nov 2020

Dynamatic builds front fuselage FOC configuration for HAL's Tejas LCA

Company a reliable supplier for HAL; will look for opportunities on trainer, UAV platforms: Madhavan

Bengaluru: Dynamatic Technologies Limited, a Bengaluru-based designer and manufacturer of engineered products for automotive, aeronautic, hydraulic and security applications, has built the first front fuselage for the FOC version of the Tejas Light Combat Aircraft (LCA). This is the first time a complex fuselage section for a supersonic fighter aircraft has been built by a private sector company in the country.

The company, in a regulatory filing to the exchanges, said Dynamatic has been a preferred production partner for Hindustan Aeronautics Limited (HAL) for over three decades on all their major platforms.



The completion of the first front fuselage was witnessed by R Madhavan, Chairman and Managing Director and other senior executives of HAL.

Addressing the event virtually Dr. Ajay Kumar, Union Defence Secretary, said, "I am really happy and honoured to join this historic occasion, when the first front fuselage of LCA has been handed over to HAL. I would like to heartily congratulate the Dynamatic and HAL LCA team who have made this joint partnership greatly successful. I think this is the model for public sector undertaking-private industry partnership in the defence aerospace sector and we hope that this example will hold in good stead for several other partnerships by HAL and other PSUs as well."

He further added: "The future generations of LCA will continuously grow. And we continue to see this as an evolutionary journey which will take India to newer heights in the fighter jet aircraft segment."

Partner for more platforms

Madhavan said, "Dynamatic has done it again by delivering the first front fuselage of LCA Tejas. The LCA program has a requirement of 20 aircraft sets per year and will grow with MK2 and AMCA. Dynamatic is a known and reliable supplier for HAL, and we will also look for opportunities on trainer and UAV platforms."

Dynamatic Technologies Limited CEO and Managing Director, Dr Udayant Malhoutra, said, "Dynamatic has been privileged to be a production partner with HAL and the Ministry of Defence for three decades. The industrialisation of LCA has gone through many upgrades during the building process. This is the FOC version with a mid-air refuelling probe, and is a tremendous success story, both of indigenous defence production, and for public-private-partnership with HAL."

<https://www.thehindubusinessline.com/news/national/dynamatic-builds-front-fuselage-foc-configuration-for-hals-tejas-lca/article33009993.ece>

Desperate for armed drones, why did India ‘outrightly reject’ American MQ-9 Reaper drones?

During a recent high profile visit of the U.S. Secretary of State Mike Pompeo and Defense Secretary Mark Esper to India for the 2+2 ministerial dialogue, the sales of long-sought MQ-9B SkyGuardian drones was one of the agenda on the table.

However, according to some recent reports, New Delhi outrightly refused the offer after one of its three services raised a question on the proposed \$3 billion deal, citing the cost-worthiness of the aircraft.

If formalized the proposal called for the sales of 30 MQ-9B armed SkyGuardian drones, 10 for each service. The joint services procurement would have seen the first six MQ-9B SkyGuardians worth \$600 million (Rs 4,400 crore) purchased outright from US firm General Atomics and delivered to the Indian army, navy, and air force over the next few months—two for each service. The remaining 24 drones were to have been acquired over the next three years.



[MQ-9 Reaper – Wikimedia Commons](#)

This comes as a surprise to many defense experts, as India had been eagerly looking forward to acquire these UCAVs. The costs incurred would have been Rs. 900 crore per unit along with a 10% additional annual maintenance cost.

Along with this, the deal would have given no transfer of technology or offsets, an issue raised during several internal meetings.

These would have been the first of its kind armed MALE RPA (Medium-Altitude Long-Endurance Remotely Piloted Aircraft) in the Indian service, with an internal one named TAPAS-BH (aka Rustom-II) being developed by the DRDO.

The deal was sought to be the last ‘diplomatic win’ for Donald Trump, who is awaiting his fate. It is also speculated that the uncertainty of the outcomes of the presidential elections also affected the decision made at Raisina Hill.

However, there is one more catch to it. These drones, which are less maneuverable and carry a lesser payload, are very vulnerable to air defenses – a capability both of India’s rival neighbors – China and Pakistan excel at.

The engagements over Afghanistan and the success rate could be attributed to the lack of air defense capability of the Taliban, while in other parts of the middle east, these drones have been shot down by even the oldest of soviet-era missile systems.

The recent clashes between Armenia and Azerbaijan might have shown how effective these drones could be against enemy armor, meanwhile, it also shows the high number of drone losses for both sides. The high costs and the susceptibility of these systems would also have raised eyebrows for the Indian services.

The deal’s Acceptance of Necessity (AON) is still yet to be approved by the Defense Acquisition Council, which is one of the most important steps in a foreign arms procurement in the Indian government.

The US diplomats wanted the SkyGuardian deal to be the highlight of their visit to India, however, they had to be satisfied only with the highlights of the inking of the Basic Exchange and Cooperation Agreement (BECA), an important milestone between the two nations.

This also allows the Indian operators to use the American navigational and mapping systems, paving a way for future procurement of the MQ-9Bs. The deal could still be signed in the future, but the plan appears to be shelved by New Delhi, at least for now.

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

The costs saved from signing the SkyGuardian deal could be used more efficiently by investing in long-sought indigenous procurement of LCA Tejas Mk-1As and Light Combat Helicopters, and supporting the internal industries under the helm of "Aatmnirbhar Bharat".

<https://eurasianimes.com/desperate-for-armed-drones-why-did-india-outrightly-reject-american-mq-9-reaper-drones/>

Defence News

Defence Strategic: National/International

Outlook

Wed, 04 Nov 2020

Army Chief Gen MM Naravane begins 3-day Nepal visit on Wednesday

New Delhi: A day ahead of his three-day crucial trip to Nepal, Chief of Army Staff Gen M M Naravane on Tuesday said he was eagerly looking forward to the visit and exuded confidence that it will go a long way in strengthening the "bonds of friendship" between the armies of the two countries.

Gen Naravane's visit to Nepal from November 4-6 is largely aimed at resetting bilateral ties that came under severe strain following a bitter border row between the two countries.

The Chief of Army Staff is scheduled to call on President Bidya Devi Bhandari and Prime Minister K P Sharma Oli, besides holding talks with several other civilian and military leaders during the visit, officials said.

"I am delighted to be visiting Nepal on their kind invitation and to meet my counterpart Gen Purna Chandra Thapa, Chief of the Army Staff of the Nepali Army. I am sure this visit will go a long way in strengthening the bonds of friendship that the two armies cherish," Gen Naravane said.

The Chief of Army Staff said he was also grateful for the opportunity to call on Prime Minister Oli.

Gen Naravane's engagements in Nepal include a visit to the headquarters of the Nepalese Army, an address to the young military officers at Nepali Army's Staff College and attending a banquet to be hosted in his honour by Chief of Nepalese Army Gen Purna Chandra Thapa, they said.

In continuation of an age-old tradition that first started in 1950, Gen Naravane will be conferred the honorary rank of "General of the Nepal Army" by the Nepalese President on Thursday. India also confers the honorary rank of "General of Indian Army" to the Nepal Army Chief.

"It is going to be a great honour for me to be conferred the honorary rank of General of the Nepali Army by the Hon"ble President of Nepal. I am looking forward eagerly to this visit," Gen Naravane said.

Officials said Gen Naravane will call on President Bhandari at the presidential palace following the ceremony. He is scheduled to meet Prime Minister Oli on Friday.

His meeting with Prime Minister Oli is seen as important as it could lead to the resetting of ties leaving behind the map row.

Gen Naravane is also scheduled to hold extensive talks with Gen Thapa on a range of key issues such as ways to enhance military-to-military cooperation and boost the management of the nearly 1,800 km-long border between the two countries, they said.

It will be the first high-level visit from India to Kathmandu since ties between the two neighbours came under strain after the Himalayan nation came up with a new political map in May claiming several areas in Uttarakhand to be part of its territory.

It will also be Gen Naravane's second diplomatic mission.

Last month, he travelled to Myanmar along with Foreign Secretary Harsh Vardhan Shringla on a very significant visit during which India decided to supply an attack submarine to the Myanmar Navy besides agreeing to further deepen military and defence ties.

Nepal had protested after Defence Minister Rajnath Singh inaugurated an 80-km-long strategically crucial road connecting the Lipulekh pass with Dharchula in Uttarakhand on May 8.

Nepal claimed that the road passed through its territory. Days later, it came out with the new map showing Lipulekh, Kalapani and Limpiyadhura as its territories. India too had published a new map in November 2019 showing the areas as its territories.

After Nepal released the map, India reacted sharply, calling it a "unilateral act" and cautioning Kathmandu that such "artificial enlargement" of territorial claims will not be acceptable to it.

In June, Nepal's Parliament approved the new political map of the country featuring areas which India maintains belong to it.

In its reaction, after Nepal's lower house of parliament approved the bill, India termed as untenable the "artificial enlargement" of territorial claims by the neighbouring country.

India said Nepal's action violates an understanding reached between the two countries to resolve the boundary issues through talks.

Prime Minister Oli has been asserting that Lipulekh, Kalapani and Limpiyadhura belong to Nepal and vowed to "reclaim" them from India.

The Lipulekh pass is a far western point near Kalapani, a disputed border area between Nepal and India. Both India and Nepal claim Kalapani as an integral part of their territory - India as part of Uttarakhand's Pithoragarh district and Nepal as part of Dharchula district.

India and Nepal have a robust defence and military relationship. The Indian and Nepalese armies have been holding "Suryakiran" military exercise since 2011. The last edition of the exercise was held in Nepal in December last year.

Both the countries also hold regular meetings under the "Nepal-India Bilateral Consultative Group on Security" with an aim to deepen the defence cooperation.

Nepal is important for India in the context of its overall strategic interests in the region and the leaders of the two countries have often noted the age-old "Roti-Beti" relationship between the nations.

Land-locked Nepal relies heavily on India for the transportation of goods and services. Nepal's access to the sea is through India, and it imports a predominant proportion of its requirements from and through India.

According to official data, Nepal's imports from India in 2017 were worth USD 6.52 billion, while its exports to the country were pegged at USD 420.18 million.

The figure for China, which was second on the list of countries from which Nepal imported its requirements, was five times lower than that of India.

On the security side, India's strategic thinkers are concerned over reports of China grabbing Nepalese territories in a number of locations along the borders between the two countries, though Kathmandu had clarified recently that there were no such encroachments.

According to reports, the Nepali, districts which have been victims of China's land-grabbing plan include Dolakha, Gorkha, Darchula, Humla, Sindhupalchowk, Sankhuwasabha and Rasuwa.

(Disclaimer:-This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

<https://www.outlookindia.com/newscroll/army-chief-gen-mm-naravane-begins-3day-nepal-visit-on-wednesday/1969447>

TIMESNOWNEWS.COM

Wed, 04 Nov 2020

Big boost to Indian Air Force, three more Rafale jets to land in Ambala today

The three Rafale jets will take off from France in the morning and reach India by evening without making a single stop

KEY HIGHLIGHTS

- **Indian Air Force (IAF) already has five Rafale jets which arrived in July**
- **The three new jets are expected to be deployed at the conflict zones in Ladakh**
- **All 36 Rafale jets, under the inter-government deal between India and France, will arrive in India by mid-2022**

New Delhi: In a major boost to the Indian Air Force (IAF) amid the ongoing tensions with China at the Line of Actual Control (LAC), three more Rafale jets will reach India today. Interestingly, the fighter aircraft will take off from France and reach India without making a single stop.

The Rafale jets will fly from Istres in France today morning and reach Jamnagar in India by evening. The jets will be accompanied by French Air Force's mid-air refuelling aircraft.

An expert team led by Assistant Chief of Air Staff (Projects) has been coordinating the logistical issues for receiving the fighter jets in France. IAF pilots who will fly the jets have been trained in batches at Saint-Dizier airbase in the European nation.



Rafale fighter jet

It should be noted that India already has five Rafale jets in service and induction of three more will significantly bolster India's defence.

India received its first batch of five Rafale jets earlier this year in July and they were officially inducted in September.

These combat aircraft have been deployed in the conflict zone of Ladakh, where the Chinese army has been making provocative moves inside the Indian territory.

Key features of Rafale jet

The Rafale jets are manufactured by French giant Dassault Aviation and India has signed an inter-governmental deal with France to buy 36 of these jets at a cost of Rs 59,000.

All the aircraft are expected to reach India by mid-2022.

It is a 4.5 generation jet and is laced with cutting-edge weapons, superior sensors and fully-integrated architecture. This fighter jet also carries semi-stealth capabilities and can execute nuclear attacks.

The fighter aircraft has HAMMER missiles integrated into it. It is also armed with beyond visual range missiles like Meteor, SCALP and MICA, increasing its ability to take on incoming targets from a distance.

Interestingly, it is an omni-role aircraft which means it can carry out at least four missions in one sortie.

<https://www.timesnownews.com/india/article/big-boost-to-indian-air-force-three-more-rafale-jets-to-land-in-ambala-today/676995>



Wed, 04 Nov 2020

चीन से तनातनी के बीच आज शाम तक तीन और राफेल विमान आएंगे भारत, तैनाती की प्रक्रिया शुरू

चीन से तनातनी के बीच तीन और राफेल जेट बुधवार शाम तक पहुंच जाएंगे। इन लड़ाकू विमानों के पहुंचने से वायुसेना की क्षमता में वृद्धि होगी। बुधवार सुबह फ्रांस से राफेल उड़ान भरेंगे और शाम तक भारत पहुंच जाएंगे। पांच राफेल का पहला बैच 28 जुलाई को पहुंचा था।

By Krishna Bihari Singh

नई दिल्ली: चीन से तनातनी के बीच तीन और राफेल जेट बुधवार शाम तक पहुंच जाएंगे। इन लड़ाकू विमानों के पहुंचने से वायुसेना की क्षमता में वृद्धि होगी। समाचार एजेंसी एएनआइ के मुताबिक, बुधवार सुबह फ्रांस से राफेल उड़ान भरेंगे और शाम तक भारत पहुंच जाएंगे। वायुसेना ने संघर्ष वाले क्षेत्रों में संचालन की भूमिका में राफेल को तैनात करने की प्रक्रिया शुरू कर दी है। पांच राफेल का पहला बैच 28 जुलाई को पहुंच गया था।

केंद्र की नरेंद्र मोदी सरकार ने 10 सितंबर को इन लड़ाकू विमानों को अधिकृत रूप से शामिल कर लिया था। आ रहे विमानों के शामिल होने के बाद वायुसेना के पास आठ लड़ाकू विमान हो जाएंगे। 2022 के मध्य तक कुल 36 राफेल लड़ाकू विमान भारत तक पहुंच जाएंगे। केंद्र की राजग सरकार ने 2016 में इन विमानों के लिए लगभग 60 हजार करोड़ रुपये के सौदे पर हस्ताक्षर किए थे।

वहीं समाचार एजेंसी आइएनएस ने कहा है कि तीनों राफेल विमान फ्रांस से उड़ान भरने के बाद रास्ते में रुके बिना भारत पहुंचेंगे। सूत्रों ने बताया कि फ्रांस के एयरबेस से गुजरात के जामनगर तक की लंबी उड़ान के दौरान फ्रांसीसी वायुसेना का हवा में ईंधन भरने वाला विमान भी साथ रहेगा। इससे पहले फ्रांस की कंपनी दासौ एविएशन से पांच राफेल विमानों का पहले बेड़े ने फ्रांस से उड़ान भरने के बाद संयुक्त अरब अमीरात (यूएई) में हॉल्ट किया था।

प्राप्त जानकारी के मुताबिक, राफेल के लिए अलग-अलग बैच में भारतीय वायुसेना के पायलटों को फ्रांस में प्रशिक्षित किया जा रहा है। पहले बेड़े को वायुसेना में शामिल किए जाने के मौके पर रक्षा मंत्री राजनाथ सिंह ने राफेल विमानों को गेम चेंजर बताया था। रक्षा मंत्री ने कहा था कि राफेल के साथ वायुसेना ने टेक्नोलॉजी के स्तर पर बढ़त हासिल कर ली है। यह नवीनतम हथियारों और सुपीरियर सेंसर से लैस लड़ाकू विमान है।

<https://www.jagran.com/news/national-indian-air-force-said-that-three-more-rafale-jets-to-reach-india-by-wednesday-evening-21018272.html>



चीन से तनातनी के बीच तीन और राफेल जेट बुधवार शाम तक पहुंच जाएंगे। इन लड़ाकू विमानों के पहुंचने से वायुसेना की क्षमता में वृद्धि होगी। बुधवार सुबह फ्रांस से राफेल उड़ान भरेंगे और शाम तक भारत पहुंच जाएंगे। पांच राफेल का पहला बैच 28 जुलाई को पहुंचा था।

Indian Army sources 20,000 extreme winter clothing gear from US for troops posted in Ladakh

Indian Army has received the initial consignment of extreme cold weather clothing from the United States, which will help the troops weather the extreme temperatures in Eastern Ladakh on China border

By Manjeet Singh Negi

New Delhi: Indian Army has received the initial consignment of extreme cold weather clothing from the United States, which will help the troops weather the extreme temperatures in Eastern Ladakh on China border.

“The initial lot of 20,000 extreme cold weather clothing from the American defence forces have been received and are being used by our troops,” top government sources told India Today.

The Indian Army maintains a stock of 60,000 of these extreme cold weathers clothing sets for troops deployed in the entire Ladakh region, including both on the western front in Siachen and eastern Ladakh sector.

This year, there was an additional requirement of around 30,000 of these sets as close to 90,000 troops are deployed in the region in view of the conflict and standoff with the People’s Liberation Army along the LAC.

The emergency acquisition of the extreme cold weather clothing will help the Indian Army troops to see through the harsh winters in the Ladakh sector.

The Indian side has deployed two additional divisions on the LAC which have been brought to the sector from plains and a mountain division which has been training for high altitude operations for years. India is sourcing a lot of equipment from US, including assault rifles, for the special forces along with the SiGSauer assault rifles for the infantry troops.

<https://www.indiatoday.in/india/story/indian-army-gets-extreme-wear-clothes-from-us-1737611-2020-11-03>



Indian Army has sourced 20,000 sets of extreme weather clothing from the US for troops in Ladakh. (Reuters)

भारतीय सैनिकों के लिए अमेरिका से खरीदे गए बेहद सर्द मौसम के कपड़े, लद्दाख क्षेत्र में तैनात हैं 90 हजार जवान

बेहद सर्द मौसम के इन कपड़ों की आपातकालीन खरीद से लद्दाख सेक्टर में भारतीय सेना के जवानों को बेहद सर्द मौसम में भी मुस्तैद रहने में मदद मिलेगी। भारतीय पक्ष ने एलएसी पर दो अतिरिक्त डिवीजन तैनात की हैं।

By Dhyanendra Singh

नई दिल्ली: वास्तविक नियंत्रण रेखा (LAC) पर चीन के खिलाफ तैयारियों के मद्देनजर भारतीय सेना को अपने जवानों के लिए बेहद सर्द मौसम के कपड़ों की पहली खेप अमेरिका से प्राप्त हो गई है। सरकारी सूत्रों ने मंगलवार को उक्त जानकारी देते हुए बताया कि सीमा पर तैनात जवान उनका इस्तेमाल भी कर रहे हैं। उन्होंने कहा कि भारतीय सेना सियाचिन में पश्चिमी मोर्चे और पूर्वी लद्दाख सेक्टर समेत पूरे लद्दाख में तैनात सैनिकों के लिए बेहद सर्द मौसम के इन कपड़ों के 60 हजार सेट स्टॉक में रखती है। इस साल करीब 30 हजार सेट्स की अतिरिक्त जरूरत थी क्योंकि चीन की पीपुल्स लिबरेशन आर्मी (PLA) के आक्रामक रुख के मद्देनजर क्षेत्र में करीब 90 हजार जवान तैनात हैं और सीमा पर चौकस नजर रखे हुए हैं।

सर्द मौसम में भी मुस्तैद रहने में मिलेगी मदद

बेहद सर्द मौसम के इन कपड़ों की आपातकालीन खरीद से लद्दाख सेक्टर में भारतीय सेना के जवानों को बेहद सर्द मौसम में भी मुस्तैद रहने में मदद मिलेगी। भारतीय पक्ष ने एलएसी पर दो अतिरिक्त डिवीजन तैनात की हैं। इनमें से एक मैदानी इलाके से है और एक पर्वतीय डिवीजन है जिन्हें कई वर्षों से ऊंचाई वाले इलाकों में ऑपरेशन का प्रशिक्षण प्रदान किया जा रहा है।

मालूम हो कि भारत को अमेरिका से कई तरह के उपकरण प्राप्त हो रहे हैं जिनमें विशेष बलों के लिए असाルト राइफलें और थलसेना के लिए सिग सॉर असाルト राइफलें शामिल हैं।

-40 डिग्री पर तैनात रहते हैं जवान

लद्दाख में एलएसी से सटे ज्यादातर क्षेत्रों में सर्दियों में तापमान -25 से -40 डिग्री सेल्सियस तक गिर जाता है। कुछ स्थानों पर यह -50 डिग्री तक पहुंच जाता है। भारी बर्फ के बीच आगे बढ़ना नामुमकिन रहता है। इसके अलावा 40 किलोमीटर प्रति घंटे की गति से नियमित बर्फ़ीली हवाएं चलती रहती हैं। वहीं, बर्फ़ीले तूफान आफत और बढ़ा देते हैं।



बेहद सर्द मौसम के इन कपड़ों की आपातकालीन खरीद से लद्दाख सेक्टर में भारतीय सेना के जवानों को बेहद सर्द मौसम में भी मुस्तैद रहने में मदद मिलेगी। भारतीय पक्ष ने एलएसी पर दो अतिरिक्त डिवीजन तैनात की हैं।

<https://www.jagran.com/news/national-very-cold-weather-clothes-bought-from-america-for-indian-army-90-thousand-soldiers-are-deployed-in-ladakh-region-21014230.html>

India, US, Japan and Australia kick-start Malabar naval exercise in Bay of Bengal

China says hope it would be conducive to regional peace and stability instead of the contrary

New Delhi: The navies of India, the US, Japan and Australia on Tuesday held a series of complex manoeuvres in the Bay of Bengal, kick-starting the four-day-long first phase of the Malabar naval exercise, seen as a prelude to future military cooperation among the member nations of the Quad or Quadrilateral Coalition.

The mega exercise is taking place at a time India and China are locked in a nearly six-month-long bitter border standoff in eastern Ladakh.

Japan, Australia and the US—the three other participants of the exercise—too are having fractious ties with China in the last few months over a range of contentious issues.

“Several complex military drills were conducted on the first day of the exercise in the Bay of Bengal,” a military official said.

The evolving situation in the Indo-Pacific region in the wake of China’s increasing military muscle-flexing has become a major talking point among the leading global powers. The US has been favouring making Quad a security architecture to check China’s growing assertiveness.

In a tweet, the US Embassy said the exercise reaffirmed the commitment of the participating countries to stronger defence cooperation in the Indo Pacific region.

Last month, India announced that Australia will be part of the Malabar exercise.

The first segment of the exercise is from November 3 to 6 while the second phase of the drill is scheduled to be held from November 17 to 20 in the Arabian sea.

“The exercise, being conducted as a non-contact, at sea only’ exercise in view of COVID-19 pandemic, will showcase the high-levels of synergy and coordination between the friendly navies, which is based on their shared values and commitment to an open, inclusive Indo-Pacific and a rules-based international order,” the Indian Navy had said in a statement on Monday.

Meanwhile, China on Tuesday hoped that the quadrilateral Malabar exercises would be conducive to the regional peace and stability instead of the contrary.

“We hope that relevant countries’ military operations will be conducive to peace and stability in the region instead of the contrary,” Chinese Foreign Ministry spokesman Wang Wenbin told a media briefing in Beijing.

The invitation by India to the Australian Navy for the exercise came two weeks after foreign ministers of the ‘Quad’ member nations held extensive talks in Tokyo with a focus on enhancing their cooperation in the Indo-Pacific, a region where China has been expanding its military influence. The first phase of the exercise would witness complex and advanced naval drills like anti-submarine and anti-air warfare operations, cross deck flying, seamanship evolutions and weapon firings. The Malabar exercise started in 1992 as a bilateral drill between the Indian Navy and the US Navy in the Indian Ocean. Japan became a permanent member of the exercise in 2015.

The annual exercise was conducted off the coast of Guam in the Philippine Sea in 2018 and off the coast of Japan in 2019.



The first segment of the exercise is from November 3 to 6 while the second phase of the drill is scheduled to be held from November 17 to 20 in the Arabian sea. Photo: DDNewslive/Twitter

The Indian Navy deployed a number of its key platforms including destroyer Ranvijay, frigate Shivalik, off-shore patrol vessel Sukanya, fleet support ship Shakti and submarine Sindhuraj.

Also, advanced jet trainer Hawk, long-range maritime patrol aircraft P-8I, Dornier maritime patrol aircraft, and several helicopters are participating in the exercise, officials said.

US Navy ship USS John S McCain, a guided-missile destroyer, Australian Navy's long-range frigate HMAS Ballarat with integral MH-60 helicopter and Japan Maritime Self Defence Force's JS Onami, a destroyer, are among the platforms participating in the first phase of the exercise, they said. During the recent Indo-US 2+2 talks, US Defence Secretary Mark Esper welcomed India's invitation to Australia to join the Malabar exercise.

For the last few years, Australia has been showing keen interest in participating in the exercise.

In June, India and Australia elevated their ties to a comprehensive strategic partnership and signed a landmark deal for reciprocal access to military bases for logistics support during an online summit between Prime Minister Narendra Modi and his Australian counterpart Scott Morrison.

The Mutual Logistics Support Agreement (MLSA) allows militaries of the two countries to use each other's bases for repair and replenishment of supplies, besides facilitating scaling up of overall defence cooperation. — PTI

<https://www.tribuneindia.com/news/nation/india-us-japan-and-australia-kick-start-malabar-naval-exercise-in-bay-of-bengal-165433>

अमर उजाला

Wed, 04 Nov 2020

भारत की जंगी ताकत की गवाह हैं ये तस्वीरें, समुद्र में भी हम किसी से कम नहीं

विशाखापट्टनम: पूर्वी लद्दाख में जारी गतिरोध के बीच मंगलवार से भारत, अमेरिका, जापान और ऑस्ट्रेलिया ने मालाबार नौसैन्य अभ्यास का पहला चरण शुरू कर दिया है। इस अभ्यास की तस्वीरें गवाह हैं कि समुद्र में भारत की जंगी ताकत भी किसी से कम नहीं है। बता दें कि यह अभ्यास बंगाल की खाड़ी में विशाखापट्टनम में किया जा रहा है। इस अभ्यास से इसमें शामिल हो रहे चारों देशों के बीच रणनीतिक संबंधों का पता चलता है। खास बात यह है कि ये चीन के लिए चिंता का सबब हो सकता है।

सैन्य अभ्यास तीन दिन तक चलेगा और शुक्रवार को खत्म होगा। इन चारों देशों के नौसेना अभ्यास का दूसरा चरण 17-20 नवंबर के बीच अरब सागर में शुरू होगा। पिछले हफ्ते भारत ने यह घोषणा की थी कि ऑस्ट्रेलिया भी इस अभ्यास का हिस्सा होगा, जिस पर अमेरिका ने सहमति जताई थी।

क्वाड सदस्य राष्ट्रों के विदेश मंत्रियों की टोक्यो में बैठक के दो हफ्ते बाद भारत ने ऑस्ट्रेलिया को अभ्यास में हिस्सा लेने के लिए न्योता दिया था। जापान में हुई इस बैठक में चारों देशों के बीच हिंद-प्रशांत क्षेत्र में सहयोग बढ़ाने पर विस्तृत बातचीत की गई थी। अधिकारियों ने बताया कि पहले चरण में जटिल और अत्याधुनिक नौसेना अभ्यास होंगे।

इस अभ्यास में पनडुब्बी रोधी या हवाई युद्ध रोधी अभियान होंगे। इसके अलावा हथियारों से फायरिंग का भी अभ्यास किया जाएगा। मालाबार अभ्यास 1992 में भारतीय नौसेना और अमेरिकी नौसेना के बीच हिंद महासागर में एक द्विपक्षीय अभ्यास के रूप में शुरू हुआ था। बाद में, 2015 में जापान इसका स्थायी सदस्य बना।

इस अभ्यास में भारतीय नौसेना रणविजय, युद्ध पोत शिवालिक, समुद्र तटीय गश्ती नौका सुकन्या, जहाजों के बेड़े को सहायता पहुंचाने वाले पोत शक्ति और पनडुब्बी सिंधुराज को शामिल करेगी। चीन की बढ़ती आक्रामकता को काबू में रखने के लिए अमेरिका सुरक्षा के तौर पर क्वाड का समर्थन कर रहा है।

<https://www.amarujala.com/photo-gallery/india-news/naval-exercise-malabar-2020-see-pictures-indian-navy-us-navy-japan-navy-australian-navy-naval-ship-war-ship-sea-war-strength>



मालाबार नौसेना अभ्यास 2020 - फोटो : twitter : @indiannavy

13 years on, the Quad resumes war games amid China's growing assertiveness

The navies of India, US, Japan and Australia are back together for Exercise Malabar

By Ajai Shukla

New Delhi: Thirteen years after they last exercised together in the Indo-Pacific, navies of the Quadrilateral (Quad) grouping countries came together again on Tuesday in the annual multi-national maritime “Exercise Malabar”.

After the Quad last exercised together in 2007, Beijing made it clear it regarded Exercise Malabar as the military manifestation of a US-Japan-Australia-India “alliance of democracies” aimed at containing China.

In response that year, New Delhi and Canberra soothed Beijing’s concerns and Malabar returned to being a bilateral exercise between the Indian and US navies. However, China’s growing assertiveness and regional muscle-flexing brought Japan back into Exercise Malabar in 2015 — and this year, Australia too joined in.

In an unusually political statement, the Ministry of Defence (MoD) stated on Monday that this year’s Exercise Malabar would “showcase the high levels of synergy and coordination between the friendly navies, which is based on their shared values and commitment to an open, inclusive Indo-Pacific and a rules-based international order”.

As was the case in 2007, this year’s 24th edition of Exercise Malabar is divided into two phases: The first to be conducted in the Bay of Bengal from Tuesday to Friday; and the second, much larger phase, in mid-November.

Phase-1 will involve one warship each from the US, Japan and Australia. These will include the American guided-missile destroyer, USS John S McCain;

the Australian long range frigate, Her Majesty’s Australian Ship (HMAS) Ballarat, and the Japanese destroyer, Japan Maritime Self Defence Ship (JMSDF) Onami.

Indian warships participating include the destroyer INS Ranvijay, stealth frigate INS Shivalik, offshore patrol vessel INS Sukanya, fleet support ship INS Shakti and the submarine INS Sindhuraj, along with P-8I long-range maritime patrol aircraft.

This is significantly lower than 2007, when 16 warships participated in the first phase of the exercise and 26 in the second. However, navy sources say the second part of Malabar 2020, which



Phase-1 will involve one warship each from the US, Japan and Australia

Fleet strength						
Total ships and submarines						
						Total
	India	US	Japan	Australia	Singapore	
2007-01	5	7	4	-	-	16
2007-02	8	13	2	2	1	26
2008	6	6	-	-	-	12
2009	3	4	2	-	-	9
2010	5	5	-	-	-	10
2011	5	7	-	-	-	12
2012	5	5	-	-	-	10
2013	2	1	-	-	-	3
2014	3	5	2	-	-	10
2015	4	3	1	-	-	8
2016	4	5	1	-	-	10
2017	9	6	2	-	-	17
2018	3	6	4	-	-	13
2019	2	2	3	-	-	7
2020-01	5	1	1	1	-	8

will be conducted in the Arabian Sea, will feature far greater participation, including by aircraft carriers.

Furthermore, the sophistication level of Exercise Malabar has systematically risen over the years. According to the MoD, the exercise that began today “would witness complex and advanced naval exercises including surface, anti-submarine and anti-air warfare operations, cross-deck flying, seamanship evolutions and weapon firing exercises”.

In addition, the signing of two foundational defence agreements by India — the Communications Compatibility and Security Agreement (COMCASA) in 2018, and Basic Exchange and Cooperation Agreement for Geospatial Intelligence (BECA) last month — opens the doors for far greater sharing of communications, intelligence and geospatial data.

India also has agreements for military logistics support with all three countries participating in Malabar. This will permit their warships to remain in the Indian Ocean Region for extended periods, plugged into Indian Navy logistics systems.

Malabar 2020 is being conducted as a “non-contact, at sea only” exercise in view of the Covid-19 pandemic.

https://www.business-standard.com/article/current-affairs/13-years-on-the-quad-resumes-war-games-amid-china-s-growing-assertiveness-120110301881_1.html



Wed, 04 Nov 2020

India-China standoff in Ladakh: The eighth round of talks

The Indo-China border talks are more akin to the Super Heavy Weight boxers pummelling each other to win the coveted world championship

By Lt Col Manoj K Channan (Retd)

The Indo-China border talks are more akin to the Super Heavy Weight boxers pummelling each other to win the coveted world championship. Here, other than the boxers the judges and the spectators have an immediate interest in the ongoing bouts as its viewed from a different prism depending on whether you are one of China’s fourteen neighbours sharing a land border or you are a Nation along the Sea Lines of Communication or you are part of the QUAD which is shaping up and needs its teeth to be more effective.

The rationale is that if India continues to take a hard stand against the Chinese belligerence and is seen to be defending its territory, it will give the smaller Nations ‘spine’ to take on the Chinese belligerence with support from countries like India, USA, Australia, Japan amongst many others who have been bullied by China.

The CCP/PLA thought that it was business as usual, and they will continue with the Salami Slicing and the Government of India/Indian Army will remain tethered to its historical baggage of 1962 and remain in a decision dilemma to the Chinese belligerence.

The events of 1967 and 1986-87, 2017 and now have given a fair indication that India / Indian Army is unshackled and prepared to stand its ground. The Chinese Government propaganda machine went into overdrive in showcasing its military might by releasing training videos of the PLA hoping that this would dampen the morale and would leave the combat troops overawed by the display of the Chinese Military Prowess.



The dates for the next round are yet to be announced and the Agenda “Military De-escalation” under a broad heading.

Troops on active combat duty are busy fellows with an endless number of tasks that need to be done and preparation of defences is never complete till the battle is joined and even then it's continuously improved upon.

The Indian Troops are combat-hardened and the induction of the Tibetans / Ladakhis to the forefront to actively engage the PLA has given a sense of supremacy to this dominant force, which was held back till now as an ace up the sleeve.

The discussions between the Raksha Mantri, External Affairs Minister and the National Security Advisor with their Chinese counterparts on the sidelines of the Shanghai Cooperation Organisation summit in Moscow indicated that the two Asian giants were keen to diffuse the situation along the Line of Actual Control and not let an all-out conflict take place.

While the political and diplomatic intent was clear, on the military intent there was no letting up as the IA and PLA in an eyeball contact refused to step back from its positions.

In upping the ante the Indian Army occupied heights dominating the Chinese defences and had gained a bird's eye view into the Chinese Moldo Garrison.

The CCP/ PLA smarted by the Indian Army have been suggesting and indicated that they recognised the 1959 positions of the Line of Actual Control. The quick fall back to the 1959 positions by the Chinese was a red herring to make the Indian Army withdraw, which was against all common military knowledge dictates'.

The Ministry of External Affairs representatives joined the Military Talks but were not able to help break the impasse on the current deployment.

The Chinese presence in the Depsang subsector and its threat to our lines of communication to the ice-cap Siachen Glacier is well understood. The Chinese in violation of all norms developed the CPEC through PoK and wants to give depth to its lines of communication to the warm waters of the Arabian Sea / Gwadar Port.

The Chinese investments in Pakistan and its purse strings open to keep Pakistan as country going bankrupt has not been liked by the domestic audience and the political parties in Pakistan; who have recently launched an agitation to take on the Pakistan Army and Imran Khan for the quagmire jointly created and the threat of blacklisting by FATF, Damocles Sword hangs on Pakistan's head.

What is the likely Agenda for the 8th Round?

The dates for the next round are yet to be announced and the Agenda "Military De-escalation" under a broad heading.

Is the Military De-escalation likely to be held?

Much as the CCP/PLA would desire that the Indian Army vacates the heights on the Kailash Range; Military Judgement is against it as both sides very well know the foolishness of taking this foolhardy step.

The trade-off of in de-escalation has to be seen from the perspective of our defences along the entire Line of Actual Control subsector wise; in particular, the Depsang sub-sector to give depth to lines of communication to the Siachen Glacier. Eastern Ladakh has to be a status quo.

While this may keep getting discussed over the next several rounds of talks too; it's important that creature comforts of the troops deployed should paid greater attention. The troops are well equipped and are comfortable in the harsh Ladakh winter.

The Rest and Recuperation policy would have been promulgated and to keep the downtime down for deployment, Leh and cities along the LAC should have such facilities created to give the troops a break.

The infrastructure development and logistics supply chain must be developed as far forward as possible to reduce the turnaround time of personnel and equipment.

The Chinese need to be contained at sea too and their vulnerabilities need to be exploited by the Indian Navy and the QUAD as it gains momentum.

The indigenous weapons are being tested and given operational clearances giving the three services a major advantage of getting more bang for the buck.

The shortcomings are known and we must continue to develop our capabilities to meet the Chinese threat in the given area of operations. We can't be in a catch your game, yet we need strong military alliances which have been backed by the 2+2 Indo US dialogue as well as the French Government during the official induction of the Rafael fighter jets on 10 September 2020 at Ambala Airbase.

The Indian Government, Indian Defence Services and the Indian population are well prepared to fight the Chinese CCP/PLA, the China Virus and the Economic Challenges are thrown up by the Economic slow-down as Europe undergoes Lockdown 02.

Let's wait and watch and see what rabbits are pulled out of the hat in the three virtual meetings this month between Prime Minister Modi and President Xi Jinping; maybe their virtual meetings may well set the agenda for the 8th round of talks.

(The author is an Indian Army Veteran. Views are personal)

<https://www.financialexpress.com/defence/india-china-standoff-in-ladakh-the-eighth-round-of-talks/2120164/>

The Tribune

Wed, 04 Nov 2020

Mixed payload satellites may have prompted ISRO to use generic name

Chennai: With Indian satellites sporting mixed payloads for varied users perhaps the space agency has decided to opt for a generic name for its earth observation satellites, said a satellite expert.

He also added that satellite names should not be changed prior to the launch as it may result in problems at a later stage.

Recently, Indian Space Research Organisation (ISRO) decided to change the name of its radar imaging satellite RISAT-2BR2 as EOS-01 standing for Earth Observation Satellite-01.

Till date ISRO has not officially told the nation that RISAT-2BR2 has been renamed as EOS-01 and the reasons for the same.

"Nowadays satellites have multiple payloads for varied users and hence a thematic satellite may be a misnomer and ISRO might have decided to go for a generic name," M. Annadurai, who retired as Director, U R Rao Satellite Centre (URSC), formerly ISRO Satellite Centre, said.

"Naming of the satellite should be done at the start of the project so that traceability of the components is easy and the project documentation is complete," he added.

Changing names of satellites at the time of launch could create problems at later stage if the satellite suffers some issues, said a former official of ISRO.

According to Annadurai, renaming of the satellites had happened earlier but the officials were serving for a long period of time and they knew everything about a project.

"Now officials are not expected for long period of time in a project. So, documentation assumes more importance. In case a satellite name gets changed then the documentation should be accordingly taken care of," Annadurai added.

According to him, in the case of RISAT-2BR2 all process documents should be changed as there will not be continuity of personnel in the same project.

Interestingly the radar imaging satellite RISAT was first proposed to be named as 'Sanjay' after Sanjaya in Mahabharata who had the divine vision and narrated the happening in the battlefield to his blind King Dhritarashtra in the palace.

"I had proposed to name RISAT as 'Sanjay' after the character in the Indian epic Mahabharata. However, the idea was shot down," Tapan Misra, Senior Advisor to ISRO and Adjunct Professor at the Indian Institute of Technology-Kharagpur said.

It is learnt, India's communication satellites too will be renamed and a former ISRO official said it could be something like CMS - communication satellite tagged with a serial number.

Be that as it may, renaming of satellites is not new for ISRO.

India first started naming its satellites after Aryabhata-famous mathematician-astronomer- and mathematicians Bhaskara I, Bhaskara II and star Rohini.

According to ISRO officials, the owing to some political thinking ISRO changed its satellite naming policy and went for generic or thematic.

The remote sensing or earth observation satellites were then badged as Indian Remote Sensing (IRS) satellite.

After sending some IRS satellites, ISRO opted for thematic names for its earth observation satellites like Cartosat for cartography satellites, RISAT for radar imaging and Oceansat.

Renaming over the years...

The country's first communication satellite was named as Ariane Passenger Payload Experiment, APPLE. Curiously the satellite sported the foreign rocket's name -Ariane.

Later the communication satellites were named as Indian National Satellite System or INSAT series of satellites and then as GSAT for geostationary satellites.

Incidentally, GSAT-3 is also called EDUSAT-a satellite dedicated for education. In the space segment the satellite was called GSAT-3 and in the ground segment it was called EDUSAT, Annadurai recalled.

In 2003, meteorological satellite MetSat was renamed as Kalpana-1 in memory of Kalpana Chawla, the US astronaut with Indian roots died in the space shuttle Columbia disaster.

In the recent past, the Indian satellite navigation system originally called Indian Regional Navigation Satellite System (IRNSS) was renamed as NavIC -- taking the first three letters from the word navigation and first two letters from the words 'Indian Constellation'. The word 'navik' also means 'sailor' in Sanskrit.

Indian eye in the sky

- The RISAT is Indian eye in the sky that can see through the clouds and take pictures. The RISAT-2BR2 with synthetic aperture radar (SAR) that can shoot pictures in all weather conditions.
- The satellite can take pictures day and night and will be useful for surveillance as well as civilian activities.

<https://www.tribuneindia.com/news/schools/mixed-payload-satellites-may-have-prompted-isro-to-use-generic-name-165358>



Wed, 04 Nov 2020

Vikram crash-landing will remain a mystery

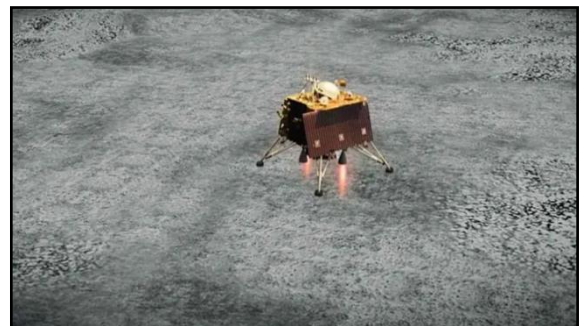
By Shankar Raj

Bengaluru: Why and how Vikram, the Indian Space Research Organisation's moon lander, did hara-kiri on the lunar surface will continue to remain a secret, if not a mystery.

ISRO has refused to share the findings of a failure analysis committee (FAC) on what happened in the final moments that resulted in Chandrayaan-2 lander Vikram crash-landing on the moon on September 7 last year.

Details of the findings were sought by RTI activist Sathish GN of Bengaluru. Replying to his RTI application, ISRO said "The information sought is exempted under Section 8(1) of the RTI Act."

This section exempts disclosure of information which would prejudicially affect the sovereignty and integrity of India, the security, strategic, scientific or economic interests of the State, relation with foreign states or lead to incitement of an offence.



File Photo

Copies of the reply found its way to the local media. The RTI application was filed on September 23, 2020, and ISRO replied on October 16.

Though the department of space and ISRO have released few details on what went wrong with Chandrayaan-2 lander, the Centre, in a written reply to a member's query in the Lok Sabha, said extra braking caused the deviation that eventually led to the hard-landing. The reply is however, silent on the reason for additional braking.

India spent Rs 970 crore — Rs 603 crore on the orbiter and landing module and Rs 367 crore on launching it — on Chandrayaan-2.

Chandrayaan-3 is scheduled for a 2021 launch. Sources say that the faults that were found in Chandrayaan-2 have been rectified in the next version.

Meanwhile, Gaganyaan, the first mission under India's human spaceflight programme, may miss the August 2022 deadline due to disruptions caused by Covid lockdowns.

Prime Minister Narendra Modi had set a deadline of August 2022, but ISRO is reportedly working on a new deadline, according to media reports.

<https://www.freepressjournal.in/india/vikram-crash-landing-will-remain-a-mystery>

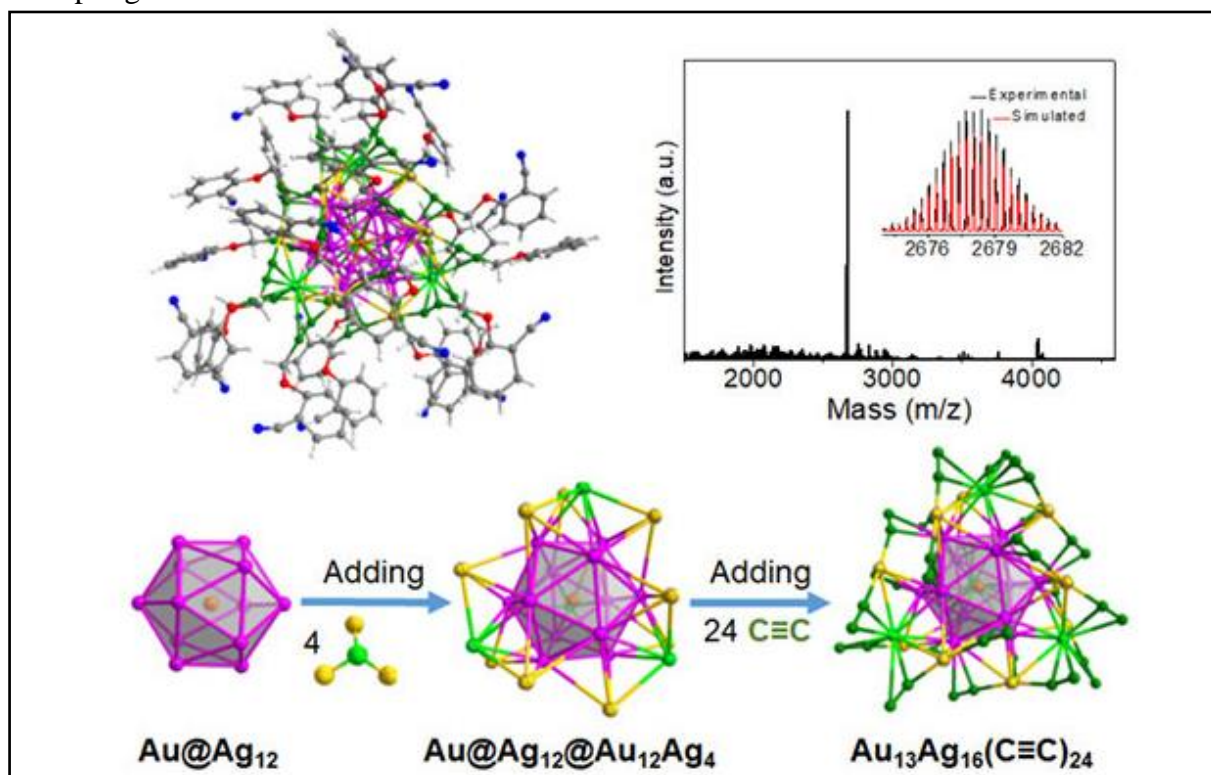


Wed, 04 Nov 2020

Scientists construct M29 cluster model catalyst

By Li Yuan

Recently, a group led by Prof. Li Gao from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences, in collaboration with Prof. Wan Chongqing from Capital Normal University and Prof. Hannu Hakkinen from University of Jyväskylä, synthesized a novel atomically precise AuAg cluster with special structure, which is exploited as a model catalyst for A3-coupling reactions.



Total structure and negative-mode ESI mass spectrum of the Au₁₃Ag₁₆L₂₄ cluster, the Au@Ag₁₂@Au₁₂Ag₄ metal framework protected by alkyne groups from 24 ligands. Credit: QIN Zhaoxian

This work was published in *Angewandte Chemie International Edition* on Sept. 30.

The scientists prepared a brand new alkynylated cluster $[\text{Au}_{13}\text{Ag}_{16}(\text{C}_{10}\text{H}_6\text{NO})_{24}]_3^-$ via the NaBH_4 -mediated reduction method, and confirmed the AuAg clusters by various sophisticated characterization techniques. They found that the unique metal framework of $\text{Au}_{\text{center}}@\text{Ag}_{12}@\text{Au}_{12}\text{Ag}_4$ was protected by 24 atypical alkyne ligands L ($\text{L} = \text{C}_{10}\text{H}_6\text{NO}$).

The ligands were found to construct a unique type of motif L-(Ag)-Au-(Ag)-L at the cluster interface, where, the alkyne ($\text{C}\equiv\text{C}$) group of each L was linked by sharing an Au atom through the σ bonds and each $\text{C}\equiv\text{C}$ group was discretely connected to chemically different Ag atom through π bonds.

DFT characterized the cluster as a clear 8-electron superatom, and peaks in the optical absorption spectrum were interpreted in terms of the P and D superatom states. The supported $\text{Au}_{13}\text{Ag}_{16}\text{L}_{24}/\text{CeO}_2$ catalyst exhibited high catalytic activity and selectivity towards the A3-coupling reaction involving benzaldehyde, diethylamine and phenylacetylene.

More information: Gao Li et al. A Homoleptic Alkynyl-Ligated $[\text{Au}_{13}\text{Ag}_{16}\text{L}_{24}]_3^-$ Cluster as a Catalytically Active Eight-Electron Superatom, *Angewandte Chemie International Edition* (2020). DOI: [10.1002/anie.202011780](https://doi.org/10.1002/anie.202011780)

Journal information: [Angewandte Chemie International Edition](https://phys.org/news/2020-11-scientists-m29-cluster-catalyst.html)
<https://phys.org/news/2020-11-scientists-m29-cluster-catalyst.html>



Wed, 04 Nov 2020

Explaining the physical origin of the memory effect in glasses

By Liu Jia

Prof. Wang Junqiang's team at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS), has revealed the key role of activation entropy in the memory effect of glasses, providing new understanding of the physical origin of the memory effect in glasses. The study was published in *Physical Review Letters*.

Unlike the common aging of glasses, the memory effect, which was observed by Kovacs in 1963, describes that when a glass is annealed sequentially at two temperatures, i.e. first at low temperature and then at a higher temperature, the glass can "rejuvenate" during the second step annealing.

Such phenomenon has been observed in various materials and complex systems, and is generally explained in terms of heterogeneous dynamics with phenomenological models, but the universal physical mechanism of memory effect still remains an unsolved mystery.

To address this issue, the researchers studied the memory effect of a model metallic glass (MG) ($\text{Au}_{49}\text{Cu}_{26.9}\text{Ag}_{5.5}\text{Pd}_{2.3}\text{Si}_{16.3}$) with good glass forming ability, and low glass transition temperature and liquidus temperature, by virtue of a high-precision high-rate differential scanning calorimeter. They systematically studied the influence of the annealing temperature and the annealing time.

According to the absolute reaction rate theory, the activation entropy S^* during isothermal annealing is determined. The memory effect occurs only when the temperature jump moves



Credit: Lynn Greyling/public domain

the glass into a state with a larger value of activation entropy S^* . No memory effect is observed if the jump occurs into a smaller S^* state. This indicates that activation entropy S^* plays a key role in triggering the memory effect in glasses.

This study provides a new perspective to account for the physical mechanism of the memory effect in glasses, and may promote the further research on the kinetic complexity in various disordered materials based on the proposed activation entropy S^* .

More information: Lijian Song et al. Activation Entropy as a Key Factor Controlling the Memory Effect in Glasses, *Physical Review Letters* (2020). DOI: [10.1103/PhysRevLett.125.135501](https://doi.org/10.1103/PhysRevLett.125.135501)

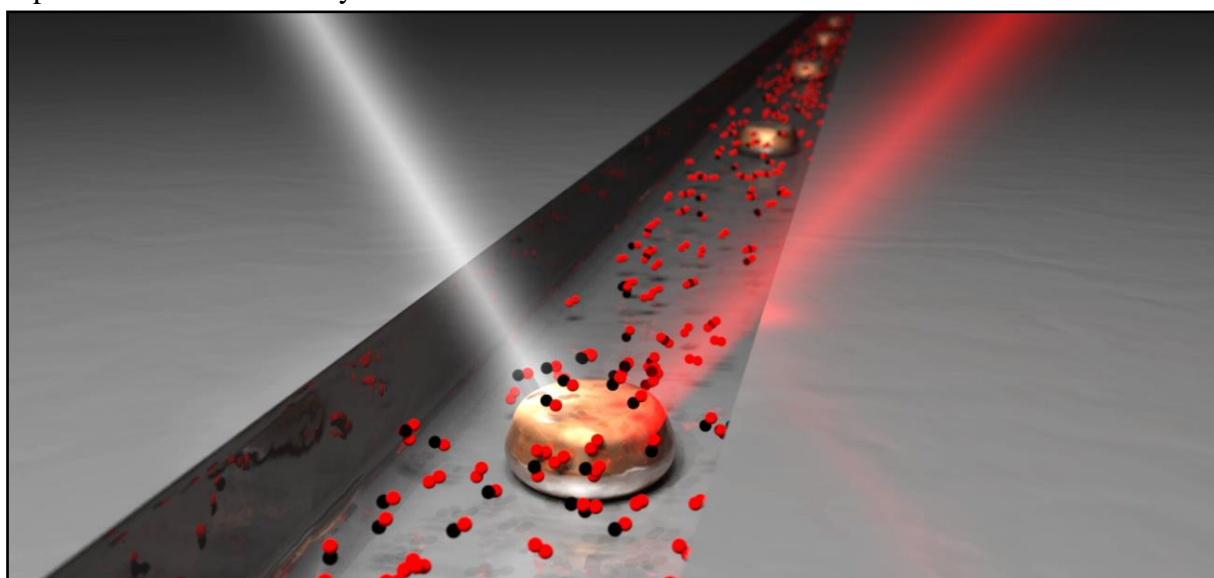
Journal information: [Physical Review Letters](https://phys.org/news/2020-11-physical-memory-effect-glasses.html)
<https://phys.org/news/2020-11-physical-memory-effect-glasses.html>



Wed, 04 Nov 2020

Researchers probe how nanoparticles affect neighbors in catalysis

Are you affected by your neighbors? So are nanoparticles in catalysts. New research from Chalmers University of Technology, Sweden, published in the journals *Science Advances* and *Nature Communications*, reveals how the nearest neighbors determine how well nanoparticles work in a catalyst.



Neighbourly collaboration for catalysis. First, a number of nanoparticles of copper are isolated in a gas-filled nanotube. Researchers then use light to measure how they affect each other in the process by which oxygen and carbon monoxide become carbon dioxide. The long-term goal of the research is to find a resource-efficient "neighbourhood collaboration" where as many particles as possible are catalytically active at the same time. Credit: David Albinsson/Chalmers University of Technology

"The long-term goal of the research is to be able to identify super-particles, to contribute to more efficient catalysts in the future. To utilize the resources better than today, we also want as many particles as possible to be actively participating in the catalytic reaction at the same time," says research leader Christoph Langhammer at the Department of Physics at Chalmers University of Technology.

Imagine a large group of neighbors gathered together to clean a communal courtyard. They set about their work, each contributing to the group effort. The only problem is that not everyone is equally active. While some work hard and efficiently, others stroll around, chatting and drinking

coffee. If you only looked at the end result, it would be difficult to know who worked the most, and who simply relaxed. To determine that, you would need to monitor each person throughout the day. The same applies to the activity of metallic nanoparticles in a catalyst.

The hunt for more effective catalysts through neighborly cooperation

Inside a catalyst several particles affect how effective the reactions are. Some of the particles in the crowd are effective, while others are inactive. But the particles are often hidden within different "pores," much like in a sponge, and are therefore difficult to study.

To be able to see what is really happening inside a catalyst pore, the researchers from Chalmers University of Technology isolated a handful of copper particles in a transparent glass nanotube. When several are gathered together in the small gas-filled pipe, it becomes possible to study which particles do what, and when, in real conditions.

In the tube, the particles come into contact with an inflowing gas mixture of oxygen and carbon monoxide. When these substances react with each other on the surface of the copper particles, carbon dioxide is formed. It is the same reaction that happens when exhaust gasses are purified in a car's catalytic converter, except there, particles of platinum, palladium and rhodium are often used to break down toxic carbon monoxide instead of copper. But these metals are expensive and scarce, so researchers are looking for more resource-efficient alternatives.

"Copper can be an interesting candidate for oxidizing carbon monoxide. The challenge is that copper has a tendency to change itself during the reaction, and we need to be able to measure what oxidation state a copper particle has when it is most active inside the catalyst. With our nanoreactor, which mimics a pore inside a real catalyst, this will now be possible," says David Albinsson, Postdoctoral researcher at the Department of Physics at Chalmers and first author of two scientific articles recently published in *Science Advances* and *Nature Communications*.

Anyone who has seen an old copper rooftop or statue will recognize how the reddish-brown metal soon turns green after contact with the air and pollutants. A similar thing happens with the copper particles in the catalysts. It is therefore important to get them to work together in an effective way.

"What we have shown now is that the oxidation state of a particle can be dynamically affected by its nearest neighbors during the reaction. The hope therefore is that eventually we can save resources with the help of optimized neighborly cooperation in a catalyst," says Christoph Langhammer, professor at the Department of Physics at Chalmers.

More information: David Albinsson et al, Copper catalysis at operando conditions—bridging the gap between single nanoparticle probing and catalyst-bed-averaging, *Nature Communications* (2020). DOI: [10.1038/s41467-020-18623-1](https://doi.org/10.1038/s41467-020-18623-1)

David Albinsson et al. Operando detection of single nanoparticle activity dynamics inside a model pore catalyst material, *Science Advances* (2020). DOI: [10.1126/sciadv.aba7678](https://doi.org/10.1126/sciadv.aba7678)

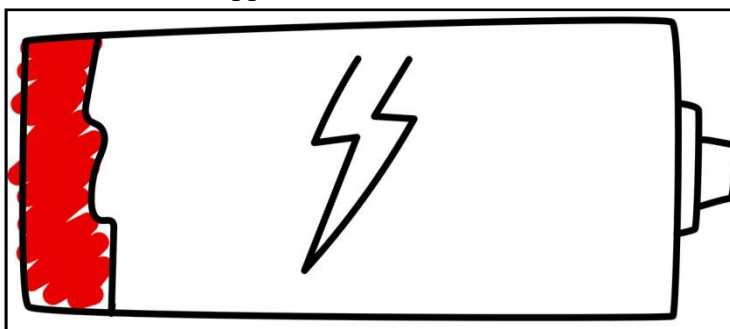
Journal information: [Science Advances](https://doi.org/10.1126/sciadv.aba7678) , [Nature Communications](https://doi.org/10.1038/s41467-020-18623-1)
<https://phys.org/news/2020-11-probe-nanoparticles-affect-neighbors-catalysis.html>

The surprising strength of liquid crystals

By Lisa Kulick

Dendrites are the destructive by-products of the cycle of charging and discharging lithium ion batteries. These tiny deposits form between the battery's anode and cathode, building up over time. Inevitably, they diminish battery life. More problematic is their risk of causing the battery to burst into flames. In the quest for safer and longer lasting batteries—especially for electric cars, trucks, and planes—researchers continue to explore methods to suppress the formation of dendrites.

Researchers at Carnegie Mellon University have found that liquid crystals can be used as electrolytes with lithium metal anodes in batteries to suppress dendrite growth. Liquid crystals represent a new class of materials that have properties that are different from conventional liquids and solids. The dendrite suppression happens due to the tendency of liquid crystal molecules to line up in an ordered arrangement.



Researchers are a step closer to developing longer lasting and safer batteries using liquid crystals. Credit: Pixabay

In findings published in the *Proceedings of the National Academy of Sciences*, the research team proposed various design criteria for selecting liquid crystals as battery electrolytes that can enable well-functioning lithium metal batteries.

"This comprehensive set of molecular level design rules will pave the way towards the realization of this new class of electrolytes for practical lithium metal batteries," said Venkat Viswanathan, associate professor of mechanical engineering at Carnegie Mellon.

"Batteries with increased energy density are critical to enable mass electrification of transportation. Lithium metal anodes offer a promising approach to improve the energy density of batteries, but dendrite formation plagues the safety and cycle life of lithium metal anodes," said Zeeshan Ahmad, the lead author on the paper.

The findings build on the research team's previous work on dendrite suppression using solid electrolytes. Although solid electrolytes provide superior dendrite suppression, they have slower lithium ion conductivities and cannot be integrated easily into the current lithium ion batteries. Liquids, on the other hand, have faster conductivity but cannot suppress dendrites.

The liquid crystal materials lie somewhere in between because they possess some orientational order but no positional order like solids. They are easily integrated into current lithium ion batteries, are safer, and offer spontaneous dendrite suppression.

Liquid crystals do have a disadvantage: their stability is not currently as good as that in current liquid electrolytes. The next step in this line of research is to further examine liquid crystalline materials so that they can satisfy all design criteria for future batteries.

More information: Zeeshan Ahmad et al. Design rules for liquid crystalline electrolytes for enabling dendrite-free lithium metal batteries, *Proceedings of the National Academy of Sciences* (2020). DOI: [10.1073/pnas.2008841117](https://doi.org/10.1073/pnas.2008841117)

Journal information: [Proceedings of the National Academy of Sciences](https://phys.org/news/2020-11-strength-liquid-crystals.html)
<https://phys.org/news/2020-11-strength-liquid-crystals.html>

New protein nanobioreactor designed to improve sustainable bioenergy production

Researchers at the University of Liverpool have unlocked new possibilities for the future development of sustainable, clean bioenergy. The study, published in *Nature Communications*, shows how bacterial protein 'cages' can be reprogrammed as nanoscale bioreactors for hydrogen production.

The carboxysome is a specialised bacterial organelle that encapsulates the essential CO₂-fixing enzyme Rubisco into a virus-like protein shell. The naturally designed architecture, semi-permeability, and catalytic improvement of carboxysomes have inspired the rational design and engineering of new nanomaterials to incorporate different enzymes into the shell for enhanced catalytic performance.

The first step in the study involved researchers installing specific genetic elements into the industrial bacterium *E. coli* to produce empty carboxysome shells. They further identified a small 'linker' - called an encapsulation peptide—capable of directing external proteins into the shell.

The extreme oxygen sensitive character of hydrogenases (enzymes that catalyse the generation and conversion of hydrogen) is a long-standing issue for hydrogen production in bacteria, so the team developed methods to incorporate catalytically active hydrogenases into the empty shell.

Project lead Professor Luning Liu, Professor of Microbial Bioenergetics and Bioengineering at the Institute of Systems, Molecular and Integrative Biology, said: "Our newly designed bioreactor is ideal for oxygen-sensitive enzymes, and marks an important step towards being able to develop and produce a bio-factory for hydrogen production."

In collaboration with Professor Andy Cooper in the Materials Innovation Factory (MIF) at the University, the researchers then tested the hydrogen-production activities of the bacterial cells and the biochemically isolated nanobioreactors. The nanobioreactor achieved a ~550% improvement in hydrogen-production efficiency and a greater oxygen tolerance in contrast to the enzymes without shell encapsulation.

"The next step for our research is answering how we can further stabilise the encapsulation system and improve yields," said Professor Liu. "We are also excited that this technical platform opens the door for us, in future studies, to create a diverse range of synthetic factories to encase various enzymes and molecules for customised functions."

First author, Ph.D. student Tianpei Li, said: "Due to climate change, there is a pressing need to reduce the emission of carbon dioxide from burning fossil fuels. Our study paves the way for engineering carboxysome shell-based nanoreactors to recruit specific enzymes and opens the door for new possibilities for developing sustainable, clean bioenergy."

More information: Tianpei Li et al, Reprogramming bacterial protein organelles as a nanoreactor for hydrogen production, *Nature Communications* (2020). DOI: [10.1038/s41467-020-19280-0](https://doi.org/10.1038/s41467-020-19280-0)

Journal information: [Nature Communications](https://www.nature.com/)

<https://phys.org/news/2020-11-protein-nanobioreactor-sustainable-bioenergy-production.html>

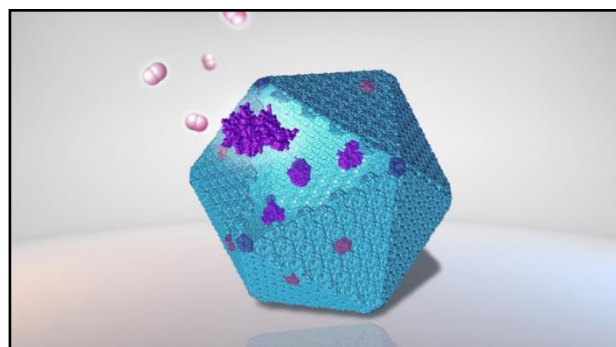


Illustration of a carboxysome and enzymes. Credit: Professor Luning Liu

Hot or cold, weather alone has no significant effect on Covid-19 spread

A research led by The University of Texas at Austin is adding clarity on weather's role in Covid-19 infection, with a new study finding that temperature and humidity do not play a significant role in coronavirus spread

Washington: A research led by The University of Texas at Austin is adding clarity on weather's role in Covid-19 infection, with a new study finding that temperature and humidity do not play a significant role in coronavirus spread.

This means whether it's hot or cold outside, the transmission of Covid-19 from one person to the next depends almost entirely on human behaviour.

"The effect of weather is low and other features such as mobility have more impact than the weather. In terms of relative importance, the weather is one of the last parameters," said Dev Niyogi, a professor at UT Austin's Jackson School of Geosciences and Cockrell School of Engineering who led the research.



Whether it's hot or cold outside, the transmission of Covid-19 from one person to the next depends almost entirely on human behaviour.(Pixabay)

The research was published in the International Journal of Environmental Research and Public Health.

Co-authors are Sajad Jamshidi, a research assistant at Purdue University, and Maryam Baniasad, a doctoral candidate at Ohio State University.

The study defined weather as "equivalent air temperature," which combines temperature and humidity into a single value. The scientists then analysed how this value tracked with coronavirus spread in different areas from March to July 2020, with their scale ranging from U.S. states and counties to countries, regions and the world at large.

At the county and state scale, the researchers also investigated the relationship between coronavirus infection and human behaviour, using cellphone data to study travel habits.

The study examined human behaviour in a general sense and did not attempt to connect it to how the weather may have influenced it. At each scale, the researchers adjusted their analyses so that population differences did not skew results.

Across scales, the scientists found that the weather had nearly no influence. When it was compared with other factors using a statistical metric that breaks down the relative contribution of each factor toward a particular outcome, the weather's relative importance at the county scale was less than 3 per cent, with no indication that a specific type of weather promoted spread over another.

In contrast, the data showed the clear influence of human behaviour -- and the outsized influence of individual behaviours. Taking trips and spending time away from home were the top two contributing factors to Covid-19 growth, with a relative importance of about 34% and 26%

respectively. The next two important factors were population and urban density, with a relative importance of about 23 per cent and 13 per cent respectively.

“We shouldn’t think of the problem as something driven by weather and climate. We should take personal precautions, be aware of the factors in urban exposure,” Jamshidi said.

Baniasad, a biochemist and pharmacist, said that assumptions about how coronavirus would respond with weather are largely informed by studies conducted in laboratory settings on related viruses. She said that this study illustrates the importance of studies that analyse how the coronavirus spreads through human communities.

“When you study something in the lab, it’s a supervised environment. It’s hard to scale up to society. This was our first motivation to do a more broad study,” she said.

Marshall Shepherd, an atmospheric sciences professor at the University of Georgia who was not part of the study, said that the research offers important insights about weather and coronavirus across scales.

“This important work clarifies some of the innuendoes about weather-Covid-19 connections and highlights the need to address science challenges at the appropriate scales,” Shepherd said.

Niyogi said that one of the key lessons of the coronavirus pandemic is the importance of analysing phenomena at the “human scale”-- the scale at which humans live their day-to-day lives. He said that this research is an example of this type of perspective.

“Covid, it is claimed, could change everything. We have been looking at weather and climate outlooks as a system that we scale down, down, down and then seeing how it might affect humans,” Niyogi said.

Now, we are flipping the case and upscaling, starting at human exposure scale and then going outwards. This is a new paradigm we will need for studying virus exposure and human environmental modelling systems involving new sensing and AI-like techniques,” Niyogi added.

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

<https://www.hindustantimes.com/health/hot-or-cold-weather-alone-has-no-significant-effect-on-covid-19-spread/story-tWjA4XzUbkTLJanuITdoHM.html>

