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Press Information Bureau
Government of India

Ministry of Defence

Wed, 28 Sept 2021 3:49PM

Public-private partnership can bring defence production revolution: Raksha Mantri Shri Rajnath Singh at SIDM Annual meeting

Exhorts defence industry to 'Make in India and Make for the world' through increased collaboration

Government has created atmosphere of jointness to ensure Armed Forces' modernisation: RM

Key Highlights of RM's speech:

- ***Indian companies capable of manufacturing state-of-the-art hardware in cost-effective way***
- ***Government reforms aim to create long-term linkages with OEMs to meet global demands***
- ***Focus must be on emerging areas such as cyberspace & AI***
- ***Public-Private partnership crucial for 'Aatmanirbhar Bharat'***

Government has created an atmosphere of jointness to ensure modernisation of the Armed Forces in the rapidly evolving global security scenario. This was stated by Raksha Mantri Shri Rajnath Singh during his address at Society of Indian Defence Manufacturers (SIDM) Annual General Meeting in New Delhi on September 28, 2021. Shri Rajnath Singh said, countries around the world are now focusing on the modernisation of their militaries and the demand for military equipment is rapidly increasing due to emerging security concerns, border disputes and maritime dominance.

"India is capable of meeting these needs through a cost-effective and quality approach. By India, we mean public sector, private sector, academia, research & development. We believe in taking them all onboard together," said Shri Rajnath Singh.

The Raksha Mantri emphasised that the Indian defence industry is home to manufacturers who can create a perfect blend of state-of-the-art, high quality and cost-effective hardware which will not only bolster national security but make India a net defence exporter. He reiterated the Government's resolve of 'Make in India' and 'Make for the world' through past learnings, present works, with focus on empowering the future.

Underlining the importance of indigenisation, Shri Rajnath Singh listed out a number of reforms undertaken by the Government to encourage the participation of private sector and achieve 'Aatmanirbhar Bharat' envisioned by Prime Minister Shri Narendra Modi. The Reforms include earmarking 64.09 per cent of the total Capital Acquisition Budget for 2021-22 for domestic capital procurement and 15 per cent of capital procurement budget for direct procurement from private industry; setting up of Defence Industrial Corridors in Uttar Pradesh & Tamil Nadu; introduction of Innovation for Defence Excellence (iDEX); free Transfer of Technology (ToT) through Defence

Research & Development Organisation (DRDO) and increase in FDI in defence up to 74 per cent through automatic route & up to 100% through government route.

The Raksha Mantri added that the Government is providing a suitable growth environment to the private sector. “We have opened up opportunities to build a Mega Defence Programme, including fighter aircraft, helicopters, tanks and submarines through a strategic partnership model that will help our private companies become global giants in the years to come. The recent contract of 56 transport aircraft for Indian Air Force is one such example,” he said. Shri Rajnath Singh stated that due to these steps, defence exports have crossed Rs 38,000 crore mark in the last seven years; more than 10,000 Small and Medium Enterprises (SMEs) have joined the defence sector and there has been an increase in research & development, start-ups, innovation and employment.

Shri Rajnath Singh appreciated the suggestions of the private sector that have been incorporated in various policy reforms, including 'Defence Acquisition Procedure (DAP) 2020, draft Defence Production and Export Promotion Policy (DPEPP 2020), draft Defence Procurement Manual (DPM) 2021 and the two Positive Indigenisation lists. These reforms will not only meet the requirements of our private industry, but also create sustainable and long-term linkages with foreign original equipment manufacturers (OEMs) to meet global demands, he said. The Raksha Mantri assured all possible support of the Government to the industry to achieve this shared vision.

Terming sustainability as an integral part of self-reliance, the Raksha Mantri urged the industry to also focus on emerging areas such as cyberspace & Artificial Intelligence by investing in R&D, developing new technologies & products and taking advantage of government’s policies. He called upon the private players to utilise the country’s talent to achieve this objective.

Saying that the concept of ‘Make in India and Make for the World’ has been a part of Indian civilisational ethos, Shri Rajnath Singh exhorted the industry to keep moving forward and help the Government realise its vision of making India a global manufacturing hub. He expressed confidence that like the White Revolution & Green Revolution, this public-private partnership will be mentioned as Defence Production Revolution in the annals of Indian defence in the times to come.

Appreciating the fact that the number of SIDM members is about to reach 500, Shri Rajnath Singh said the growing popularity of SIDM also reflects the growth of the country’s defence industry. On the setting up of the first SIDM state office in Lucknow & the signing of agreement with the Uttar Pradesh Expressway Industrial Development Authority to promote investments in the UP Defence Industrial Corridor, he stated that these initiatives indicate the quality of vision & approach of SIDM which is essential to achieve the goal of self-reliance.

The Raksha Mantri gave away SIDM Champion Awards in four categories, namely Technology Product Innovation to address defence capability gaps; Import Substitution; creation of niche technological capability for design, manufacturing & testing and export performance of aerospace and defence sector. Congratulating the winners and participants, Shri Rajnath Singh said such efforts are playing an important role in realising ‘Aatmanirbharta’ in defence manufacturing. He exuded confidence that these awards will not only contribute in the design & development of defence equipment, but also assist in achieving the $5 billion defence export target by 2025 set by the Government.

President of SIDM Shri Jayant D Patil, former SIDM President Shri Baba Kalyani and captains of industry were among those present on the occasion.

https://pib.gov.in/PressReleasePage.aspx?PRID=1758934

The Indian EXPRESS

Wed, 29 Sept 2021

Explained: What are the two advanced versions of Akash missile?

The development of the Akash SAM was started by the DRDO in the late 1980s as part of the Integrated Guided Missile Development Programme. The initial systems trials and field trials along with the target neutralisation trials were conducted in the late 1990s and 2000s

By Sushant Kulkarni

Pune: The Defence Research and Development Organisation (DRDO) Monday conducted the maiden flight test of the new version of Akash Missile — Akash Prime. This comes months after the maiden test of another Akash version, Akash-NG (New Generation), in January. What's different in these newer versions of the surface to air missile (SAM) and what is their operational significance?

The maiden flight test of the Akash Prime was conducted on Monday. (Photo credit: PIB)

The Akash missile

The development of the Akash SAM was started by the DRDO in the late 1980s as part of the Integrated Guided Missile Development Programme. The initial systems trials and field trials along with the target neutralisation trials were conducted in the late 1990s and 2000s. These were followed by extensive user trials by the Indian Air Force and Indian Army.

Named after the original Sanskrit term for sky or space, Akash is primarily a Short Range Surface to Air Missile built to provide air defence cover to the vulnerable areas. The Akash weapon system can simultaneously engage multiple targets in group mode or autonomous mode. It has built-in Electronic Counter-Counter Measures (ECCM) features, which means that it has mechanisms on-board that can counter the electronic systems that deceive the detection systems.

The entire weapon system has been configured on a mobile platform. A full Akash missile system comprises a launcher, set of missiles, a control centre, an built-in mission guidance system and a C4I (command, control communication and intelligence) centres and supporting ground equipment along with a radar named Rajendra which accompanies each of the missile batteries.

Following the induction of the earlier version of Akash in the 2010s, the Indian Air Force and Indian Army currently operate multiple squadrons and groups of the missile respectively, with some more in the pipeline. According to the Ministry of Defence, the Akash Missile system is 96 per cent indigenised, one of the highest proportions of the indigenisation. In December 2020, the cabinet approved the Akash missile for exports after many friendly foreign countries showed interest in it during various international exhibitions.

The advanced versions of Akash — Akash Prime and Akash NG

The initial version of the Akash has an operational range of 27-30 km and a flight altitude of around 18 km. The Akash Prime, which underwent its maiden flight test on Monday from Integrated Test Range (ITR), Chandipur, Odisha, has the same range as that of the earlier version but has a crucial new addition — that of an indigenous active Radio Frequency (RF) seeker for improved accuracy to hit aerial targets. Other improvements in the system ensures more reliable performance under low temperature environments at higher altitudes. These new additions have been made after receiving feedback from the IAF and the Army for deployment of the system to provide air defence cover for vital installations and sensitive areas in high-altitude regions.

Earlier this year, on January 25, the DRDO conducted the successful maiden launch of Akash-NG or New Generation Missile from ITR. Akash-NG is a new generation SAM, primarily

designed for the IAF with an aim of intercepting high maneuvering aerial threats that have low Radar Cross Section (RCS), which is the electromagnetic signature of the object. Along with the increased lethality of striking threats with significantly small electromagnetic signature, the NG version has an extended range of up 70 km, is sleeker, lighter and has much smaller ground system footprint. The RF seeker of the NG version operates in the Microwave Ku-band, the missile has a propulsion system of solid-fueled dual-pulse motor. In July DRDO conducted two back-to-back trials of the Akash NG system, one with the RF seeker and one without it.

As an additional feature, Akash NG is canisterised, which means that it is stored and operated from specially designed compartments. In the canister, the inside environment is controlled thus along with making its transport and storage easier, the shelf life of weapons also improves significantly. The beginning of the development of Akash Prime and Akash-NG coincides with the time when the earlier version was being inducted in the IAF and Army in the mid-2010s

The operational significance of the new versions

A senior DRDO scientist said, "The earlier version of the Akash system did the important job of reducing the dependence on old air defence systems of Russian origin. The already inducted units of the Akash missile system now provide a robust air defence cover to vital installations of the defence forces. However, the nature of threats keeps evolving with time, and newer versions of the weapon systems have to be developed. The nature of the threats from the sky is such that they have to be responded to very fast and the task becomes technologically more complex when the threats are becoming less and less visible on the radar. Newer versions of the RF seekers, more robust computing and networking systems and command-control mechanisms are incorporated in these newer versions."

The scientist added, "With advancement in material sciences, engineering techniques and better availability of components within India, the development cycles of the missiles have become significantly shorter than before."

The Akash NG and Prime versions are slated to undergo extensive field and user trials before they are up for induction into armed forces. The Akash missiles have been developed by DRDO's Defence Research and Development Laboratory (DRDL), Hyderabad under the Missiles and Strategic Systems (MSS), in collaboration with several other DRDO facilities in the country along with industry partners.

In a note on indigenous defence projects of the DRDO, the Ministry of Defence had said in 2018, "As a result of successful development production and induction of AKASH missiles system, Rs.34,500 crore foreign exchange could be saved by existing production order…"

https://indianexpress.com/article/explained/explained-two-advanced-versions-of-akash-missile-7539643/

Wed, 29 Sept 2021

Everything you need to know about Akash Prime - The latest range of missile in India's arsenal

By Bobins Abraham

Highlights

- ***In its maiden flight test, the Akash Prime missile intercepted and destroyed an unmanned aerial target mimicking an enemy aircraft.***
- ***Akash Prime missile improves on the capabilities of the existing Akash range.***
- ***DRDO Chairman G Satheesh Reddy said Akash Prime system will further boost the confidence of the Indian Army and Indian Air Force***

India on Monday successfully test-fired a new version of the Akash missile. The new range - named Akash Prime was tested from the integrated test range at Chandipur in Odisha.

In its maiden flight test, the Akash Prime missile intercepted and destroyed an unmanned aerial target mimicking an enemy aircraft.

The range stations of ITR comprising Radars, Electro Optical Tracking System (EOTS) and Telemetry stations monitored the missile trajectory and flight parameters.

According to the Defence Research and Development Organisation (DRDO), the Akash Prime missile improves on the capabilities of the existing Akash range. The modified ground system of the existing Akash weapon system was for the flight test.

"In comparison to the existing Akash system, Akash Prime is equipped with an indigenous active RF seeker for improved accuracy. Other improvements also ensure more reliable performance under a low-temperature environment at higher altitudes," a DRDO official told PTI.

Surface-to-air missile

The medium-range mobile surface-to-air missile (SAM) system developed by the DRDO and produced by Bharat Dynamics Limited (BDL) will replace the Russian 2K12 Kub (SA-6 Gainful) missile system, currently in service.

DRDO Chairman G Satheesh Reddy said Akash Prime system will further boost the confidence of the Indian Army and Indian Air Force as the Akash system is already inducted and now getting improved with more lethal missiles.

The Indian Air Force has already deployed Akash at its bases in Gwalior, Jalpaiguri (Hasimara AFS), Tezpur, Jorhat and Pune.

Indian Army had deployed Akash air defence system along Line of Actual Control in Ladakh as tension rose between India and China 2020 China–India skirmishes.

India is self reliant

Last week Reddy had said that India has achieved "complete self-reliance" in missile technology and the most advanced missiles can now be developed in the country.

He mentioned the five missiles -- Prithvi, Agni, Akash, Trishul Nag -- developed by India under the Integrated Guided Missile Development Programme (IGMDP).

"We developed, Prithvi, Agni, Akash, Trishul, Nag under the IGMDP. Agni was also a technology demonstrator for the country in going out of the atmosphere and returning to the atmosphere.

"And, then we joined a select club of countries with ballistic missiles which can intercept an enemy missile and kill it. And, then many more missiles with long-range and more capabilities," he said.

"Today I can confidently say that we are having complete 'Atmanirbharta' in the missile technology, and we can develop the most advanced missiles in the country," Reddy said.

In March this year, the DRDO had test fired the Solid Fuel Ducted Ramjet (SFDR) technology which will give a technological advantage in developing long-range air-to-air missiles.

DRDO had started the development of the SFDR technology in 2013 and it was first tested in 2018.

Akash is one of the best and most cost-effective missiles in its class globally. It is estimated to cost under Rs 2 crore which is less than half the cost of similar Western missiles which usually cost between Rs 5-6 crore. It is expected that this cost will further decrease due to the economies of scale achieved as production ramps up.

Variants of Akash

Currently, there are three Variants of Akash - Akash 1S, Akash Prime and Akash NG.

The Akash NG which stands for Akash - New generation was approved in September 2016 with a funding of Rs 470 crore to succeed Akash and Akash-1S with improved capabilities. Akash-NG will have an improved reaction time and higher level of protection against saturation attacks.

The second stage uses dual-pulse solid rocket motor which is lighter instead of air-breathing solid ramjet engine to increase the overall range from current 40 km to greater than 80 km, an active electronically scanned array Multi-Function Radar (MFR) and optical proximity fuze.

https://www.indiatimes.com/explainers/news/everything-you-need-to-know-about-akash-prime-550437.html

FINANCIAL EXPRESS
Read to Lead

Wed, 29 Sept 2021

Atmanirbhar Bharat in Defence: BrahMos gets airframe assemblies from Godrej Aerospace

BrahMos missile is a joint Indo-Russian joint venture being made in India and has a large number of Indian components

BrahMos Aerospace Pvt Ltd (BAPL) takes delivery of the 200th set of stealth universal supersonic cruise missile airframe assemblies from Godrej Aerospace. Each of these airframes which are to be used in the BrahMos missile is made up of 138 complicated sub-assemblies that are manufactured from more than 1500 parts. BrahMos missile is a joint Indo-Russian joint venture being made in India and has a large number of Indian components. With more indigenous components in these supersonic missiles, this will help in strengthening the country's security through self-reliance.

Brahmos missile has the capability to be launched from ships, submarines, land based platforms and aircraft.

The missile airframe assemblies were handed over virtually in the presence of the mentors and leaders from Godrej & Boyce, BrahMos Aerospace Pvt. Ltd, Missile Systems Quality Assurance Agency (MSQAA) and Defence Research & Development Laboratory (DRDL) a lab under DRDO.

About BrahMos

This missile has the capability to be launched from ships, submarines, land based platforms and aircraft.

The supersonic cruise missile can be used for a precision strike to destroy targets both on land and sea.

Godrej Aerospace in just three and a half years has achieved the remarkable feat of manufacturing 100 complex airframes.

In an official statement issued by the Godrej & Boyce, Anil Verma, Executive Director & President, Godrej & Boyce credited contribution by the team which had officers from BrahMos, Godrej Aerospace team, scientists from DRDL, and representatives from MSQAA.

He also assured full support to BrahMos, DRDO and MSQAA and plans to upscale the production in an attempt to reach more milestones in the future.

Adding, "The roots of Godrej & Boyce are based on self-reliance."

Dr Sudhir Mishra, Distinguished Scientist & Director General (BrahMos), CEO & MD BrahMos Aerospace said, during the handing over ceremony acknowledged the milestone in manufacturing advanced missiles. He also encouraged Godrej to channelize its focus on design & development.

Godrej is one of the major partners of the BrahMos Industry Consortium and today's milestone is indicative of the Make-in-India narrative. The company has been associated with this programme since 2001 and has been contributing in manufacturing most of the metallic sub-systems, supply control surfaces and nose caps. One of its business arms Godrej Precision Engineering, according to the company official statement supplies the Mobile Autonomous Launchers, and Missile Replenishing Vehicles which are used for the land launched versions.

https://www.financialexpress.com/defence/atmanirbhar-bharat-in-defence-brahmos-gets-airframe-assemblies-from-godrej-aerospace/2339605/

The EurAsian Times

Wed, 29 Sept 2021

India successfully tests Akash Prime Missile; Experts say Pakistan has a 'very similar' missile deployed along the LOC

By Aritra Banerjee

India's Defence Research and Development Organisation (DRDO) successfully tested the Akash Prime, an upgraded variant of the existing Akash surface-to air-missile (SAM).

The Prime missile was flight tested at the Integrated Test Range (ITR) located in Chandipur, Odisha on September 28. An unmanned aerial target acted as a surrogate for incoming hostile aircraft which was intercepted and neutralized by the missile.

The Akash Prime being test-fired from ITR in Odisha's Chandipur on September 27, 2021. (via DRDO)

The Akash is a medium-range SAM, which underwent its first flight test in 1990. The missile is reportedly capable of eliminating a host of airborne threats ranging from enemy cruise missiles, air-to-air missiles, ballistic missiles, and fighter jets at ranges as far as 80 kilometers and at altitudes of up to 18,000 meters and can be fired from a tank or a wheeled truck.

The new variant of the Akash missile has been produced by Bharat Dynamics Limited (BDL) and comes equipped with indigenous radio frequency (RF) seekers. This allows the missile to operate with greater accuracy.

The missile's trajectory was monitored by ITR's range stations comprising radars, electro-optical tracking system, and telemetry stations.

Akash Prime – Eye On China?

The latest improvements will ensure Akash Prime performs more reliably in "low-temperature environments at higher altitudes", according to a Defence Ministry statement.

This would bolster India's air defense measures along the Himalayan border in Ladakh where the Indian Army has been locked in a protracted standoff with the Chinese PLA.

DRDO spokesperson Dr. Narendra Kumar Arya did not respond to requests for comment on this development. However, information available in the public domain indicates that the Akash Prime system will be used by the Indian Army and Air Force (IAF), both of whom operate the existing Akash variant.

The Akash is part of the IAF's inventory at its bases in Gwalior (Maharajpur Airforce Station), Jalpaiguri (Hasimara AFS), Tezpur, Jorhat, and Pune (Lohegaon AFS). The Indian Army has deployed the Akash air defense system along the Line of Actual Control (LAC) in Ladakh following the 2020 Galwan Valley clashes.

The Akash SAM was an indigenous solution to replace the Russian 2K12 Kub (SA-6 Gainful) missile system. Like its predecessor, the Akash leverages an integrated ramjet-rocket propulsion system, which provides sustained thrust for the missile throughout its flight until interception after initial rocket motor burnout.

Indian Army veteran, Major General VK Madhok (Retd), offered his take, "The addition of the Akash Prime, which is an upgraded variant of the existing Akash SAM to the inventory of Indian Army and IAF will surely bolster the air defense capability of our sensitive borders, especially along LAC and LOC and other enemy targets like our critical and vulnerable air bases."

Dr. S Guruprasad, a former DRDO Director-General (Production Coordination and Services Interaction), told The EurAsian Times, "The new Akash missile is a significant jump in performance parameters. DRDO has mastered the use of matured technologies in the missile programs.

"Akash uses the standard solid rocket motor booster technology mastered my DRDO over many missile projects. The original Akash was using a solid ramjet booster. The real improvement is the use of indigenous RF seekers. The earlier Akash was command-guided; now this one uses RF seeker probably during the terminal phase.

"Now, we have a state-of-the-art air defense missile that would have huge export potential. One thing is absolutely sure — Indian Air Force will be extremely happy and induction is going to start quickly."

Akash-Prime Vs Chinese & Pak SAMs

Any comparison between SAM systems in use by India, China, and Pakistan is purely hypothetical as they have not been battle-tested. Furthermore, air combat and engagements from the ground are not a simplistic affair and therefore, cannot be assessed purely on the basis of weapons capabilities.

Nevertheless, Philippines-based military weapons analyst, Miguel Miranda says — "The Akash is very similar to the Chinese LY-80 SAM. Both are medium range. Guess what? Pakistan has the LY-80. The truth is the military technology and equipment of both India and China are nearly the same…except India is lagging behind due to a broken procurement system."

Pakistan has begun making course corrections in its air defense gap by procuring new medium-range SAMs from China. This move marks a significant shift given that Pakistan used to buy weapons from the US earlier.

The induction of the LY-80, designated as the HQ-16 by the People's Liberation Army (PLA), may prove to be a concern for New Delhi.

Small batches of the *"*Chinese origin*"* air defense system were procured between 2013 and 2016 and received by 2017. The Pakistan military's PR wing, the Inter-Services Public Relations (ISPR), described the induction as a "godsend".

The chief of ISPR stated that the LY-80 will be Pakistan's most potent weapons platform for "intercepting multiple targets including fighter aircraft, cruise missiles, air to ground missiles, anti-radiation missiles, UAVs and armed helicopters at long ranges." The ISPR described the LY-80 as the perfect countermeasure to India's air superiority.

On the other hand, Indian media claimed the LY-80 missiles that Pakistan acquired from China are not working and a team from the manufacturers were in Pakistan to repair them.

The Chinese technical team is going to be in the places where the LY-80 Lomads are placed, including Lahore, Bhawalpur, and Gujranwala for 2-3 months to bring them back to working order, the report claimed.

And yet, Islamabad has little choice but to continue with Chinese weapons — the acquisition of 6 more LY-80 systems is on the anvil. There are only a few countries that will sell high-end weapons like fighter aircraft or tanks to Pakistan, the Indian report said.

https://eurasiantimes.com/india-successfully-tests-akash-prime-missile-experts-say-pakistan-has-a-very-similar-missile-deployed-along-the-loc/

COVID 19: DRDO's Contribution

Wed, 29 Sept 2021

India: Jalalabad Civil Hospital now self-sufficient with oxygen plant installation

By Molly Burgess

A new medical oxygen plant has been installed at Jalalabad Civil Hospital in India to strengthen the country's healthcare infrastructure against a potential third wave of coronavirus (Covid-19).

Making the hospital self-sufficient in supporting 195 beds with oxygen, the plant has capacity to generate 57.6 cubic meters per hour, 960 litres per minute, of the life saving gas.

Utilising pressure swing absorption (PSA) technology developed by India's Defence Research and Development Organisation (DRDO); the new capacity ensures oxygen purity of 93±3%.

The plant was integrated through India's HDFC Bank, under its flagship CSR programme Parivartan.

Commenting on the development, Vivek Dhoda, Circle Head – Bathinda at HDFC Bank, said, HDFC Bank is with the nation in fighting Covid-19 and supporting frontline workers."

"The bank is conscious about the hardships people are going through during this pandemic. We have extended every possible help under our flagship CSR programme Parivartan."

"Apart from providing scholarships to students impacted by Covid, and training youth, farmers and women in different vocations, the bank is proud to strengthen the state's preparedness for a possible third wave."

https://www.gasworld.com/india-jalalabad-civil-hospital-now-self-sufficient-with-oxygen-plant-installation/2021831.article

DRDO on Twitter

Defence News

Defence Strategic: National/International

THE HINDU

Wed, 29 Sept 2021

Will try and finish any acquisition in two years: Defence Ministry

As long as there is no research and development involved, says official

By Dinakar Peri

New Delhi: The Ministry of Defence (MoD) will try and complete acquisition of any defence equipment in two years, from the current average of 3.5 years, as long as there is no research and development involved, Additional Secretary and Director General Acquisition in the Ministry V.L. Kantha Rao said on Tuesday.

Officials during signing of an contract between Ministry of Defence, Airbus Defence, & Spain for acquisition of 56 C-295MW transport aircraft for IAF, in New Delhi on September 24, 2021. | Photo Credit: PTI

"Our average is about 3.5 years and to bring it to two years takes a lot of changes in the procedures," Mr. Rao noted at the Annual Session of the Society of Indian Defence Manufacturers. For this, time lines for various steps like Acceptance of Necessity (AoN), trial methodology and benchmarking of price of equipment were being advanced.

On the AoN, he remarked that if the process did not move forward within 12 months after an in-principle approval, it would be withdrawn. "We will also work on Request For Proposal (RFP) even before the in-principle approval."

Stressing on cutting down time in cost negotiations before the final deal is reached, he stated, "We will do beach marking of cost well in advance to save on time when bids are opened."

Domestic procurement

Secretary Defence Production Raj Kumar talked of the push for domestic procurement, saying that in the last five years, about 35-45% of the contracts were from domestic sources and the rest through imports. Of the total number of contracts under execution now by value, ₹1.9 lakh crore worth were from domestic sources, while contracts worth ₹1.85 lakh crore were through imports, he pointed out.

Of all the AoN cases under progress, ₹5.7 lakh crore were from domestic players, while ₹2.11 crore worth projects were under the import route, he highlighted. On the issues impacting indigenisation in defence, he observed that they were not able to give a clear procurement priority signal to the industry.

Mr. Rao emphasised that given the urgency in deals, there wasn't time given to domestic production capability. "Other means of procurement like Inter-Governmental Agreements (IGA), follow-on orders and optional clause enhance the risk to development of domestic capabilities," he added.

Rajnath on reforms

Addressing the event, Defence Minster Rajnath Singh outlined the reforms undertaken to promote domestic manufacturing and reduce imports that include earmarking 64.09% of the total Capital Acquisition Budget for 2021-22 for domestic capital procurement and 15% of capital procurement budget for direct procurement from the private sector.

Due to various steps, defence exports have crossed the ₹38,000 crore mark in the last seven years. The draft Defence Export Promotion Policy was under discussion to further boost exports, he added.

https://www.thehindu.com/news/national/will-try-and-finish-any-acquisition-in-two-years-defence-ministry/article36717931.ece

THE FREE PRESS JOURNAL SINCE 1928

Wed, 29 Sept 2021

Atmanirbhar Bharat: BHEL awarded order for upgraded Super Rapid Gun Mount of Frontline Ships system

New Delhi: In a major boost to Defence Production under the 'Make in India' initiative and towards achieving self-reliance in the critical field of Defence equipment, Goa Shipyard has placed a maiden order on Bharat Heavy Electricals Limited (BHEL) for supply of an upgraded Super Rapid Gun Mount (SRGM), the Main gun onboard most Warships of the Indian Navy.

The order envisages supply, installation and commissioning of the entire system – Upgraded SRGM and accessories for Triput Class Frigates of the Indian Navy, which will be manufactured by the Haridwar unit of BHEL.

The upgraded SRGM is a state-of-the-art weapon system having additional features such as capability to manage different types of ammunition to engage fast, manoeuvring and non-manoeuvring, radio controlled targets. The upgraded SRGM has the capability to fire advanced Ammunition with higher range and programmable ammunition.

BHEL has been a reliable supplier of critical equipment and services in the Defence and Aerospace sector for over three decades with the aim of making a major contribution towards self-reliance in these sectors.

Towards this, BHEL has established dedicated, intricate manufacturing and inspection facilities at its manufacturing plants, for production, installation & commissioning and lifecycle support of various products and components. The initiatives taken by BHEL will be a driving force towards the AatmaNirbhar Bharat Abhiyan of the Government of India.

https://www.freepressjournal.in/business/atmanirbhar-bharat-bhel-awarded-order-for-upgraded-super-rapid-gun-mount-of-frontline-ships-system

NEWS 18

Wed, 29 Sept 2021

India buys 4 Israeli Herons, to upgrade them with missiles as Army, IAF, Navy ramp up drone inventory

The Heron drones will initially be used in surveillance missions, and later upgraded under Project Cheetah when it kicks off. Several such procurement processes are underway across the three services

By Amrita Nayak Dutta, Edited By Nitya Thirumalai

New Delhi: India has finalised the deal to buy four new Heron TP drones from Israel that will initially be used in surveillance and reconnaissance missions, but will eventually be upgraded and armed with missiles for precision strikes under Project Cheetah when it kicks off, News18.com has learnt.

The Heron TP drone. (Photo from iai.co.il)

Defence sources said a contract to this effect has been signed and that the drones should arrive by the end of this year. Sources added that while the initial plan was to lease the four drones from Israel, India later decided to buy them instead.

When Project Cheetah is finalised, the Medium Altitude Long Endurance (MALE) Heron TP UAVs in the inventory of the Army, Navy and the Indian Air Force (IAF) will not just be upgraded with advanced satellite communication and sensors for longer surveillance and reconnaissance missions, but are also likely to be armed with air-to-ground missiles and laser-guided munitions for precision strikes.

Some of the upgraded Heron TP UAVs will have a loitering time of nearly 24 hours and a communication range of 1,000 km.

India has also been looking to buy 30 MQ-9B High Altitude Long Endurance (HALE) armed drones from the US, 10 for each of the defence services, costing a total of $3 billion.

Last week, Prime Minister Narendra Modi met General Atomics CEO Vivek Lall whose company manufactures the armed Predator drones. Sources say there will be further discussions with the United States on the transfer of technology aspect before the deal is sealed.

The Navy, meanwhile, has already leased two MQ-9B Sea Guardian drones from General Atomics for surveillance in the Indian Ocean.

India Going for Wide Range of Drones

The developments come at a time when the Indian military has been working to ramp up its drone inventory, with the three services procuring different categories of unarmed drones with varying classifications, as well as counter-drone systems.

For instance, the Army alone is procuring hundreds of unarmed drones across various categories for surveillance purposes, most of them from indigenous firms.

Multiple micro and mini UAVs are being indigenously procured, including 200 swarm drones, from two Indian firms — Raphe mPhibr and New Space Technologies. The former is also providing Logistics Drones, which can ferry 20 kg load for 10 km one way to high-altitude areas, defence sources said.

Earlier this month, the Army had also signed a contract to procure over 100 explosives-carrying drones ‘SkyStriker’ to be manufactured by a Bengaluru-based joint venture between Israel’s Elbit System and India’s Alpha Design.

Also known as loitering munitions, the drones, which hit the spotlight when used by Azerbaijan against Armenia last year leading to the latter's defeat over Nagorno-Karabakh, can detect a target and explode there.

The Army had, earlier this year, inked $20-million contract deal with ideaForge to procure SWITCH UAVs for surveillance operations in high-altitude areas.

As per defence sources, the Navy is also planning to procure about a dozen ship-launched drones from an indigenous firm, while the IAF is also in the process of procuring swarm drones.

"Over 500 drones are being procured by the three services from emergency procurement funds alone," a defence source told News18.com. Out of these, over 300 drones will be procured by the Army alone.

Different commands of the defence forces are also in the process of procuring micro drones using local funds which can be used for limited surveillance missions. For instance, the Northern Command of the Army has published a Request for Information for UAVs which can carry out surveillance.

Counter-Drone Systems Also on the List

As part of its emergency procurements, the Army is also buying around 100 man portable counter-drone systems and Integrated Drone Detection and Interdiction System from indigenous firms. The force has also procured counter-drone systems from Bengaluru-based Defsys Solutions.

As per the defence ministry, the Navy has signed a contract with Bharat Electronics Limited (BEL) to procure an indigenous comprehensive Naval Anti-Drone System (NADS) with hard kill and soft kill features.

The IAF has also placed a Rs 155-crore order with Hyderabad-based firm Zen Technologies for supply of anti-drone systems.

https://www.news18.com/news/india/india-buys-4-israeli-herons-to-upgrade-them-with-missiles-as-army-iaf-navy-ramp-up-drone-inventory-4255400.html

The EurAsian Times

Wed, 29 Sept 2021

P-8 Poseidon: Indian Navy bets big on Boeing's Maritime Recon Aircraft to puncture China's swelling military

By Nitu J Ticku

Boeing has won a US Navy contract to build five new Poseidon P-8A maritime reconnaissance aircraft for Germany, the Defense Department said.

Boeing P-8 Poseidon – Wikipedia

"The Boeing Company [in] Seattle, Washington, is awarded a $756,634,580… modification to a previously awarded contract… for the production and delivery of five Lot 12 P-8A aircraft for the government of Germany," the Defense Department said in a press release on Monday.

Almost all the work on the contract – more than 98.1% – will be performed in Seattle in the US state of Washington and work is expected to be completed in February of 2025, the release said.

The P-8 Poseidon operates as an anti-submarine and anti-surface aircraft and is also utilized in shipping interdiction roles. The aircraft is armed with torpedoes, Harpoon anti-ship missiles and other weapons and can operate with unmanned aerial vehicles, or drones.

The P-8 is already operated by the US Navy, the Indian Navy, the Royal Australian Navy and the UK Royal Air Force.

P-8 Poseidon – A Lethal Aircraft

Earlier in July, India took delivery of the tenth P-8 aircraft, increasing the country's anti-submarine warfare capabilities. "This is the second aircraft to be delivered under an option contract for four additional aircraft that the Indian Ministry of Defense awarded in 2016," Boeing said in a press release.

Boeing supports India's growing P-8I fleet by providing training of Indian Navy flight crews, spare parts, ground support equipment and field service representative support, the release said.

The support includes the construction of a training and maintenance center for Indian Navy crews, now nearing completion, to provide ground-based instruction as additional surveillance aircraft becomes available, the release added.

The P-8 is developed for long-range anti-submarine warfare, anti-surface warfare, and intelligence, surveillance and reconnaissance missions. It has a range of about 2,200 km and flies at a maximum speed of 490 knots, or 789 km per hour.

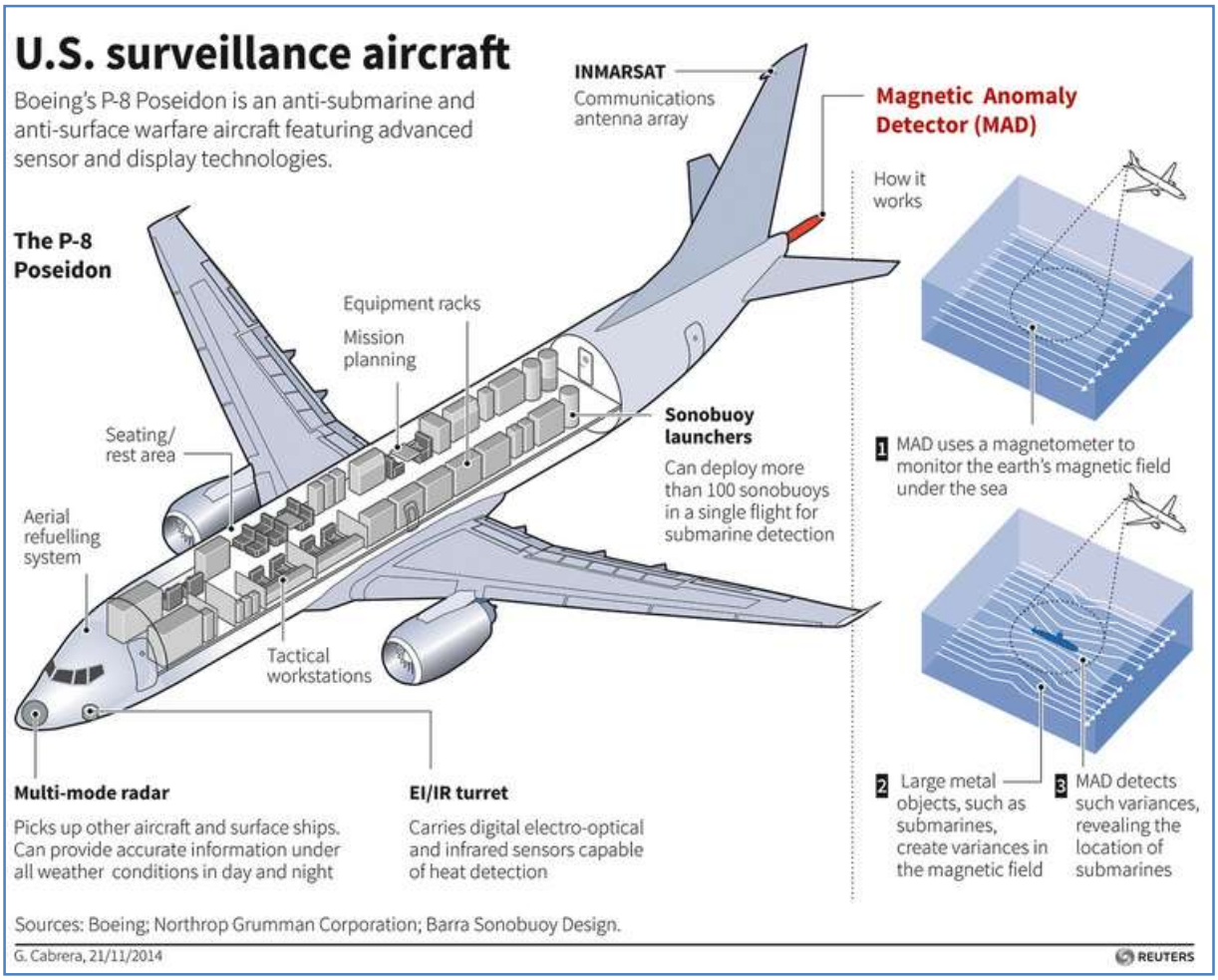
A number of key systems on the P-8I are designed to track immersed submarines. A rotary launcher system in the rear of the P-8I can dispense sonar buoys into the water. A recent upgrade allows P-8s to employ new Multistatic Active Coherent buoys that generate multiple sonar pulses over time, allowing for greater endurance and search range.

The P-8 also has its own acoustic sensor and even a new hydrocarbon sensor that can "sniff" for fuel vapor from submarines. The Poseidon can carry five missiles, depth charges or torpedoes in a rotary launcher in the rear hull, and six more on underwing racks.

The P-8 can use a special High Altitude Air Launch Accessory to transform its Mark 54 324-millimeter lightweight torpedoes into GPS-guided glide bombs that can be dropped from altitudes as high as thirty thousand feet.

With China acquiring a string of ports in Myanmar, Iran, Sri Lanka and Djibouti, the Indian Navy remains on high alert. According to experts speaking with the EurAsian Times, Beijing is

striving to choke the Indian Navy in the Indian Ocean region (IOR), an area which New Delhi considers its backyard.



However, in the face of military belligerence by China, India has not backed down. Instead, it has intensified maritime drills with Japan, the US and is planning to do the same with Australia. The addition of the P-8 is a big boost to India's long-range anti-submarine, reconnaissance, surveillance and electronic jamming capabilities in the IOR.

The P-8 has 6 external hardpoints and 5 internal weapons bays which can carry a load of both AGM-84 Harpoon missile (and its variants), Mk-54 Torpedoes, depth charges, mines, and the latest HAAWC (which stands for High Altitude Anti-Submarine Warfare Weapon Capability, is an add-on kit for the Mk-54 torpedoes to enhance their range while firing from high altitude).

The U.S. Navy's P-8As have been one of the most vital platforms to deter China. Designed particularly for maritime security purposes and armed to the teeth, this aircraft is proficient in deterring and destroying any Naval aggression or misadventure.

However, the P-8 is not just restricted to Oceans, it can also carry out missions in the border regions with China and Pakistan. Indian Navy had deployed the P-8I Neptune in Ladakh as a surveillance platform during the confrontation with China, complementing its MiG-29K and the Indian Air Force's MiG-29UPG, Mirage-2000, Su-30MKI aircraft.

The platform can be successfully used in battlefield surveillance and management roles, which was also done during the 73-day Doklam standoff.

In 2020, the Chief of Defense Staff of the Indian forces, Gen. Bipin Rawat revealed "I came to know about the capabilities of the P-8I anti-submarine warfare planes after they were deployed in Doklam for surveillance." It was also used during the 2019 Pulwama attack aftermath, where it was used to keep an eye on the Pakistani army movements.

https://eurasiantimes.com/p-8-poseidon-indian-navy-bets-big-on-boeings-maritime-recon-aircraft-to-puncture-chinas-swelling-military/

Wed, 29 Sept 2021

AstroSat-2: ISRO mulls developing next generation astronomy satellite

ISRO's first mission dedicated for astronomy, AstroSat, launched on September 28, 2015 with its design life of five years, on Tuesday completed six years of its operation.

Bengaluru: The Indian Space Research Organisation is exploring the possibility of developing a next-generation astronomy satellite, an official indicated on Tuesday. ISRO's first mission dedicated for astronomy, AstroSat, launched on September 28, 2015 with its design life of five years, on Tuesday completed six years of its operation. "It (AstroSat) is expected to last some more years", A S Kiran Kumar who as the then Chairman of ISRO led the mission team, and is presently serving as the chair of the apex science committee at the space agency, told PTI. "We can expect some more results to come which will be path-breaking", he said. Asked about the possibility of ISRO launching AstroSat-2, he said: "Not AstroSat-2. Next generation…thinking is going on…depending on how planning happens…follow-on to this (AstroSat) in a different manner are being looked at".

A S Kiran Kumar who as the then Chairman of ISRO led the mission team. (Image: News18)

According to ISRO officials, data from AstroSat is widely utilised for the study of various fields of astronomy, from galactic to extra-galactic and from users from all over the world. The multi-wavelength space observatory, which has five unique X-ray and ultraviolet telescopes working in tandem, had detected extreme-UV light from a galaxy, called AUDFs01, 9.3 billion light-years away from Earth.

The discovery was made by an international team of astronomers led by Dr. Kanak Saha, at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune and reported in 'Nature Astronomy'. This team included scientists from India, Switzerland, France, the USA, Japan and the Netherlands. AstroSat has also observed for the very first time rapid variability of high energy (particularly >20keV) X-ray emission from a black hole system, officials noted.

"AstroSat has been a very successful mission and it has produced results which are globally acclaimed…", Kiran Kumar said. "Large number of papers have also got published".

https://www.news18.com/news/business/astrosat-2-isro-mulls-developing-next-generation-astronomy-satellite-4257878.html

अमर उजाला

Wed, 29 Sept 2021

इसरो: भारत भेज सकता है एस्ट्रोसैट की अगली पीढ़ी का खगोल अध्ययन उपग्रह

सार

इसरो की विज्ञान समिति के अध्यक्ष एसके किरनकुमार ने बताया, 28 सितंबर 2015 को पांच साल के लिए भेजा गया ऐसा ही एक उपग्रह एस्ट्रोसैट छह साल पूरे कर चुका है और अब भी बखूबी काम कर रहा है।

विस्तार

बंगलूरू: इसरो नई पीढ़ी के खगोलीय उपग्रह भेजने की संभावनाओं पर काम कर रही है। इस बारे में इसरो की विज्ञान समिति के अध्यक्ष एसके किरनकुमार ने बताया, 28 सितंबर 2015 को पांच साल के लिए भेजा गया ऐसा ही एक उपग्रह एस्ट्रोसैट छह साल पूरे कर चुका है और अब भी बखूबी काम कर रहा है।

एस्ट्रोसैट की अगली पीढ़ी का उपग्रह भेजने की संभावनाएं तलाश रही इसरो

किरनकुमार के मुताबिक, यह अभी कुछ और समय काम करता रहेगा, इसके जैसा ही एक और उपग्रह भेजने की संभावनाओं को तलाशा जा रहा है। नया उपग्रह एस्ट्रोसैट - 2 नहीं, बल्कि नहीं पीढ़ी का खगोल अध्ययन उपग्रह होगा।

इस बारे में अभी विचार किया जा रहा है, इसका भविष्य प्लानिंग पर निर्भर करेगा। इस बीच एस्ट्रोसैट के प्रदर्शन से पूरे विश्व का वैज्ञानिक समुदाय उत्साहित है। इसरो के अनुसार इससे मिला डाटा खगोलीय अध्ययन में उपयोग हो रहा है।

https://www.amarujala.com/india-news/isro-says-india-may-send-astrosats-next-generation-astronomical-study-satellite

PHYS.ORG

Wed, 29 Sept 2021

Optical chip protects quantum technology from errors

By Tobias Sydradal Lund

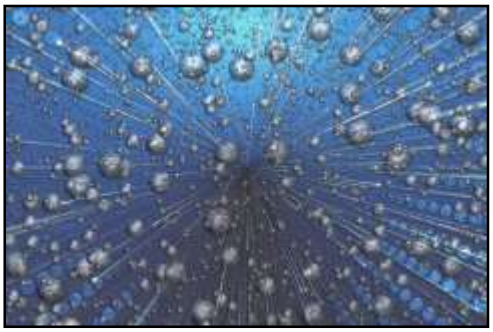
In today's digital infrastructure, the data-bits we use to send and process information can either be 0 or 1. Being able to correct possible errors that may occur in computations using these bits is a vital part of information processing and communication systems. But a quantum computer uses quantum bits, which can be a kind of mixture of 0 and 1, known as quantum super-position. This mixture is vital to their power—but it makes error correction far more complicated.

Researchers from DTU Fotonik have co-created the largest and most complex photonic quantum information processor to date—on a microchip. It uses single particles of light as its quantum bits, and demonstrates a variety of error-correction protocols with photonic quantum bits for the first time.

"We made a new optical microchip that processes quantum information in such a way that it can protect itself from errors using entanglement. We used a novel design to implement error

correction schemes, and verified that they work effectively on our photonic platform," says Jeremy Adcock, postdoc at DTU Fotonik and co-author of the *Nature Physics* paper.

This research is important because error correction is key to developing large-scale quantum computers, which will unlock new algorithms for e.g. large-scale chemical simulations and faster machine learning.



Credit: CC0 Public Domain

One key application could be drug discovery. Today's computers cannot simulate large molecules and their interactions, for example when you introduce a drug molecule to the human body. In today's computers, the size of classical computation grows exponentially with the size of the molecules involved. But for future quantum computers, more efficient algorithms are known, which do not blow up in computational cost.

This is just one of the problems that the quantum technology of the future promises to solve, by being able to process information beyond the fundamental limits of traditional computers. But to reach this goal, we have to go small:

"Chip-scale devices are an important step forward if quantum technology is going to be scaled up to show an advantage over classical computers. These systems will require millions of high-performance components operating at the fastest possible speeds, something that is only achieved with microchips and integrated circuits, which are made possible by the ultra-advanced semiconductor manufacturing industry," says co-author Yunhong Ding, senior researcher at DTU Fotonik.

To realize quantum technology that goes beyond today's powerful computers requires scaling this technology further. In particular, the photon (particles of light) sources on this chip are not efficient enough to build quantum technology of useful scale.

"At DTU, we are now working on increasing the efficiency of these sources—which currently have an efficiency of just 1 percent—to near-unity. With such a source, it should be possible to build quantum photonic devices of vastly increased scale, and reap the benefits of quantum technology's native physical advantage over classical computers in processing, communicating, and acquiring information, says postdoc at DTU Fotonik, Jeremy Adcock.

"With more efficient photon sources, we will be able to build more and different resource states, which will enable larger and more complex computations, as well as unlimited range secure quantum communications."

More information: Caterina Vigliar et al, Error-protected qubits in a silicon photonic chip, *Nature Physics* (2021). DOI: 10.1038/s41567-021-01333-w

Journal information: *Nature Physics*

https://phys.org/news/2021-09-optical-chip-quantum-technology-errors.html

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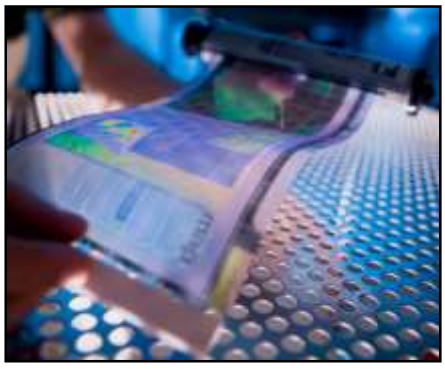
Wed, 29 Sept 2021

Will twisted superconducting flakes make better components for quantum computers?

By Vittoria D'alessio

Researchers at the University of Bath in the UK have found a way to make 'single-crystal flake' devices that are so thin and free of defects, they have the potential to outperform components used today in quantum computer circuits.



Credit: U.S. Army RDECOM, CC BY 2.0

The study is published this month in the journal *Nano Letters.*

The team from the university's Department of Physics made its discovery while exploring the junction between two layers of the superconductor niobium diselenide ($NbSe_2$) after these layers had been cleaved apart, twisted about 30 degrees with respect to one another, then stamped back together. In cleaving, twisting and recombining the two layers, the researchers were able to build a Superconducting Quantum Interferometer Device (SQUID) – an extremely sensitive sensor used to measure incredibly tiny magnetic fields.

SQUIDs have a wide range of important applications in areas that include healthcare (as seen in cardiology and magnetoencephalography—a test that maps brain function) and mineral exploration.

SQUIDS are also the building blocks of today's commercial quantum computers—machines that perform certain computational tasks much more rapidly than classical computers. Quantum computing is still in its infancy but in the next decade, it is likely to transform the problem-solving capacity of companies and organizations across many sectors—for instance by fast-tracking the discovery of new drugs and materials.

"Due to their atomically perfect surfaces, which are almost entirely free of defects, we see potential for our crystalline flakes to play a significant role in building quantum computers of the future," said Professor Simon Bending, who carried out the research together with his Ph.D. student Liam Farrar. "Also, SQUIDs are ideal for studies in biology—for instance, they are now being used to trace the path of magnetically-labeled drugs through the intestine—so we're very excited to see how our devices could be developed in this field too."

As Professor Bending is quick to point out, however, his work on SQUIDs made using $NbSe_2$ flakes is very much at the start of its journey. "This is a completely new and unexplored approach to making SQUIDs and a lot of research will still have to done before these applications become a reality," he said.

Extremely thin single crystals

The flakes from which the Bath superconductors are fabricated are extremely thin single crystals (10,000 times thinner than a human hair) that bend easily, which also makes them suitable for incorporation into flexible electronics, as used in computer keyboards, optical displays, solar cells and various automotive components.

Because the bonds between layers of $NbSe_2$ are so weak, cleaved flakes—with their perfectly flat, defect-free surfaces—create atomically sharp interfaces when pushed back together again. This makes them excellent candidates for the components used in quantum computing.

While this is not the first time $NbSe_2$ layers have been stamped together to create a weak superconducting link, this is the first demonstration of quantum interference between two such junctions patterned in a pair of twisted flakes. This quantum interference has allowed the

researchers to modulate the maximum supercurrent that can flow through their SQUIDs by applying a small magnetic field, creating an extremely sensitive field sensor. They were also able to show that the properties of their devices could be systematically tuned by varying the twist angle between the two flakes.

More information: Liam S. Farrar et al, Superconducting Quantum Interference in Twisted van der Waals Heterostructures, *Nano Letters* (2021). DOI: 10.1021/acs.nanolett.1c00152

Journal information: *Nano Letters*

https://phys.org/news/2021-09-superconducting-flakes-components-quantum.html

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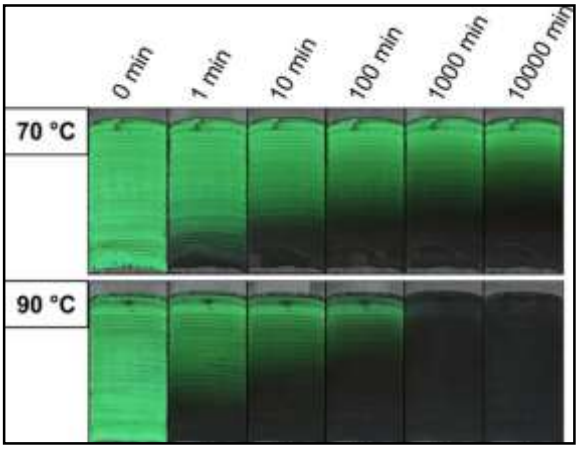
Wed, 29 Sept 2021

Time-temperature–integrating optical sensors based on gradient colloidal crystals

Due to their iridescent colors, opals have been considered particularly precious gemstones since antiquity. The way these stones shimmer is caused by their nanostructures. A research group led by Prof. Dr. Markus Retsch at the University of Bayreuth has produced colloidal crystals mimicking such structures, which are suitable for constructing new types of sensors. These sensors visibly and continuously document the temperature in their environment during a defined period. They are, therefore, tailor-made for a permanent monitoring of temperature-sensitive processes. The scientists have presented their discovery in the journal *Advanced Materials*.



Two colloidal crystal gradients exhibiting the time-dependent loss of color when exposed to two different temperatures. Credit: Marius Schöttle

Attractive applications are already in sight for this new type of sensors. "For the safe operation of modern high-performance batteries, it is important that they are exposed to only moderate temperatures for many hours of operation. Short-term temperature spikes can endanger the safety and service life of the batteries. With the help of the new sensors, compliance with uniform ambient temperatures can be monitored reliably. Moreover, the sensor is already pre-programmed due to its material composition: it works autonomously and cannot be manipulated afterward," says doctoral researcher Marius Schöttle (M.Sc.), lead author of the new publication. Prof. Dr. Markus Retsch, Chair of Physical Chemistry I and coordinator of the new study, adds: "We have developed a sensor that is sensitive to time and temperature—without the need for complex electronics or special measuring devices. In addition, the artificial crystals we synthesized represent a new class of materials that are very interesting for fundamental research. It is possible that these colloidal gradients will help us to track down previously inaccesible physical phenomena."

Gradual colloidal crystals derived from natural opals

Opals consist of spherical particles that form superordinate nanostructures. Interactions of these highly symmetrical structures with visible light make the surfaces shimmer in the most diverse colors. The same is true for the wings of butterflies or some beetles. In recent years, natural and artificial representatives of this class of materials have been increasingly studied. At the University of Bayreuth, the research team led by Prof. Dr. Markus Retsch has now investigated whether nanostructured materials can be produced using this construction principle but with a controlled variation of the mixtures of different particles, which have technologically attractive properties.

The vision was to realize nanostructured films that gradually change their physical properties along a certain direction. This unique gradual behavior could be achieved by simply varying the composition of a binary particle mixture. For this purpose, the researchers developed an experimental setup that enables the preparation of such gradual colloidal crystals comprising two types of distinct particles.

Two types of particles were produced in the laboratory that differed in only one aspect: their resulting nanostructures merge at different temperatures so that the surfaces of the materials irretrievably lose their iridescent colors. Technically speaking, this irreversible dry sintering process creates a colorless film layer. The researchers have created colloidal crystals from both types of particles and utilized their newly developed gradient fabrication technique. The structure of the resulting crystals is always the same: within each crystal, the proportion of particles that lose their structures at higher temperatures and are thus more stable increases continuously towards one side. Comparative studies have shown that a larger percentage of more stable particles causes a slower structural degradation within the crystal and retards the resulting color loss.

Fine-tuned crystals as optical sensors

The Bayreuth team has now used this discovery to fine-tune various colloid crystals. A colloid crystal in which the proportion of stable particles changes gradually now takes on the function of a sensor: the higher the temperature during a defined period, the further the color loss spreads along the gradient direction. The shorter the periods during a constant temperature, the sooner this process aborts. Since the color losses are irreversible in any case, the sensor documents the level of an ambient temperature as a function of time.

More information: Marius Schöttle et al, Time–Temperature Integrating Optical Sensors Based on Gradient Colloidal Crystals, *Advanced Materials* (2021). DOI: 10.1002/adma.202101948

Journal information: *Advanced Materials*

https://phys.org/news/2021-09-time-temperatureintegrating-optical-sensors-based-gradient.html

COVID-19 Research News

INDIA TODAY

Wed, 29 Sept 2021

Smoking may increase risk of Covid-19 severity, death: Study

This is the first of its kind to pool observational and genetic data on smoking and Covid-19 to strengthen the evidence

New Delhi: Smoking is highly likely to increase the severity of Covid-19 and the risk of dying from the viral infection, according to a study published on Tuesday.

Studies carried out early on in the pandemic reported a lower prevalence of active smokers among people admitted to hospital with Covid-19 than in the general population.

However, other population based studies have suggested that smoking is a risk factor for the infection.

Most of the research to date, however, has been observational in nature and so unable to establish a causal effect.

The latest study, published in the journal Thorax, is first of its kind to pool observational and genetic data on smoking and Covid-19 to strengthen the evidence.

"Our results strongly suggest that smoking is related to your risk of getting severe Covid, and just as smoking affects the risk of heart disease, different cancers, and all those other conditions we know smoking is linked to, it appears that it's the same for Covid," said lead researcher Ashley Clift.

"So now might be as good a time as any to quit cigarettes and quit smoking," said Clift, from the University of Oxford in the UK.

The team of researchers from Oxford, the University of Bristol, and the University of Nottingham drew on linked primary care records, Covid-19 test results, hospital admissions data and death certificates.

They looked for associations between smoking and Covid-19 infection severity from January to August 2020 in 421,469 participants of the UK Biobank, all of whom had had their genetic make-up analysed when they agreed to take part in 2006-10.

The researchers found that compared with people who had never smoked, current smokers were 80 per cent more likely to be admitted to hospital and significantly more likely to die from Covid-19.

They used Mendelian randomisation to assess whether a genetic predisposition to smoking and heavy smoking might have a role in Covid-19 severity among 281,105 of the original participants living in England.

Mendelian randomisation is a technique that uses genetic variants as proxies for a particular risk factor -- in this case genetic variants that make someone more likely to smoke or to smoke more heavily -- to obtain genetic evidence in support of a causal relationship.

The technique revealed that a genetic predisposition to smoking was associated with a 45 per cent higher risk of infection and a 60 per cent higher risk of hospital admission for Covid-19.

Having these genetic factors to smoke more heavily was associated with over twice the risk of infection, a five-fold increase in the risk of hospital admission, and a 10-fold increase in the risk of death from the virus, the researchers found.

While the researchers acknowledge that they relied only on hospital Covid-19 test data rather than on more representative community data, they point to the similarity of the findings in both sets of analyses.

Both the observational analyses indicating associations with recent smoking behaviours and Mendelian randomisation analyses indicating associations with lifelong predisposition to smoking and smoking heaviness support a causal effect of smoking on Covid-19 severity, they said.

https://www.indiatoday.in/science/story/smoking-may-increase-risk-of-covid-19-severity-death-study-1858157-2021-09-28