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# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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## Business Standard

Wed, 18 Aug 2021

### HAL inks Rs 5,375-cr contract for supply of engines for Tejas aircraft

*Since it first flew in January 2001, the Tejas LCA has been powered by a single General Electric (GE) F404-IN20 engine*

*By Ajai Shukla*

In an important step that will galvanise India's largest ever domestic arms deal – viz. the acquisition of 83 Tejas Mark 1A fighters for Rs 45,696 crore – Hindustan Aeronautics Ltd (HAL) has ordered 99 engines worth US \$716 million (Rs 5,375 crores) for the indigenous light combat aircraft (LCA), the Ministry of Defence (MoD) announced on Tuesday.

Since it first flew in January 2001, the Tejas LCA has been powered by a single General Electric (GE) F404-IN20 engine. HAL is continuing with that engine for its first 123 fighters. Support services for the engine will also be provided by GE Aviation, USA, as a part of this project.

The Tejas Mark 1 and 1A both use the highest thrust variant of GE's F404 family, the F404-IN20. "This incorporates GE's latest "hot section materials and technologies" as well as FADEC (Full Authority Digital Engine Control)," stated the MoD.

FADEC is a computer-managed aircraft ignition and engine control system that is used in modern commercial and military aircraft to control all aspects of engine performance digitally. It replaces the old technical or analogue electronic controls in previous generation aircraft.

"This is largest ever deal and purchase order placed by HAL for the LCA", said R Madhavan, HAL's chairman and managing director.

HAL is working closely with GE to develop the export potential of the LCA, and to supply spare parts to the global supply chain of GE 404 engines, Madhavan said.

"The F404 family of engines has proven itself in operations all over the world and we have committed to deliver all 99 engines and support services by 2029", stated Chris Cyr, Vice President of GE Aviation.

The F404 engines are amongst the world's most comprehensively proven, having logged more than 14 million engine flight hours. The F404 has powered 15 different production and prototype aircraft, said GE in a press release today.

The next batch of GE engines that will be bought are the bigger, more powerful GE F-414 engines for the Tejas LCA Mark 2 fighter. The F-404 will not be built in India as it is required in limited quantities. However the F-414 engines are likely to be built in India in larger numbers.

[https://www.business-standard.com/article/companies/hal-inks-rs-5-375-cr-contract-for-supply-of-engines-for-tejas-aircraft-121081701317\\_1.html](https://www.business-standard.com/article/companies/hal-inks-rs-5-375-cr-contract-for-supply-of-engines-for-tejas-aircraft-121081701317_1.html)



## HAL signs \$716 mn deal with GE Aviation for 99 engines for LCA Tejas

*'This is largest-ever deal and purchase order placed by HAL for LCA,' said Mr. R. Madhavan, CMD, HAL*

New Delhi: Hindustan Aeronautics Limited (HAL) on Tuesday signed a \$716 mn deal with GE Aviation of the U.S. for 99 F404 aircraft engines and support services that will power the indigenous Tejas Light Combat Aircraft (LCA) Mk-1A.

In February, the Defence Ministry signed a ₹48,000 crore deal with HAL to supply 83 LCA-Mk1A to the Indian Air Force.

"This is largest-ever deal and the purchase order placed by HAL for LCA," said Mr. R. Madhavan, CMD, HAL. The company was working closely with GE for its support to pursue the export potential of the LCA and also to supply spares to the global supply chain of GE 404 engines, he added.

The 83 MK-1A jets are in addition to the 40 LCA already ordered by the IAF in two batches of 20 each in the Initial Operational Clearance (IOC) and the Final Operational Clearance (FOC) configurations.

Interacting virtually, Chris Cyr, Vice President, Business Development and Sales, GE Aviation, said the F404 family of engines had proven itself in operations all over the world. They were "committed to deliver all 99 engines and support services by 2029," he stated.

Ordering of the engines marked a major milestone in the execution of 83 LCA contract, HAL said in a statement. It noted that the cooperation would be further enhanced with the manufacturing of GE F414 engines in India for the upcoming LCA MkII program. The F404 family engines have logged in more than 14 million engine flight hours, and had powered 15 different production and prototype aircraft, the statement added.

<https://www.thehindu.com/news/national/hal-signs-716-mn-deal-with-ge-aviation-for-99-engines-for-lca-tejas/article35962210.ece>



Indian Air Force light combat (LCA) aircraft Tejas. File | Photo Credit: MURALI KUMAR K.

## End of MiG-29K, India's promising carrier-based fighter TEDBF coming

The TEDBF (Twin Engine Deck Based Fighter) project is a twin-engine, carrier-based multi-role fighter with a delta wing and PGO (duck scheme), which is currently being developed for the Indian Navy.

The aircraft is designed by the Aviation Development Agency (ADA) and will be manufactured by Hindustan Aeronautics Limited (HAL). It is designed to perform a variety of tasks: air superiority, theater isolation, anti-ship operations and electronic warfare. The TEDBF is expected to replace the MiG-29K in service with the Indian Navy aboard INS Vikramaditya and the future INS Vikrant ...



TEDBF scale model during Aero India

The program was officially announced in 2020 in response to the Indian Navy's dissatisfaction with the operation of the single-engine carrier-based variant of the Tejas fighter and the possible collapse of the naval LCA program. The aircraft model was presented at Aero India 2021. The first flight is expected in 2026, and commissioning by 2032. The two engines will provide better takeoff characteristics from aircraft carriers of the Indian Navy, as well as increased maneuverability, increased flight range, increased combat load, as well as a survival advantage if one of the engines is damaged in battle. As a dedicated carrier-based fighter, it will have folding wings for storage in the aircraft carrier's hangar. The aircraft will be equipped with weapons of predominantly national production.

In April 2020, DRDO-ADA announced that they are working on a new carrier-based fighter in accordance with the Indian Navy's MRCBF requirements issued in 2016 to replace the existing fleet of MiG-29K carrier-based fighters. During the development, the experience gained in the Naval-LCA program was used. The Indian government approved the project in summer 2020. According to the first calculations, the total cost of designing and developing flying prototypes should be about \$ 1,750,000,000.

The aircraft will have a PGO that creates additional lift, will be equipped with two General Electric F414 engines, a phased array radar and will be able to carry a maximum combat load of about 8 tons at thirteen external hardpoints (including two on the wingtips for air-to-air missiles. range).

The proposed version of this aircraft for the Air Force is called the Omni-Role Combat Aircraft (ORCA) and is under study. The Indian Air Force will need more than 750 aircraft between 2030 and 2050. ORCA is being developed to complement the HAL AMCA program. The vehicle will weigh about a ton and a half less than the deck version due to the lightweight chassis design.

The estimated cost of the carrier-based aircraft is \$ 72.5 million, the land version – \$ 66 million.

**Estimated performance characteristics** : crew – 1 person, length – 16.3 m, wingspan – 11.3 m, maximum take-off weight – 26000 kg, power plant – two General Electric F414 diesel-turbine engines with thrust of 5965 (10000) kgf each, maximum speed – 1 , 6M (about 2000 km / h), ceiling – 18000 m, combat radius without PTB and without refueling in the air – 800 km, armament: 1 30-mm cannon, guided and unguided missiles and bombs for various purposes with a total weight of up to 8000 kg

<https://defenceview.in/end-of-mig-29k-indias-promising-carrier-based-fighter-tedbf-coming/>

## India develops tiny memory to make chips 'perfect'

*"In contrast to the high voltage required by gate oxide breakdown (a popular OTP memory), IIT Bombay's memory chip requires less power and chip-area as the need for boosted voltage supply is avoided," a release from the Scientific Advisor's office said.*

New Delhi: The Department of Space's Semi-Conductor Laboratory (SCL), Mohali, and the Indian Institute of Technology, Bombay (IITB) have collaborated to successfully demonstrate CMOS 180nm-based production-ready 8-bit memory technology, described as a "gamechanger by enabling secure memory and encryption hardware for the country" by top scientists.

"The focus on electronics hardware including integrated circuits or chips is key to strengthen R&D primarily in the space and defence sectors. Development of standards, product design or IP development, and semiconductor manufacturing are increasingly important. The partnership between IIT Bombay and SCL to establish this memory technology for the first time demonstrates the augmented potential for semiconductor research in the country," Govt's Principal Scientific Adviser, Prof K. VijayRaghavan, said.



For successfully demonstrating CMOS 180nm based production-ready 8-bit memory technology, IIT Bombay invented the one-time programmable (OTP) memory based on ultra-thin deposited silicon dioxide (a few atoms thick) instead of the existing gate oxide-based OTP technology.

"In contrast to the high voltage required by gate oxide breakdown (a popular OTP memory), IIT Bombay's memory chip requires less power and chip-area as the need for boosted voltage supply is avoided," a release from the Scientific Advisor's office said.

Stating that "memory technology is critical to data security, and it is essential for present and future Indian Fabs," NITI Aayog Member, Dr V.K. Saraswat, said: "To infuse innovation, translating memory technology from research to manufacturing is the key to compete globally and serve locally to establish a vibrant semiconductor ecosystem. The OTP Memory Technology Adoption for Trimming Application by the joint IIT Bombay-SCL Chandigarh teams is a pioneering step in this direction. It will be a gamechanger by enabling secure memory and encryption hardware for the country."

For the uninitiated, the analogue (as in natural world) output is converted into the language of computers (digital) through a digitiser chip or an analogue to digital converter.

Foundries mass-produce these chips. Ideally, these chips should be identical, but manufacturing variations produce tiny offsets which are revealed upon testing. This renders a large fraction of chips useless.

"The tiny offset may be stored in memory once and applied to the output afterward to make each imperfect chip 'perfect'! Using this method, generic chips can now be designed, and application-specific offsets added to make expensive custom chip design redundant, saving time and money for the user," the release said, explaining the importance of the new collaboration.

Chip technology gaps became the focus of investigation for Indian researchers as the demand for semiconductors increased in the country and globally. The government took cognizance of the significance of R&D in innovation-driven semiconductor manufacturing, and improved R&D



capacity by building Centres for Excellence in Nanoelectronics (CENs); the first ones being at IIT Bombay and the Indian Institute of Science (IISc). This led to a transformed semiconductor research ecosystem making the country a major contributor to electron device-related research.

The next challenge was to translate research to manufacturing. The semiconductor manufacturing ecosystem in India is led by SCL, Mohali and is the most advanced semiconductor manufacturing fab (a large facility with cleanroom environments used to produce memory chips) in the country.

The team at IIT Bombay was supported by the Department of Science and Technology's Intensification of Research in High Priority Area (IRHPA). Aspects of the work, funded by MeitY/DST's Nanoelectronics Network for Research and Applications (NNetRA), supports the memory application, DST-Advanced Manufacturing Technologies, and the Office of PSA for hardware security. The team at IIT Bombay partnered with IIT Delhi, SETS Chennai, and DRDO for hardware encryption.

"One out of 100 ideas make the journey from Lab to Fab. The exacting process of exceeding 95 per cent yield requires an unrelenting multi-disciplinary team supported by a world-class R&D infrastructure to form an enduring collaboration. Once successful such technology opens possibilities of touching countless lives, in this case, through chips with a tiny memory," said Professor Udayan Ganguly, who lead the team at IIT Bombay.

<https://telecom.economictimes.indiatimes.com/news/india-develops-tiny-memory-to-make-chips-perfect/85418136>

## THE TIMES OF INDIA

*Wed, 18 Aug 2021*

### **Sahni's term ends today, GU likely to appoint acting VC**

Panaji: Goa University's vice-chancellor (VC) Varun Sahni's term in office will end on Wednesday and the varsity is expected to appoint an acting VC.

GU had begun the procedure to appoint a new VC and has scheduled interviews for the 23 shortlisted candidates on August 25. Since there is still time for the procedure of appointment of the new VC to be completed, an acting vice-chancellor will take over for the time being.

Usually, the senior-most dean is expected to be appointed as the acting vice-chancellor. But as per GU statutes, the current VC can also continue in the post till the time his successor is appointed.

A farewell for Sahni with limited attendees has been organised on his final day in office by GU, while the rest of the faculty and staff will watch the event online.

In June, the Goa governor and chancellor of Goa University initiated the process of identifying a new candidate for the post of vice-chancellor by inviting applications from academicians who have over 10 years of experience.

Goa governor had formed a three-member search panel of CSIR director general Dr Shekhar Mande, former NCERT director Jagmohan Singh Rajput and DRDO's Dr G Satish Reddy, to shortlist candidates for the post held for a five-year term.

<https://timesofindia.indiatimes.com/city/goa/sahnis-term-ends-today-gu-likely-to-appoint-acting-vc/articleshow/85414676.cms>

## COVID 19: DRDO's Contribution



Wed, 18 Aug 2021

### बदायूं में केंद्रीय राज्य मंत्री बीएल वर्मा बुधवार काे करेंगे DRDO के आक्सीजन प्लांट का शुभारंभ, पूरी की तैयारियां

बरेली: बदायूं में लंबे समय से अटके डीआरडीओ के आक्सीजन प्लांट के शुभारंभ का रास्ता साफ हो गया है।

19 अगस्त को प्रथम बार आगमन के मौके पर कैबिनेट राज्यमंत्री बीएल वर्मा आक्सीजन प्लांट का शुभारंभ करेंगे।

इसके लिए राजकीय मेडिकल प्रशासन और जिला प्रशासन ने तैयारियां पूरी कर ली हैं।

राजकीय मेडिकल कालेज परिसर में दो आक्सीजन प्लांट स्थापित किए गए हैं।

जिसमें पहला आक्सीजन प्लांट पूर्व सासंद धर्मेन्द्र यादव के आह्वान पर सहसवान विधायक ओमकार सिंह और सपा एमएलसी की सरकारी निधि से स्थापित किया गया।

जबकि दूसरा आक्सीजन प्लांट केंद्र सरकार की ओर से डीआरडीओ द्वारा स्थापित किया गया।

दोनों ही प्लांट का शुभारंभ लंबे समय से अटका पड़ा है।

[https://www.hindi.nyoooz.com/news/bareilly/drdo-oxygen-plant-inauguration-union-minister-of-state-bl-verma-will-inaugurate-drDOS-oxygen-plant-in-badaun-on-wednesday\\_1053338/](https://www.hindi.nyoooz.com/news/bareilly/drdo-oxygen-plant-inauguration-union-minister-of-state-bl-verma-will-inaugurate-drDOS-oxygen-plant-in-badaun-on-wednesday_1053338/)





## जिले के सभी स्वास्थ्य केंद्रों में है आक्सीजन

### कंसनट्रेटर मशीन, बैठक में दी जानकारी

प्रदेश के मुख्य सचिव अमिताभ जैन ने 16 अगस्त की शाम वीडियो कान्फ्रेंसिंग के जरिए कोरोना की तीसरी लहर की आशंका के तहत तैयारियां, मुख्यमंत्री हाट-बाजार क्लिनिक योजना की जिलेवार प्रगति की समीक्षा की।

धमतरी: प्रदेश के मुख्य सचिव अमिताभ जैन ने 16 अगस्त की शाम वीडियो कान्फ्रेंसिंग के जरिए कोरोना की तीसरी लहर की आशंका के तहत तैयारियां, मुख्यमंत्री हाट-बाजार क्लिनिक योजना की जिलेवार प्रगति की समीक्षा की।

समीक्षा के दौरान कलेक्टर पीएस एल्मा ने बताया कि जिले में 169 उप स्वास्थ्य केंद्र, 25 प्रथमिक स्वास्थ्य केंद्र हैं। इन सभी प्राथमिक स्वास्थ्य केंद्रों में चार से पांच आक्सीजन कंसनट्रेटर उपलब्ध है। इसके अलावा गुजरा को छोड़ शेष चार सामुदायिक स्वास्थ्य केंद्रों में 15 जंबो सिलिंडर उपलब्ध है।



जिला अस्पताल स्थित कोविड विंग में 80 में से 50 आक्सीजनयुक्त बिस्तर तथा लि में कुल 32 वेंटीलेटर उपलब्ध हैं। इसके साथ ही लि अस्पताल में आक्सीजन आपूर्ति के लिए एक पीएसए प्लांट 425 लीटर प्रति मिनट क्षमता का चालू है और एक प्लांट निर्माणाधीन है तथा 29 डी टाइप 55 बी टाइप जम्बो सिलिंडर उपलब्ध हैं।

इसके अलावा बच्चों के लिए 12 आइसीयू बिस्तरों की उपलब्धता है। डेडिकेटेड कोविड अस्पताल धमतरी (आइएलआइ) में सभी 40 बिस्तर आक्सीजनयुक्त हैं तथा चार वेंटीलेटर हैं। यहां 130 डी टाइप जंबो सिलिंडर की व्यवस्था है। वीसी में जिला पंचायत की सीईओ प्रियंका महोबिया, लि शिक्षा अधिकारी मौजूद रहे।

चार आक्सीजन प्लांट बन रहे

जिले में कुल चार पीएसए प्लांट स्वीकृत किए गए हैं, जिनमें जिला चिकित्सालय के कोविड विंग में एक पीएसए प्लांट एनएचआई-डीआरडीओ द्वारा बनाया जा रहा है, सिविल काम पूर्ण तथा अगले दस दिनों में प्लांट भी आने की संभावना है।

वहीं कुरुद सिविल अस्पताल में अजीम प्रेमजी फाउंडेशन द्वारा प्लांट स्थापित करने निर्माण कार्य जारी है। साथ ही सामुदायिक स्वास्थ्य केंद्र भखारा में सीजीएमएससी द्वारा स्थापित किए जा रहे प्लांट का सिविल कार्य प्रगति पर है। वहीं नगरी के सामुदायिक स्वास्थ्य केंद्र में पीएसए प्लांट स्थापना का कार्य सीजीएमएससी द्वारा किया जाएगा। फिलहाल राज्य स्तर पर टेंडर प्रक्रियाधीन है।

<https://www.naidunia.com/chhattisgarh/dhamtari-oxygen-concentrator-machine-is-in-all-the-health-centers-of-the-district-information-given-in-the-meeting-7005321>

# Defence Strategic: National/International



Press Information Bureau  
Government of India

Ministry of Defence

Tue, 17 Aug 2021 3:56PM

## Raksha Mantri Shri Rajnath Singh flags-in climb-a-thon organised as part of 'Azadi ka Amrit Mahotsav'

*Key Highlights:*

- *Climb-a-thon held at four smaller peaks of Sikkim Himalayas by a team of Himalayan Mountaineering Institute, Darjeeling*
- *7,500 sq ft National Flag hoisted at Mt Rhenock*
- *Recorded as biggest Indian National Flag atop a mountain in Asia Book of Records & India Book of Records*
- *Flag planned to be displayed at different locations across the country*
- *Team also performs world record 75-hour nonstop Surya Namaskar 2.51 lakh times at the institute*
- *RM lauds the institute for promoting patriotism through adventure among the youth*

Raksha Mantri Shri Rajnath Singh flagged-in a climb-a-thon organised by Himalayan Mountaineering Institute (HMI), Darjeeling to celebrate 'Azadi ka Amrit Mahotsav', in New Delhi on August 17, 2021. The climb-a-thon was organised at four smaller peaks of Sikkim Himalayas from April 20-25, 2021. The climb-a-thon, under the leadership of Group Captain Jai Kishan, was conducted at Mt Rhenock, Mt Frey, Mt BC Roy and Mt Palung, by a team of 125 mountaineers.

The National Flag, measuring 7,500 sq ft and weighing 75 kilograms, was hoisted atop Mt Rhenock at an altitude of 16,500 ft above sea level. The point where the National Flag was hoisted has been named after first freedom fighter from Sikkim, Trilochan Pokhrel, fondly remembered as Gandhi Pokhrel. The feat was recorded as the biggest Indian National Flag hoisted atop a mountain in the Asia Book of Records and India Book of Records. The team also performed a world record 75-hour nonstop Surya Namaskar 2.51 lakh times at HMI, Darjeeling.

Appreciating HMI for this unique initiative, Shri Rajnath Singh stated that such events will promote patriotism through adventure among the youth. He conveyed his best wishes to the team and released the certificates of participation for the team.

Group Captain Jai Kishan presented the replica of the Indian Flag to the Raksha Mantri. Defence Secretary Dr Ajay Kumar and other senior officials of Ministry of Defence were also present on the occasion.

The National Flag is planned to be displayed at different locations across the country, including Statue of Unity in Gujarat on October 31, 2021; National War Memorial/South Block in New Delhi on December 16, 2021 on the occasion of Swarnim Vijay Diwas; Lal Chowk in Srinagar on August 15, 2022; Andaman & Nicobar Islands on March 23, 2022 and Kanyakumari. In addition, the team plans to display the Indian Flag over highest peak of South Pole in January 2022.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1746678>



Wed, 18 Aug 2021

## **Pune University to set up ‘Chair of excellence in military history of India’, Gets nod from Ministry of Defence**

Pune: The Ministry of Defence had called for expression of interest from top 100 universities as per NIRF ranking for setting up a chair of excellence in the military history of India with particular focus on communication and awareness creation of Indian gallantry. Proposals were received from 25 universities/ institutions.

The proposals were examined by the Institute Selection Review Committee (ISRC) and unanimously recommended for awarding the chair to the Department of Defence and Strategic Studies Savitribai Phule Pune University, Pune for a period of three years to undertake research.



The scope of the chair, inter-alia, include publishing of monographs, conducting seminars, webinars to propagate and enhance understanding of the military history of India, creating a platform for faculty/researchers to undertake research work, develop strategies for communication and awareness on the valour of Indian Military and to provide advice to Ministry on any other matter related to the subject from time to time.

A Memorandum of Understanding will be signed with the University shortly. The chair will be supported through an endowment fund of Rs two crore.

“We are very happy to receive the Chair of Excellence from the Ministry of Defence. This has created an opportunity for students to do research in these subjects”, said Prof Dr Nitin Karmalkar, Vice-Chancellor, Savitribai Phule Pune University.

“The Department of Defence and Strategic Studies is the only department in the country in which the Chair of Excellence has been established in coordination with the Army, Air Force and the Ministry of Defence. We intend to set up a ‘Chair of Excellence’ with the Indian Navy in the near future and a proposal for this has been sent to the Navy Headquarter”, said Dr Vijay Khare, Head of Department, Department of Defence and Strategic Studies.

The Department is one of the flourishing departments in the field of Defence and Strategic Studies. Our footprint with the Indian Armed Forces is remarkable and collaborative work is going well with all three services. The Department of Defence and Strategic Studies shares a strong bond

with the Indian Armed Forces. In the year 1994, the Indian Army established the Chhatrapati Shivaji Chair in Policy Studies. The Department has unique courses such as Scholars in Residence Programme under which several officers from the Indian Army join the Department as Visiting Scholars.

Every year the Department and the Indian Army organize General B.C. Joshi Memorial Lecture in the memory of General B.C. Joshi. This lecture is delivered by the serving Chief of the Army Staff (COAS), Chief of the Naval Staff (CNS) and Chief of the Air Staff (CAS), in rotation. In the year 2020, the Department of Defence and Strategic Studies in collaboration with the Indian Air Force have established the first “Chair of Excellence” named as “Marshal of the Air Force Arjan Singh Chair of Excellence”.

DDSS offers M.A./M.Sc. in Defence and Strategic Studies, M.Phil. and Ph.D. in Defence and Strategic Studies. Recognising the need of disseminating information of the key areas of national security like Terrorism, Disaster Management and Defence Analyst, the Department from the academic year 2018-19 has introduced three Post Graduate diploma courses namely, Disaster Management and National Security, Counter-Terrorism Studies and Defence Analyst and National security. With the aim to strengthen the awareness about India’s National Security and training young minds to lead the global security issues, the department from the academic year 2020-21 has introduced a Five Year Integrated Course in M.A./M.Sc.

Defence and Strategic Studies, M.A. in Global Peace, Security and Strategic Studies and also six Post Graduate diploma courses namely, Chhatrapati Shivaji Maharaj’s Vision & Nation Building, West and South Asian Security, African Peace & Security, CBRN (Chemical, Biological, Radiological, Nuclear) & National Security, European Peace and Security, Cyber Security and India’s National Security. All these courses help to explore the diverse areas of national and international security. The Department is willing to further this trend to incorporate the changing dynamics of International and National Security.

<https://www.punekarnews.in/pune-university-to-set-up-chair-of-excellence-in-military-history-of-india-gets-nod-from-ministry-of-defence/>



## Advanced short range air to air missile final assembly to take place in India

By Ch Sushil Rao

Hyderabad: Bharat Dynamics Limited (BDL) and MBDA, UK will establish a facility for the final assembly, integration and test (FAIT) of advanced short range air-to-air missile (ASRAAM) in India.

BDL and MBDA, UK on Tuesday signed a licencing agreement to establish the manufacturing facility in India. The agreement was signed by NP Diwakar, director (Technical), from BDL and George Kyriakides, International Industrial Cooperation director from MBDA in the presence of commodore Siddharth Mishra (Retd), CMD, BDL at a virtual ceremony. P Radhakrishna, director (production), BDL, N Srinivasulu, director (finance), BDL and senior officials of both the companies were also present on the occasion.



Under the licensing agreement, MBDA will transfer the equipment and knowledge to BDL for establishing the facility. Work on establishing this capability in India is due to start immediately and is expected to commence operations by the year 2022-23.

Commodore Siddharth Mishra (Retd), CMD, BDL said the signing of the licencing agreement reinforces the Company's commitment to contribute towards 'Make in India' and the 'Atmanirbhar' initiatives of government of India in the defence sector.

ASRAAM is one of the Within Visual Range missiles available and BDL will manufacture these at its Bhanur Unit for the domestic needs and also export in future through MBDA.

The new facility will provide India with the ability to carry out final assembly, integration and test of ASRAAM missiles. "BDL has been endeavouring to enter into a tie-up with foreign OEMs (Original Equipment Manufacturers) in pursuit of its expansion programme. The agreement signed with MBDA today, is one such effort, which will go a long way in further strengthening the collaboration, which BDL has with MBDA for its various missile programmes," BDL said.

George Kyriakides, International Industrial Cooperation director of MBDA said MBDA had a long and highly successful history of working with BDL for over four decades, a partnership that has seen BDL manufacture a large number of MBDA-designed Milan missiles in India.

The agreement to establish the facility follows on from an earlier Memorandum of Understanding (MoU) between BDL and MBDA on ASRAAM FAIT signed during 2019. The new BDL ASRAAM facility will have the potential to also conduct maintenance, repair and overhaul (MRO) of ASRAAM missiles. The facility can also be adapted to conduct final assembly, integration and test of the CAMM missile of MBDA. CAMM is the missile used by the Sea Ceptor naval air defence system that has been offered as Short Range Surface to Air Missile (SRSAM) requirement.

ASRAAM, a Within Visual Range Air Dominance weapon, is a New Generation Close Combat Missile. Its low drag, aerodynamic airframe, unrivalled speed and manoeuvrability throughout its flight, increased agility make it the best missile in its category of weapons. The missile has full 'Lock On Before Launch' and 'Lock On After Launch' operating modes, BDL said.

<https://timesofindia.indiatimes.com/india/advanced-short-range-air-to-air-missile-final-assembly-to-take-place-in-india/articleshow/85402323.cms>

## Saudi-India naval exercise heralds new era in ties

AKIPRESS.COM - India and Saudi Arabia have embarked on a well-trodden journey toward enhancing bilateral relations in a variety of different fields, including trade and business, infrastructure development, commerce, medical research, and people-to-people exchanges, Arab News reported.

Now the two countries have added defense cooperation and military training to that list. Navies of both the countries have started their first-ever joint exercise, called the “Al-Mohed Al-Hindi Exercise”. Indian Naval ship INS Kochi, a flagship destroyer for the Indian Western Naval Fleet, is docked in Jubail as part of the exercise.



Indian Navy in a statement said that its “visit to Kingdom of Saudi Arabia was set rolling with the Flag Officer Commanding Western Fleet (FOCWF), Rear Adm Ajay Kochhar visiting the Fleet Cdr of Royal Saudi Navy’s Eastern Fleet, Rear Adm Majid Al Qahtani” on August 10, which was held at the King Abdul Aziz Naval Base, “the Headquarters for Saudi Eastern Fleet”.

It mentioned that Kochhar also visited the King Fahd Naval Academy and met with the Commandant Rear Admiral Faisal Bin Fahd Al Ghufaily. He called on the Governor of Eastern Province of the Kingdom of Saudi Arabia, Saud bin Nayef Al Saud at Dammam on August 11.

The harbor phase of the “Al-Mohed Al-Hindi 2021” exercise began on August 9 and the sea-based drills started August 11.

Defense relations between both the countries constitute a significant element of shared strategic vision for the region and this first bilateral naval exercise is a testimony to India’s strong ties with Saudi Arabia. “The naval exercise will assist in promoting understanding and furthering interoperability between the two Navies.”

The arrival of the Indian Navy ship heralds a new chapter in bilateral defense ties, as India-Saudi bilateral defense engagements have seen a noticeable upswing in the past few months with an increased number of Indian Navy ships visiting Saudi Arabia.

India’s Western Fleet commander was aboard the ship for the first exercise as the India-Saudi naval training will include a number of sea exercises and maneuvers.

Indian naval assets have been increasingly deployed to address the maritime concerns within the region. Indian Navy has assisted countries in the region with hydrographic surveys, search and rescue, and other capacity-building and capability-enhancing activities.

The warship arrived in Saudi Arabia after carrying out a similar Naval exercise with the UAE Navy off the coast of Abu Dhabi on August 7.

The Indian Naval ship INS Kochi is one of three Kolkata-class stealth guided-missile destroyers, equipped with sophisticated digital networks along with state-of-the-art weapons and sensors to neutralize any threat from the air, sea, or from underwater.

[https://akipress.com/news:661526:Saudi-India\\_naval\\_exercise\\_heralds\\_new\\_era\\_in\\_ties/](https://akipress.com/news:661526:Saudi-India_naval_exercise_heralds_new_era_in_ties/)





Wed, 18 Aug 2021

## ISRO soon to carry out static test of solid fuel engine for small rocket

*The SSLV is being designed to have a carrying capacity of about 500kg targeting the small satellite launch market*

The Indian space agency is gearing up to test the solid fuel motor of its small rocket under development, said a senior official.

The official also said the space agency is planning to fly the small rocket -- Small Satellite Launch Vehicle (SSLV) -- before the end of this year itself with an Indian earth observation satellite.

The SSLV is being designed to have a carrying capacity of about 500kg targeting the small satellite launch market.

As a matter of fact, Indian Space Research Organisation (ISRO) is getting orders from foreign parties to launch small satellites.

The first static test of SSLV's solid fuel motor was unsuccessful as there were some issues with the engine's nozzle.

An official had earlier told IANS that the second test will be with the engine that was kept for the rocket. A new first stage engine for the rocket has to be built.

The other two stages/engines for the proposed SSLV have been tested earlier, an ISRO official had told IANS.

The 34 metre tall with a lift off mass of 120 ton, the SSLV is a three staged/engine rocket all powered by solid fuel.

Currently the Indian space agency loads the small satellites as piggyback luggage to its bigger satellite launched with its rocket -- Polar Satellite Launch Vehicle (PSLV).

The ISRO at times also gets orders to launch bigger satellites for which it uses one of the PSLV variants.

India presently has three fully operational rockets -- the four stage/engine PSLV and its variants and two GSLV variants -- GSLV-Mk II with a carrying capacity of 2.5 tonnes and GSLV-MkIII with a payload capacity of four ton.

The GSLV is a three stage/engine rocket. The core of the first stage is fired with solid fuel and the strap-on motors by liquid fuel. The second is the liquid fuel and the third is the cryogenic engine developed indigenously.

<https://www.zeebiz.com/technology/news-isro-soon-to-carry-out-static-test-of-solid-fuel-engine-for-small-rocket-163047>



The SSLV is being designed to have a carrying capacity of about 500kg targeting the small satellite launch market.

# Sensitive GSEM-based bionic airflow sensor developed

By Liu Jia

Prof. Chen Tao's team at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) developed a flexible and self-adaptive airflow sensor enabled by bioinspired thin-membrane, which is mediated by the reversible microspring effect. The study was published in *Advanced Functional Materials*.

Airflow sensors based on mechanical deformation mechanism have drawn increasing attention thanks to their excellent flexibility and sensitivity. However, fabricating highly sensitive and self-adaptive airflow sensors via facile and controllable methods remains a challenge.

Inspired by the bats' wing membrane which shows unique airflow sensing capacity, researchers at NIMTE prepared graphene/single-walled nanotubes (SWNTs)-Ecoflex membrane (GSEM), which can be arbitrarily transferred and subsequently adapt to diverse flat/bend and smooth/rough surface.

By virtue of the reversible microspring effect, researchers developed a highly sensitive and self-adaptive GSEM-based airflow sensor.

When airflow was applied, the microscale deformation of interlayer SWNTs led to significant variation of contact resistance, endowing the developed GSEM-based airflow sensor with superior properties including the ultralow airflow velocity detection limit ( $0.0176 \text{ m s}^{-1}$ ), fast response time ( $\sim 1.04 \text{ s}$ ) and recovery time ( $\sim 1.28 \text{ s}$ ).

As a proof of concept, the GSEM-based airflow sensor can be employed to realize noncontact manipulation. Via a threshold control, it was applied to a smart window system to successfully realize the intelligent open and close behaviors.

In addition, researchers designed an array of airflow sensors to differentiate the magnitude and spatial distribution of the applied airflow stimulus. Being integrated into a wireless vehicle model system, the GSEM-based airflow sensor can sensitively capture the flow velocity information to realize real-time manipulation of motion direction.

This microspring effect-based airflow sensing system shows great potential in the fields of wearable electronics and noncontact intelligent manipulation.

**More information:** Wei Zhou et al, Bionic Adaptive Thin-Membranes Sensory System Based on Microspring Effect for High-Sensitive Airflow Perception and Noncontact Manipulation, *Advanced Functional Materials* (2021). DOI: [10.1002/adfm.202105323](https://doi.org/10.1002/adfm.202105323)

**Journal information:** *Advanced Functional Materials*  
<https://phys.org/news/2021-08-sensitive-gsem-based-bionic-airflow-sensor.html>



Credit: Pixabay/CC0 Public Domain

## A new liquid crystal ink for 3D printing

Cholesteric liquid crystals, a man-made material with properties between liquids and solid crystals, can mimic the colors of butterfly wings. Liquid crystals are used in televisions and smartphones, but future applications for healthcare sensors or decorative lighting are difficult as the materials can't be used in advanced, rapid production methods like 3D printing. The materials are not viscous enough to make stable, solid structures, and it's difficult to align the molecules to produce specific colors. TU/e researchers have solved these issues by developing a new light-reflective liquid crystal ink that can be used with existing 3D printing techniques. The new research has been published in the journal *Advanced Materials*.

In nature, iridescent materials, which exhibit a color change when viewed from different angles, can be found in butterfly wings and in nacre (or mother of pearl) in the inner shell of mollusks.

A man-made version of these natural materials is cholesteric liquid crystal, which has already been used as "smart" materials in light reflectors, switchable windows, and tunable solar energy collectors.

For healthcare applications in soft wearable sensors or decorative lighting, cholesteric liquid crystals are ideally suited. Until now though, an easy way of producing these materials and making devices from these materials has been lacking.

Researchers from the department of Chemical Engineering and Chemistry at TU/e in collaboration with TNO, DSM, Brightlands Materials Center (in the DynAM consortium), and SABIC have created a nature-inspired liquid crystal elastomer-based ink that can be 3D printed on a surface via Direct-Ink-Writing (DIW). Lead author for the study is Ph.D. candidate Jeroen Sol, with Albert Schenning and Michael Debije from the Stimuli-responsive Functional Materials and Devices (SFD) group heading the research project.

"DIW is an extrusion-based 3D printing approach where an ink is dispensed from a small nozzle onto a surface on a layer-by-layer basis. Current cholesteric liquid crystal inks cannot be printed with DIW, so we created a liquid crystal ink compatible with DIW," says Sol.

The new liquid crystal ink has several key properties. First, the light reflective properties of the ink rely on the precise helical alignment of molecules throughout the material which requires fine tuning of the printing process. Second, the molecules in the ink can self-assemble into such structures that display colors similar to natural iridescent materials, like those in butterfly wings. Third, the new ink has greater viscosity than previous inks, which makes it suitable for DIW printing.

Finally, the new ink is novel, easy to make, easy to process, and based on materials previously developed by the SFD research group at TU/e for light-reflective coatings, which help make it suitable for 3D printing.

### Butterfly wings

"To successfully print the new ink with DIW, we varied parameters like print speed and temperature. And to get the ink to print properly, we also made an ink containing low-molecular weight liquid crystals," notes Sol. Rather impressively, the researchers were able to use the new ink to print synthetic butterfly wings!



Credit: Eindhoven University of Technology

Much to the surprise of the researchers though, they were also able to control the nanoscale molecular alignment very accurately by varying the print speed. This allowed the researchers to have greater control over the appearance and light reflecting properties of the material. "Traditionally, this level of control is only possible with very specialized fabrication devices, so to do this with the new ink and DIW 3D printing is a real breakthrough," says Sol.

### Future applications

Given that the new liquid crystal ink can be printed with DIW, it could be used in future printing procedures for personalized medical devices such as thin wearable biosensors that interact visually and colorfully with the wearer.

"What's more, the combination of our new ink and DIW can be used to print the specialized optical structures needed for augmented reality headsets where real-life and artificial images are seamlessly combined," says Sol excitedly. "The new materials could find their way into the HoloLenses of the future—now that would be something extraordinary!"

**More information:** Jeroen A. H. P. Sol et al, Anisotropic Iridescence and Polarization Patterns in a Direct Ink Written Chiral Photonic Polymer, *Advanced Materials* (2021). DOI: [10.1002/adma.202103309](https://doi.org/10.1002/adma.202103309)

**Journal information:** [Advanced Materials](https://phys.org/news/2021-08-liquid-crystal-ink-3d.html)  
<https://phys.org/news/2021-08-liquid-crystal-ink-3d.html>



Wed, 18 Aug 2021

## Boron quantum dots surpassing graphene with excellent thermal properties

In a new publication from *Opto-Electronic Advances*, researchers led by Professor Han Zhang from Shenzhen University, Shenzhen, China, consider whether boron quantum dots surpass the graphene in thermal properties.

The discovery of graphene in 2004 opened the door to the possibilities of two-dimensional materials. Various two-dimensional materials have been reported since, (black phosphorus, transition metal sulfides, topological insulators, MXene, etc.) but graphene is still widely studied due to its excellent optoelectronic properties. The thermal conductivity of pure single-layer graphene with few defects is as high as 5300 W/mK, which is the most potential thermal material known. As the properties of materials are closely related to their atomic structure it could be asked whether there are new materials with thermal properties exceeding that of graphene? Some researchers have used the non-equilibrium Greens function and the first-principles method to prove that the thermal conductivity of borophene can surpass that of graphene, implying that boron has high potential for thermal applications. Due to the difficulty of fabricating borophene, there have not been relevant experimental reports about the thermal properties to date. In this current article, Professor Han Zhang's research group describe the preparation of boron quantum dots, and indirectly proved the thermal properties of boron materials by combining thermo-optical switches. The results have been successfully applied to the fields of all-optical modulators and laser engineering. The authors' experiments prove that boron materials are promising for photothermal

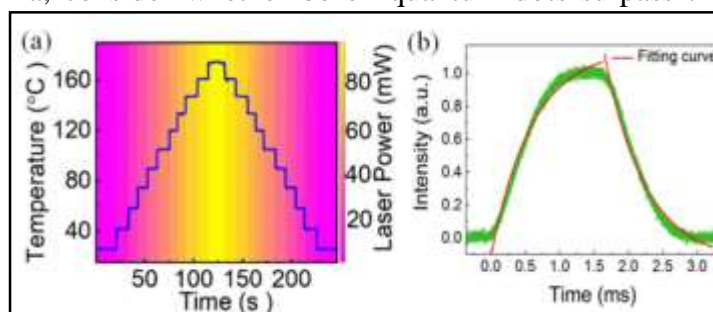


Figure 1. (a) The temperature of boron quantum dots with the increase of light power from 0 to 100 mW; (b) the response curve of the all-optical modulator. Credit: Compuscript Ltd

conversion and the thermal conducting applications exceed those of graphene. Further investigations of the thermal properties of borophene are planned by the research group.

Professor Han Zhang's research group proposes the preparation of boron quantum dot material by the liquid-phase exfoliation method. The high-resolution electron microscopy and atomic force microscopy were used to prove the successful preparation of boron quantum dots. The thermography was used to record and analyze the photothermal conversion characteristics and the stability of the boron quantum dots. Experimental results show that boron quantum dots have excellent thermal stability (Figure 1a). The response time of the all-optical modulator based on the thermo-optical effect is closely related to the heat generation and thermal diffusion. The authors used this method to indirectly compare the photothermal characteristics of the boron material with that of graphene and successfully realized the all-optical phase and intensity modulator. The rise and fall times of the all-optical modulator based on graphene are 9.1 ms and 3.2 ms, respectively. In the experiment described by this paper, the rise and fall times of the all-optical modulator based on boron quantum dots are 1.1 ms and 1.3 ms respectively (Figure 1b). This proves that the thermal properties of boron quantum dots are better than that of graphene, with more researches required to investigate further. By applying the constructed all-optical modulator to the laser resonator, the optically controlled Q-switched laser operation is realized. Compared with the application of acousto-optic modulator and electro-optic modulator in the laser field, this work shows excellent monochromaticity (0.04 nm) and controllable frequency, which has potential applications in nonlinear frequency conversion and all-optical communication fields.

**More information:** Cong Wang et al, Boron quantum dots all-optical modulator based on efficient photothermal effect, *Opto-Electronic Advances* (2021). DOI: [10.29026/oea.2021.200032](https://doi.org/10.29026/oea.2021.200032)  
<https://phys.org/news/2021-08-boron-quantum-dots-surpassing-graphene.html>

## COVID-19 Research News

ScienceDaily®

Wed, 18 Aug 2021

# New research provides clues to developing better intranasal vaccines for COVID-19 and flu

### Summary:

*While gut microbiota play a critical role in the induction of adaptive immune responses to influenza virus infection, the role of nasal bacteria in the induction of virus-specific adaptive immunity is less clear. New research explores the role of nasal bacteria and provides clues to developing better intranasal vaccines for flu and COVID-19.*

While gut microbiota play a critical role in the induction of adaptive immune responses to influenza virus infection, the role of nasal bacteria in the induction of virus-specific adaptive immunity is less clear. New research published this week in *mBio*, an open-access journal of the American Society for Microbiology, explores the role of nasal bacteria and provides clues to developing better intranasal vaccines for flu and COVID-19.

"Our study shows that both integrity and amounts of nasal bacteria may be critical for effective intranasal vaccine," said study principal investigator Takeshi Ichinohe, Ph.D., an associate professor in the Division of Viral Infection, Department of Infectious Disease Control, International Research Center for Infectious Diseases, Institute of Medical Science, the University of Tokyo, Minato-ku, Tokyo, Japan. "We showed that oral bacteria-combined intranasal vaccine protects from influenza virus and SARS-CoV-2 infection."



In the new study, to determine the effects of nasal bacteria in the induction of mucosal immune responses to influenza virus infection, Dr. Ichinohe and colleagues treated mice intranasally with an antibiotic cocktail to kill the nasal bacteria before influenza virus infection.

The researchers found that disruption of nasal bacteria by antibiotics before influenza virus infection enhanced the virus-specific antibody responses. "We found that intranasal application of antibiotics (to kill nasal bacteria) could release bacterial pathogen-associated molecular patterns (PAMP), which are bacterial components that stimulate innate immunity that act as mucosal adjuvants for influenza virus-specific antibodies response," said Dr. Ichinohe.

Innate immunity, which is not specific to a particular pathogen, is the first line of defense against non-self pathogens such as bacteria and virus. The main purpose of the innate immune response is to immediately prevent the spread and movement of foreign pathogens throughout the body. The innate immune responses play an essential role for inducing the pathogen-specific adaptive immune responses. Adjuvants are substances that increase or modulate the immune response to a vaccine and stimulate the innate immune system.

The researchers also found that while the upper respiratory tract contained commensal bacteria, relative amounts of culturable commensal bacteria in nasal mucosal surface were significantly lower than that in the oral cavity. The researchers tested whether intranasal supplementation of cultured oral bacteria enhances antibody responses to intranasally administered vaccine and found that oral bacteria combined with intranasal vaccine increased antibody responses to intranasally administered vaccine.

Dr. Ichinohe said the findings provide clues to developing better intranasal vaccines. "We wish to develop effective intranasal vaccines for influenza and COVID-19 in the near future," said Dr. Ichinohe.

**Journal Reference:**

1. Minami Nagai, Miyu Moriyama, Takeshi Ichinohe. **Oral Bacteria Combined with an Intranasal Vaccine Protect from Influenza A Virus and SARS-CoV-2 Infection.** *mBio*, 2021; DOI: [10.1128/mBio.01598-21](https://doi.org/10.1128/mBio.01598-21)  
<https://www.sciencedaily.com/releases/2021/08/210817084656.htm>



