

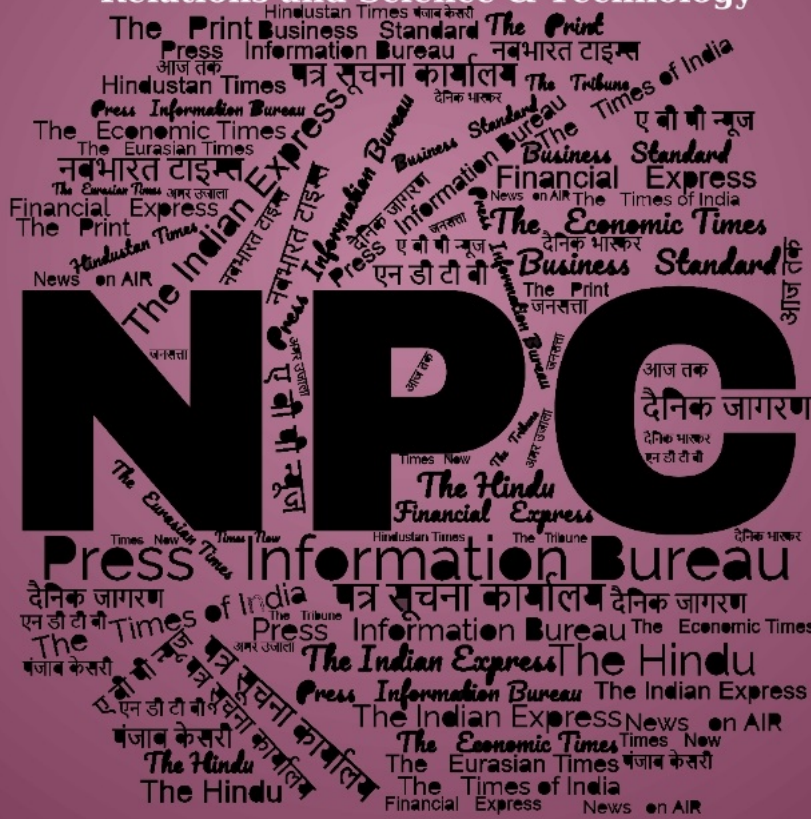
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Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Tue, 15 Oct 2024

DG Paramesh Sivamani takes over as 26th Director General of Indian Coast Guard

DG Paramesh Sivamani took over as the 26th Director General of the Indian Coast Guard (ICG). The Flag Officer, during his illustrious career spanning over three and a half decades, has served in various capacities in ashore and afloat appointments.

DG Paramesh Sivamani specialises in Navigation & Direction and his sea commands include all major vessels of ICG which include Advanced Offshore Patrol Vessel 'Samar' & Offshore Patrol Vessel 'Vishwast'. The Flag Officer was at the helm of Coast Guard Region (East), Coast Guard Region (West), Coast Guard Commander Eastern Seaboard). He is an alumnus of the National Defence College, New Delhi and Defence Services Staff College, Wellington.

DG Paramesh Sivamani was elevated to the rank of Additional Director General in September 2022, and was subsequently posted at the Coast Guard Headquarters, New Delhi. He was given the additional charge of Director General Coast Guard in August 2024.

During the period, many significant operations and exercises were accomplished that includes the seizure of drugs/narcotic substances and gold worth crores of rupees, rescue of mariners during severe cyclonic storms, joint exercises with the Foreign Coast Guards, anti-poaching operations, humanitarian assistance during cyclones/naturals calamities & Coastal Security exercises.

The Flag Officer was conferred with the Tatrakshak Medal in 2014 and the President Tatrakshak Medal in 2019 for his illustrious service. He was also awarded the DG Coast Guard Commendation in 2012 and Flag Officer Commanding-in-Chief (East) Commendation in 2009.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2064900>



**Press Information Bureau
Government of India**

Ministry of Defence

Tue, 15 Oct 2024

Sea Phase Of Malabar 2024

The Sea Phase of Exercise MALABAR 2024 commenced on 14 Oct 24 off the coast of Visakhapatnam.

Naval warships, embarked integral helicopters and long-range maritime patrol aircraft from Australia, India, Japan and USA are now exercising in unison in the Bay of Bengal, demonstrating a high level of collaboration and operational synergy.

As part of this phase, the participating navies will engage in a wide range of maritime warfare operations, covering the surface, sub-surface, and air warfare domains. These advanced and complex exercises are designed to enhance mutual understanding and coordination, with the aim of operating seamlessly as a Combined Task Force at sea. In sub-surface warfare exercises, Indian Naval submarines would be participating and combined drills of Special Forces from participating nations will also be featured in this phase.

This Sea Phase will further strengthen interoperability between the participating nations and contribute towards enhancing regional security and stability in the Indo-Pacific. The sea phase will culminate on 18 Oct 24 with the closing ceremony for MALABAR 2024.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2065011>

THE ECONOMIC TIMES

Tue, 15 Oct 2024

Indian Navy is biggest guarantee of peace in Indian Ocean Region, says Rajnath Singh

Union Defence Minister Rajnath Singh on Tuesday emphasised the importance of continuously empowering the Indian Navy, given the increasing global interest in the Indian Ocean Region (IOR). Singh laid the foundation stone for a new Very Low Frequency (VLF) station of the Indian Navy at the Damagundam Reserve Forest site, Pudur Mandal, in Vikarabad, Telangana.

The facility spans 2,900 acres and is being constructed at a cost of Rs3,200 crore. "Our interests extend across the Indo-Pacific region. We have also emerged as the first responder and a net security provider in the IOR. Today, many nations have shifted their focus towards marine resources in the region. If India is to safeguard its commercial and security interests and maintain a

strong deepsea presence, it is crucial to possess state-of-the-art platforms, equipment, and a robust communication system," he said.

Singh described the Indian Navy as the primary guarantor of peace throughout the IOR, including the Bay of Bengal.

"The countries with which India shares its maritime borders must understand that maritime security is a collective responsibility. Summoning external forces to one's doorstep undermines this effort. Maintaining peace and order in the Bay of Bengal and the IOR should be our top priority. The support of all friendly nations is vital in this endeavour, as even the exclusion of one nation could disrupt the entire security framework. India believes in unity, not division. We are taking every step to move forward in cooperation with our friendly neighbouring countries," he added.

The VLF station will enhance the Indian Navy's operational readiness, ensuring effective command and control in challenging maritime environments. It will play a key role in bolstering naval communication infrastructure, enabling secure and reliable long-distance transmissions. Singh reaffirmed the government's commitment to strengthening the Indian Navy, stating that the focus is on empowering the armed forces with a longterm vision rather than short-term benefits.

Addressing concerns about the project's environmental impact, Singh assured that all environmental conditions are being adhered to and that provisions will be made for the rehabilitation of affected people, if necessary, during construction. "When it comes to the security and sovereignty of the nation, all citizens rise above ideologies, religions, and sects, and unite as one," he said.

He also paid tribute to Dr APJ Abdul Kalam, the former President and "Missile Man of India", on his birth anniversary. "Dr Kalam's contributions to India's defence sector will be remembered for generations. He not only advanced India's military technology but also inspired countless scientists and engineers," he said.

The event was attended by Chief of the Naval Staff Admiral Dinesh K Tripathi, Telangana Chief Minister A Revanth Reddy, Minister of State for Home Affairs Bandi Sanjay Kumar, and several other dignitaries.

<https://economictimes.indiatimes.com/news/defence/indian-navy-is-biggest-guarantee-of-peace-in-indian-ocean-region-says-rajnath-singh/articleshow/114254138.cms>

THEWEEK

Tue, 15 Oct 2024

15 SeaGuardian drones for Navy, 8 SkyGuardian drones each for Army, Air Force: All about India-US Predator drone deal

India will procure 31 Predator drones from US defence major General Atomics under government-to-government framework, officials confirmed on Tuesday.

The deal was signed in presence of top defence and strategic brass of India in New Delhi.

The much-anticipated drone deal, which will give India's forces an edge over land, sky, and sea, boosting the surveillance capabilities of the three forces, will cost India Rs 32,000 crore. The high-altitude long-endurance drones can stay airborne for over 35 hours and can carry four Hellfire missiles and around 450 kgs of bombs.

The Cabinet Committee on Security (CCS) had, on October 9, approved the procurement of 31 Predator long-endurance drones from the US. According to the deal, the Indian Navy will get 15 Sea Guardian drones, while the Indian Air Force and the Army will each get eight Sky Guardian drones.

The SeaGuardian drones are capable of carrying out a variety of roles including maritime surveillance, anti-submarine warfare, and over-the-horizon targeting among others. These drones will enhance the surveillance apparatus of the forces, especially along the Line of Actual Control (LAC) with China.

General Atomics describes SeaGuardian thus: "This highly versatile maritime patrol and reconnaissance aircraft can seamlessly integrate a centerline wide-area maritime radar, an automatic identification system, electronic support measures, and a self-contained anti-submarine warfare (ASW) mission kit. SeaGuardian not only integrates the most advanced maritime intelligence, surveillance, and reconnaissance (ISR) capabilities, but it is also the first RPAS in its class to enable real-time search and patrol above and below the ocean's surface."

SkyGuardian drones are designed to fly over the horizon via satellite for up to 40 in all types of climatic conditions. The operations that it can aid include search and rescue operations, defensive counter-air operations, electronic warfare, and disaster relief among others.

<https://www.theweek.in/news/defence/2024/10/15/15-seaguardian-drones-for-navy-8-skyguardian-drones-each-for-army-air-force-all-about-india-us-predator-drone-deal.html>

THEWEEK

Tue, 15 Oct 2024

What makes Vikarabad in Telangana the ideal location for setting up Indian Navy's VLF radar station

Defence Minister Rajnath Singh laid the foundation stone for the Indian Navy's very low frequency (VLF) radar station at Damagudem forest area in Vikarabad district of Telangana.

" The VLF station which we are going to establish today, is a key effort of us to establish communication for our maritime forces...lack of secure and real-time communication is equal to a key a factor between victory and defeat so VLF station is very important" said Singh.

This is the second VLF communication transmission station in India, with INS Kattabomman Radar Station at Tirunelveli in Tamil Nadu being the first. The VLF radar station helps boost

submarine communication as VLF radio waves are capable of reaching diesel-electric and nuclear submarines submerged 20 to 30 meters.

VLF technology operates within the frequency range of 3–30 kHz, allowing for reliable long-distance communication that can penetrate various terrains and obstacles, making it highly valuable for military operations.

The foundation laying ceremony for the VLF communication transmission station comes weeks after the second Arihant-Class submarine ‘INS Arighaat’ was commissioned into the Navy.

“The strategically important VLF facility, once it becomes fully operational in two to three years, will provide round-the-clock encrypted communication connectivity to submerged submarines across India’s entire area of interest,” Times of India quoted a source as saying.

Vikarabad was selected for setting up the facility because of its geographical advantages as the district lacks mountains and high altitude, allowing nearly 300 kilometers of unobstructed signal transmission. The location, situated at about 250 feet above sea level, was identified for the facility by Eastern Naval Command in Visakhapatnam.

The station is expected to be completed by 2027.

<https://www.theweek.in/news/defence/2024/10/15/what-makes-vikarabad-in-telangana-the-ideal-location-for-setting-up-indian-navys-vlf-radar-station.html>

ThePrint

Tue, 15 Oct 2024

France’s Safran, frontrunner to power 5th-gen fighter AMCA, expands India operations

French aerospace and defence giant Safran, the frontrunner to power India’s fifth-generation fighter aircraft programme—the advanced medium combat aircraft (AMCA)—is expanding its India operations.

Safran Data Systems, a subsidiary of Safran, has opened a new office in Chennai.

The company said in a press release that the facility would be a hub for design and development and address the surge in demand within the sector. It added that the strategic expansion would also allow Safran to tap into Chennai’s pool of engineering capabilities.

France and India have been in talks for a collaboration on AMCA engines since last year. Safran is the frontrunner and is in competition with the UK’s Rolls Royce and the American GE.

Currently, discussions are ongoing between Safran and the Defence Research and Development Organisation’s (DRDO) Aeronautical Development Agency and Gas Turbine Research Establishment to determine specifications, The Hindu reported.

The engine programme is part of the Horizon 2047 document for the India-France strategic partnership.

Last October, Safran and Hindustan Aeronautics Limited (HAL) also signed a memorandum of understanding, announcing their intent to develop industrial cooperation in forging parts' manufacturing for commercial engines.

Hindustan Aeronautics Ltd (HAL) and SAFHAL Helicopter Engines— which is a joint venture between HAL and Safran Helicopter Engines—also signed a contract to begin the joint design and development of a new generation high power engine, Aravalli, for the 13-ton medium lift Indian multi-role helicopter (IMRH) and the 12.5-ton deck-based multi-role helicopter (DBMRH). Both the IMRH and DBMRH are being designed and developed by HAL.

Safran is the leading supplier of turbine engines for helicopters used by the Indian military. According to its website, more than 1,400 such helicopter engines are in service.

The Shakti/Ardiden 1H1 engine, certified in 2009, is a key element in the defence partnership between the two countries. Co-developed by Safran and HAL, the engine is currently under construction in Bengaluru. It is now known as the Shakti engine.

Initially selected for the Dhruv helicopter produced by HAL, the engine will also be used to power the light combat helicopter (LCH). Till date, 350 Shakti engines have been manufactured in India. The Ardiden 1U engine was also selected for the 3-tonne light utility helicopter (LUH).

<https://theprint.in/defence/frances-safran-frontrunner-to-power-5th-gen-fighter-amca-expands-india-operations/2312842/>



Tue, 15 Oct 2024

From Nuclear Diplomacy to Tech Diplomacy: How the US-India Partnership Evolved into a Strategic Force for Emerging Technologies

The Beginnings of an Unlikely Alliance

The US-India relationship was not always as collaborative as it is today. Following India's nuclear tests in May 1998, the United States responded with sanctions, reflecting long-standing concerns over nuclear proliferation. Diplomatic exchanges between then-US Deputy Secretary of State Strobe Talbott and Indian Foreign Minister Jaswant Singh in the late 1990s sought to manage and gradually resolve nuclear tensions, building a foundation of cautious trust.

Through these conversations, the US recognised the need to accommodate India's regional security concerns, while India began to see the United States as a partner in its ascent on the global stage.

The breakthrough came in 2008 with the US-India Civil Nuclear Agreement, a landmark deal that paved the way for strategic cooperation across multiple sectors. The agreement not only marked India's acceptance into the global nuclear order but also shifted US-India relations from one of mutual suspicion to mutual respect and collaboration.

The Pivot to Technology: Birth of iCET

In recent years, this shift has crystallised in the US-India Initiative on Critical and Emerging Technology (iCET). The iCET, launched in early 2023, represents a new phase in bilateral relations by focusing on advanced technology areas, including AI, quantum computing, and advanced materials. This initiative underscores both nations' recognition that emerging technologies will define the global balance of power in the years ahead.

The iCET recently awarded over \$2 million in grants to 17 US-India joint research projects targeting AI and quantum technologies for societal benefit. Projects funded under this grant, administered by the Indo-US Science and Technology Forum (IUSSTF), range from AI-assisted cancer detection to the development of scalable quantum components. This focus on leveraging cutting-edge research for public welfare reflects a broader shift towards tech diplomacy, where cooperation in science and technology is seen as a force for both social good and geopolitical strategy.

Expanding the Technological Frontier: Advanced Materials and Critical Minerals

Alongside AI and quantum, the US and India are also deepening their collaboration in advanced materials and critical minerals—sectors vital for securing sustainable, resilient supply chains in a multipolar world.

This year, the US committed an additional \$1 million to expand joint research in these areas, recognising India's potential as a crucial partner in diversifying global supply chains. With India rich in several critical minerals and the U.S. possessing advanced mining and processing technologies, this partnership aims to secure the supply of essential materials while fostering innovation.

Strategic Alignment in a Multipolar World

The alignment in US-India tech diplomacy comes at a time of complex geopolitical shifts, particularly with the rise of China. Both the US and India are wary of China's ambitions in the Indo-Pacific region and its dominance in technology fields like AI, quantum, and advanced manufacturing.

Through joint initiatives like iCET, the US and India are not only addressing these strategic concerns but also building a tech ecosystem that offers an alternative to China's approach. Their collaboration has become emblematic of a new type of partnership that prioritises open, democratic governance of technology, counterbalancing China's state-driven model.

This alignment has been strengthened by recent remarks from leaders on both sides. US Ambassador Eric Garcetti highlighted the cultural synergies, stating, "The Indian dream is the flip side of the American dream, and vice versa." Meanwhile, Dr Seth Center, Acting Special Envoy for Critical and Emerging Technologies at the US Department of State, reinforced that the

partnership is key to “shaping the future of these and other emerging technologies so we collectively remain at the leading edge of innovation.”

From Cold War Mistrust to Shared Tech Goals

This pivot to technology diplomacy also signifies a shift away from the Cold War-era mistrust that once defined US-India relations. Historically, India’s commitment to non-alignment and the US’s reliance on alliances led to cautious engagement at best. But today, the two countries are bonded by shared democratic values and a mutual interest in preserving a rules-based international order. The technological focus of their partnership reflects a pragmatic acknowledgement that in a world where technological prowess dictates influence, only those who innovate will remain secure.

The iCET programme, along with initiatives under the IUSSTF, has enabled U.S. and Indian institutions—universities, national labs, and private enterprises—to collaborate on high-stakes research. Notable past projects include the U.S.-India AI Initiative and the Joint Center for Secure and Resilient Quantum Optical Networks, which laid the groundwork for today’s partnerships in AI and quantum.

The Road Ahead: From AI to Climate Tech and Beyond

While AI, quantum, and critical materials currently dominate the US-India tech agenda, the potential for broader collaboration remains vast. As climate change threatens global stability, clean technology and climate innovation are emerging as key areas of interest. India’s ambitious renewable energy goals and the US’s technological expertise present a unique opportunity for joint projects in areas such as carbon capture, battery storage, and sustainable agriculture.

Moreover, the two nations are exploring collaborations in cybersecurity, space exploration, and biotech—sectors that could redefine global standards if led by democratic partners. India’s expanding tech industry and large talent pool align well with the US’s cutting-edge research institutions, making both countries ideal collaborators in these fields.

A Partnership of the 21st Century

The journey from nuclear diplomacy to tech diplomacy encapsulates the transformation of US-India relations from a transactional engagement to a deeply strategic partnership. This evolution highlights not only the resilience of the relationship but also its adaptability to the changing global landscape. The US and India now see each other not just as partners, but as co-architects of a future where technology serves as a force for good, democratises innovation, and safeguards the principles of freedom and security.

As global technological competition intensifies, the US-India partnership stands as a testament to what two democracies can achieve when united by a vision of inclusive, equitable growth. If the 20th century was defined by arms races and strategic alliances, the 21st century may well be defined by tech diplomacy. In this new paradigm, the US and India are well-positioned to lead, not only for their mutual benefit but for the stability and prosperity of the world.

<https://www.financialexpress.com/business/defence-from-nuclear-diplomacy-to-tech-diplomacy-how-the-us-india-partnership-evolved-into-a-strategic-force-for-emerging-technologies-3640434/>

Artificial Intelligence to assist IAF in planning postings of officers

Artificial Intelligence (AI) could soon assist the IAF in planning the postings of officers to various units and establishments that is expected to bring in greater transparency while cutting down on manual processes and human subjectivity.

As part of revamping its human resource management, the IAF is looking at developing an AI-based system that can help optimise the process of transferring officers as per organisational requirements as well as personal career progression.

The system is envisioned to reduce the tedious manual work, subjectivity and time involved. The present process is bogged down by high costs in terms of manpower utilisation on administrative tasks like collection and analysis of data, communication with individuals, approvals from the chain of command and coordination. Factors like human bias and errors also creep in.

AI-based system would be designed to automate and streamline the posting planning process by using advanced data processing and analytics techniques.

It would improve the accuracy and fairness of posting decisions by using objective and transparent criteria and by considering multiple factors and constraints, such as organisational needs and goals, officers' performance, qualifications and preferences and the relevant policies and regulations.

The system would undertake routine posting tasks on the basis of historical data, policies, guidelines, correspondence, skill mapping and an individual's ability to achieve the tasks, besides presenting multiple probable solutions and an analysis of the impact of a particular movement on other locations.

The IAF has an officer strength of around 13,000 and they are governed by policies issued by the Defence Ministry and Air Headquarters. Deficiencies in cadre strength, which vary from year to year also has an impact on deciding the postings of officers or the duration of stay at a particular station.

There have also been instances in posting orders getting embroiled in litigation over perceived unfairness on the part of the individual affected or incorrect interpretation of relevant policies.

<https://www.tribuneindia.com/news/india/artificial-intelligence-to-assist-iaf-in-planning-postings-of-officers/>

India's S-400 Acquisition – Outdated Tech, Delayed Delivery, Russian SAMs No ‘Game Changer’ For IAF: OPED

In his interactions with the press, ahead of Air Force Day on October 8, Indian Chief of the Air Staff (CAS), Air Chief Marshal Amar Preet Singh, confirmed that deliveries of all S-400 air defense systems ordered from Russia would be completed next year. India has already received three S-400 regiments, and two more will be delivered by the end of 2025. While the CAS's assurance is welcome, concerns linger about the geopolitical situation surrounding the delivery of the Russian S-400 systems.

Need for Additional S-400 Systems & Upgrades

The last S-400 system will be delivered seven years after the initial contract signing. During this time, the S-400 system has evolved greatly. The imperative for its rapid evolution has been the threat posed to Russia by the West since 2014 and the operational deployment and heavy use of the system since the start of the Russian Special Military Operation (SMO) in February 2022.

While the S-400 system has rapidly evolved, the IAF's ability to leverage its improvements may well have diminished due to geopolitical uncertainties, specifically sanctions against Russia and the threat of sanctions against countries dealing with Russia.

US Sanctions

Evidently, India has evaded US sanctions under CAATSA (Countering America's Adversaries Through Sanctions Act) on the S-400 acquisition because the contract was negotiated with Russia well before the US imposed sweeping sanctions against Moscow. At the time of contract signing, the IAF was keen to acquire additional S-400 systems and eventually manufacture them in India, starting with the manufacture of major subsystems.

Is the Indian government in a position to sign a follow-up contract for acquisitions of additional S-400 systems despite CAATSA?

Equally important, does the IAF still have the inclination to pursue its original plans? This is a valid question since leadership changes can lead to priority changes, though they shouldn't. The Indian government could well be inclined to allow the IAF's S-400 plans to languish in the face of US pressure. To avoid the appearance that it's succumbing to US pressure, the government could well invoke its Atamanirbharta (self-reliance) paradigm with even more stridency.

We are told that India is working on its own S-400-class air defense system under "Project Kusha." This system features Long-Range Surface-to-Air Missiles (LR-SAM) comparable to Russia's S-400 Triumph air defense system. The Kusha system is expected to have a strike range of around 400 kilometers and will enhance India's preparedness along both the China and Pakistan borders. The problem is that Project Kusha is at least two decades away from becoming an operational S-400

analog! Russia has S-400 systems today because it has been working on integrated air defense systems for over 50 years!

Acquiring additional S-400 systems quickly will address the IAF's operational capability drop due to a 30% reduction in fighter fleet strength over the years. Manufacturing S-400 systems in India with Russian ToT will place us just 10 years behind the state of the art in air defence in the world. Logically, Project Kusha needs to be conceived as an S-400 follow-up, not a replacement!

Let me illustrate the perils of a limited, one-time acquisition of S-400 systems without follow-up upgrades. The IAF's operational capabilities will likely suffer more precipitously than may be evident at first glance. It's likely that India's contract with Russia, signed in October 2018 for the acquisition of the five S-400 regiments, did not include the supply of the 40N6 interceptor missiles. Russia completed the development of the missiles in October 2018. The missile was first combat tested in the Ukrainian theatre in November 2023.

If true, the S-400 systems supplied to India may be limited to a maximum firing range of 250 km using the 48N6 interceptor. The 40N6 has an effective range of 380 km against aerodynamic targets. Its engagement altitude envelope extends from 10m to 35 km. The average flight speed is 1190 m/s. The 40N6 is designed to destroy air command posts (AWACS, Elint, and ISR Platforms), strategic bombers, tactical and theatre ballistic missiles, and medium-range ballistic missiles with a maximum speed of more than 4800 m/s.

The missile features both an active and semi-active seeker. Because of its active seeker, the missile is capable of destroying targets beyond the visibility of ground radars. In contrast, the latest variant of the 48N6 interceptor (48N6E3) has a range of 250 km. The missile, which features a SARH (Semi-Active Radar Homing) seeker, can fly at speeds of 17,000 kph (Mach 14) and engage targets flying up to 4,800 m/s.

Four 48N6 interceptors can be placed in each 40N6 canister. In some ways, the S-400 SAMs supplied to India are already outdated. Russia has already exported 40N6 interceptors to China for its two S-400 regiments. In the past, either due to leadership apathy or US pressure, the IAF did not upgrade its Russian-supplied weapon systems in time. As a result, India faced acute embarrassment during Pakistan's Balakot riposte—Operation Swift Resort—because the IAF had not acquired longer-range Russian RVV-SD air-to-air missiles for its Su-30MKI fighters.

Indeed, there is no evidence that the IAF has acquired the Russian long-range RVV-BD air-to-air missile, which clearly has performed exceptionally well during the ongoing Russian special operation in Ukraine.

Conclusion

If India does choose to dial down its S-400 acquisition, the degradation in the IAF's operational capability will be serious. The war in Ukraine has demonstrated that the outcome of a peer-to-peer conflict will depend as much on missile warfare as on air warfare.

In Ukraine, conventional airpower is largely confined to the 100 km stretch along the front line. Deeper strikes are best carried out by missiles—ballistic missiles or high supersonic/hypersonic missiles. Missile threats are best countered with S-400-like systems. One important reason Ukraine has resisted Russia for over two and a half years is that it has Patriot systems.

Luckily for India, we are well on our way to acquiring five S-400 systems, which are more lethal than the Patriot systems. Unluckily, however, we have China as our adversary. China has invested very heavily in fifth-generation stealth fighters and missile (ballistic, supersonic, and hypersonic) systems. To counter both, India needs S-400 systems in much larger numbers. The number of S-400 systems that India is set to acquire is too small. Unless India acts now, it may well be too late.

<https://www.eurasiantimes.com/indias-s-400-acquisition-outdated-tech/>



Wed, 16 Oct 2024

Only 5th-Gen Option For IAF: Russian Su-57 Remains One Of ‘Key Interim Choices’ For India As It Pushes AMCA

Western defense analysts have been highlighting that the Russian fifth-generation Sukhoi Su-57 “Felon” fighter jet’s development and production have been delayed due to a number of factors, such as the Ukraine war and Western sanctions, which have restricted some critical micro-electronic components for major sensors and cockpit displays.

To compensate, Russia has been forced to ramp up production of the Su-30SM2 and Su-35S to make good numbers for the war effort. Others feel there are only minor delays. In June 2019, the Russian Ministry of Defence signed a contract for the production of 76 Su-57s. As per the plan, three full Aviation Regiments of Su-57 fighters will be in existence by 2028.

Meanwhile, the Russian government has stated that the order numbers are going up, and the production rate for the Su-57 will double in 2024. The target is to deliver more than 20 Su-57s in 2024. If Su-57 production begins to increase, could it be of interest to India?

New Su-57 Batch Deliveries

The Su-57, Russia’s most advanced front-line aircraft, is produced at the Komsomolsk-on-Amur Aviation Plant in the Russian Far East. According to the Russian state-owned United Aircraft Corporation (UAC), a new batch of Su-57 fighter aircraft has been delivered and is already at their operational airbases. The pilots and engineers are reportedly very happy with the aircraft’s performance.

Russia seems to have sorted out most technology development issues and supply chain bottlenecks. Meanwhile, the Sukhoi Design Bureau is continuously working on improving and expanding the aircraft’s functionality and building infrastructure for further expanding production.

Su-57 Woes, As Per Western Reports

The Russo-Ukraine War is in its third year. Russia has been unable to dominate Ukrainian airspace for various reasons, including inadequate Suppression of Enemy Air Defences (SEAD).

One other issue was the limited production of Russia's fifth-generation stealth Su-57 fighters for penetration. It has been 14 years since its first flight in 2010, and less than 40 aircraft have been delivered. This is primarily due to design and development delays and the slow rate of production compounded by Western Sanctions. Actually, serious production didn't even begin until 2019, reflecting the industrial bottlenecks that have hampered Russia's war effort.

Western experts have estimated the aircraft's Radar Cross-Section (RCS) at around 0.5 square meters, which is about the same as a typical 4th-generation aircraft and certainly phenomenally more than the F-35 class fighters.

The aircraft is still forced to fire weapons into Ukraine from its own territory. A real stealthy aircraft should have been able to intrude deeper without being seen. Delays in the more advanced NPO Lyulka-Saturn AL-51 engines forced the designer to continue using the Al-41F1 engines, which are also used in the Su-35S. Western sanctions have affected the Su-57's sensor suite. Based on deliveries to date, the West feels that the UAC is unlikely to meet the production target of 2024.

Su-57: A Very Capable Fighter

The West acknowledges that the Su-57 is a highly maneuverable fighter like most others from the Sukhoi fighter stable. Its 360-degree thrust vectoring allows aerodynamics-defying combat manoeuvres.

The Su-57's 'Integrated Modular Avionics Combat Systems' uses fiber optic channels. It consists of the main nose-mounted N036-1-01 X band active electronically scanned array (AESA) radar with 1,514 T/R modules and two side-looking N036B-1-01 X-band AESA radars with 404 T/R modules embedded in the cheeks of the forward fuselage for increased angular coverage.

It also has an N036L-1-01 L-band array on the leading edges. Onboard computers process the X- and L-band signals, significantly enhancing the system's information. The aircraft's electro-optical system includes infrared search and track (IRST), directional infrared countermeasures (DIRCM), ultraviolet missile approach warning sensors (MAWS), a thermal imager for low-altitude flight and landing, and a navigation and targeting pod.

The aircraft is capable of deploying countermeasures such as flares and radar decoys, as well as single-use programmable ECM transmitters. The Su-57 would also serve as a test-bed for advanced AI and man-unmanned teaming technologies.

Today, the Su-57 is one of the leading platforms, along with the Su-34 and Su-35, in Russia's combat inventory and operations in Ukraine. Russia is also working on continuous integration of new weapons into the aircraft. Several new air-to-surface weapon systems have evolved based on the combat experience in Ukraine. As part of the Manned-Unmanned Teaming (MUM-T), the Su-57 will be able to launch and/or control the S-71M "Monochrome" combat UAV for deep penetration attacks. Similar to the British Shadow Storm, the drone is more like an "air-to-surface" cruise missile.

Work is on to integrate the Okhotnik UCAV as a 'loyal wingman' for uncrewed teaming. A carrier-based variant of the aircraft is also under development. Reportedly, a 'swarm' teaming experiment had been conducted with a group of Su-35s and a Su-57 acting as a command and control aircraft.

The delay in upgrading the Su-57 with AL-51 engines is undeniable, but all production Su-57 fighters transferred to the VKS in 2024 would feature second-stage AL-51 engines. The Stage 2 engines would feature serrated exhaust nozzles that improve thrust efficiency, stability, maneuverability, and performance while reducing engine Radar, IR, and noise signatures. The Stage 2 AL-51 will not only give the fighter super-cruise and longer range but also cut down operating costs because of better fuel consumption and longer engine life.

It is worth noting that the NPO Lyulka-Saturn AL-41F1 and AL-41F1S engines, which were developed from the AL-41F, simply did not fit into the Su-57 airframe. These smaller engines had less thrust with 88.3 kN dry thrust, 142.2 kN in afterburner, and 147.1 kN in emergency power rating.

The AL-51F-1 has 107.9 kN dry thrust and 167 kN in afterburner. It is a two-shaft, low-bypass, after-burning turbofan engine. Unlike its AL-41F1 predecessor, the engine has glass-fiber plastic IGVs and convergent-divergent nozzles that use serrated flaps to reduce its signature. It also has a 19 percent higher thrust-to-weight ratio, 6.4 percent better specific thrust, and 9 percent lower specific fuel consumption. The Russians have stated that the new engines allowed the plane to reach a maximum speed of 2,600 km/h and 2,100 km/h without using an afterburner.

Russia has also developed a variety of specific armaments that can be carried in internal weapon bays. The aircraft can carry four beyond-visual-range (BVR) missiles (R-37M) in its two main weapons bays and two short-range missiles (upgraded R-74) in the side bays. It can carry bombs and surface-attack missiles on each station in the main bay. For missions that do not require stealth, the Su-57 can carry stores on its six external hardpoints, which could include the hypersonic Kh-47M2 Kinzhal air-launched ballistic missile.

The aircraft has seen operational action in Syria and Ukraine, albeit in limited missions. Whether the aircraft will be able to compete with the American F-22 and F-35 aircraft remains a matter of conjecture. The F-35 aircraft has a large number of financially powerful Western partners and also has huge orders from over 20 countries.

A Reasonably Priced & Low Life-Cycle Costs

The Su-57's flyaway cost is reportedly around \$35 million per aircraft. If true, it makes the Su-57 nearly half the price of the Chinese J-20 and even further cheaper than the much smaller single-engine F-35. Russians suggest that the Su-57's lifecycle costs are comparable to those of the Su-27, Su-30, and Su-35, which it was designed to replace. The Su-57 was intended to be the successor to the MiG-29 and Su-27. But it is clear that it will have to now operate in conjunction with the Su-35S and Su-30SM2.

Can India Acquire Su-57?

As India continues to slowly progress on its home-developed Advanced Medium Combat Aircraft (AMCA) fifth-generation fighter, Russia sees it as one of the few partnership or export options. It has been making overtures. Russia also claims to be receiving requests from some (unnamed) foreign countries for the purchase of the Su-57 multi-role fighter. Until the production rates go up, the world has been at a wait-and-watch stage.

India had earlier joined the Sukhoi/HAL Fifth Generation Fighter Aircraft (FGFA) project, which evolved the Su-57. However, India withdrew from the FGFA program in 2018 for technical and operational reasons, as well as unequal cost and work-sharing issues. India paid its 50 percent share of \$250 million toward the initial development cost. Despite India's exit, the two sides did leave a small window of hope for the future. With AMCA's squadron entry timelines slipping past 2035, the speculation has begun.

India's Urgency & Options For Fifth-Gen Aircraft

China has already produced 300 Chengdu J-20 "Mighty Dragon" fifth-generation fighters, and to match the US, it plans to induct 1,000 by 2035. Pakistan has already announced its intention to have a fifth-generation fighter by 2029. They are talking to China for the smaller but fairly versatile Shenyang J-31.

Nearly 200 Pakistan Aeronautical Complex (PAC) complex technicians are currently working with Turkish Aerospace Industries (TAI) on the TAI TF Kaan fifth-generation aircraft project. They are likely to exercise one of the options. The American Lockheed F-35 Lightning II aircraft is still not on offer, as India operates the Russian S-400 air defense system. While India pursues and accelerates the AMCA, the only global fifth-generation fighter option for New Delhi is the Russian Su-57.

But with 60 percent of the IAF still of Russian origin, is India ready to put more eggs in Russia's basket? Also, with the never-ending war in Ukraine, likely extended sanctions, and dollar-payment restrictions, Russia's ability to deliver will remain in question. India is thus stuck between the two ends of the Vice. But reviving the Indian connection with the Su-57 remains an option.

One school of thought is that the US could make an exception by selling a few F-35 squadrons to keep India away from Russia and in the American-led Western fold. India is crucial for the US' Indo-Pacific strategy. The technical hitches linked to the S-400 can be surmounted and secured through the already signed General Security of Military Information Agreement (GSOMIA) and Communications Compatibility and Security Agreement (COMCASA) agreements. For the first time, the US brought the F-35 to Aero India in 2023. Over 1,000 F-35s are already flying in 17 air forces, and due to higher investments, they will continue to see upgrades at a much faster rate.

A Non-Stealthy Interim Option

The French Air and Space Force (FASF) has recently ordered 42 Rafale jets for around \$5.5 billion. The purchase comes amidst French lawmakers' concerns about the serious delays in Franco-German-Spanish "Future Combat Air System" (FCAS) project which was to be the successor of Rafale.

The FCAS is now predicted to enter full service no earlier than 2045 or 2050. The French defense procurement agency has notified Dassault Aviation and its major equipment suppliers, Thales, Safran, and MBDA, of the contract for the fifth round of Rafale production. The Rafale is considered a 4.5-generation fighter. It has forward-hemisphere stealth and super-cruise capability. IAF Rafale aircraft are highly customized with some India-specific modifications. Essentially, they are of the F3-plus standard. The F3R standard was validated in 2018 and is currently in place on French Rafale.

Development of the F4 standard began in 2019. The standard improved onboard processing, external connectivity, MBDA's MICA medium-range air-to-air missile, and upgrade of the Thales Spectra self-defense system. The radar and sensor upgrades facilitate the detection of airborne stealth targets at long range. The helmet-mounted display also has improved capabilities.

With improved communications equipment, it is also more effective in network-centric warfare. Flight tests began in 2021, and the first F4-standard aircraft was delivered in 2023. All FASF aircraft are planned to be will be upgraded to this standard. UAE is the first foreign customer of F4. The "Super Rafale" F5 standard will have cutting-edge capabilities. Dassault and its partners are already working on the standard, which will be ready by around 2030.

The F5 standard will have next-generation new sensors, armaments, and a faster and more secure ability to communicate and collaborate. The Rafale F5 will also act as a sensor truck with data fusion and processing abilities that allow it a tactical flying command post role, a role that is evolving in the USA's Next Generation Air Dominance (NGAD).

The F5 will also be modified to carry the Anglo-French Future Cruise Missile (FCM) and Future Anti-Ship Missile (FASM). Thales RBE2 XG radar is planned for F5. The "Super Rafale" will also be modified to carry hypersonic nuclear-guided missiles known as "ASN4G," which will replace the nuclear-guided ASMPA missile as France's deterrence capability.

It is planned to integrate a loyal unmanned wingman on the lines being evolved in the European nEUROn combat drone program. Most major countries, including India, are developing the loyal wingman concept. The Rafale has seen action in Afghanistan, Libya, Mali, Iraq, and Syria. The number built to date is around 260. The new order will bring the total number of Rafale in the French armed forces to 234.

Rafale export orders currently stand at 297, including India (36), Egypt (55), Qatar (36), Greece (24), the United Arab Emirates (80), Indonesia (42), and Croatia (24) as current foreign customers. The FASF new order will keep Dassault Aviation Rafale's production line active for the next 10 years. If the IAF were to acquire 114 Rafale as a one-time import measure, all these could be made in India. India could choose to have the F5 variant, which will have many traits of the fifth-generation fighter.

To Summarize

The Indian Air Force (IAF) is considered the fourth largest and fourth most powerful air force. Its fighter squadrons are down to an all-time low of 31, and the IAF does not have a fifth-generation fighter. Chinese J-20 numbers are growing rapidly, and the aircraft has been operating at airfields across the LAC (Line of Actual Control) in Xinjiang (Hotan) and Tibet (Shigatse).

While India must invest more and take a task force approach to developing the LCA Mk2 and AMCA, it needs an interim solution to make good numbers and reduce the capability gap with China. The choices are far and few. The time to exercise is now, lest we get left far behind.

<https://www.eurasiantimes.com/only-5th-gen-option-for-iaf-russian-su-57/>

China's most advanced missile DF-41: How this ICBM helps Beijing enhance its nuclear dominance

The recent move by China to hold an intercontinental ballistic missile (ICBM) test, which Beijing claimed was a "routine arrangement in our annual training plan" had raised concerns about how China is accelerating its nuclear build-up.

The ICBM, with a dummy warhead, launched by the People's Liberation Army Rocket Force is rumoured to be a DF-31AG, a modern variant of China's Dong Feng-31 (DF-31), developed by the China Aerospace Science Corporation (CASC) and the Tai'an Special Vehicle Company. China reportedly had publicly displayed DF-31AG in 2017. The country has three DF-31AG brigades as of 2020.

However, this may not be China's most advanced missile. With a range of 12,000-15,000 km, a payload capacity of 2,500 kg, and the ability to deliver multiple warheads to different targets simultaneously, the fourth-generation DF-41 of the Dongfeng (meaning 'east wind') missile series—a highly advanced variant of China's ICBM—is being hailed as the most advanced missile possessed by Beijing.

Some social media users had suggested that China may have tested DF-41 and not DF-31AG.

The development of DF-41 began in July 1986 and the first flight test was conducted in 2012. A second test was held in 2013, and a year later, China tested it again. Multiple reports suggest that China may have tested DF-41 six to eight times.

DF-41 was first showcased at a military parade in 2019, coinciding with the 70th anniversary of the founding of the People's Republic of China.

The missile reportedly entered limited production in 2019.

According to a Missile Defense Advocacy Alliance report, DF-41—which is being developed as rail-mobile system, making it harder for intelligence agencies to track the missile moments—is capable of targetting much of the continental US and can carry as many as 10 Multiple Independently-targetable Reentry Vehicles (MIRVs) with nuclear warheads.

<https://www.theweek.in/news/defence/2024/10/15/chinas-most-advanced-missile-df-41-how-this-icbm-helps-beijing-to-enhance-its-nuclear-dominance.html>

Russia, China bolster defence ties at 'substantive' talks

Russia and China held "substantive" defence and military talks to bolster ties, Russia's defence minister said on Tuesday, as Moscow and Beijing cement a "no limits" partnership and step up criticism of U.S. efforts to extend its influence in Asia.

"The military departments of Russia and China are united in their assessments of global processes, and they have a common understanding of what needs to be done in the current situation," a post on the Russian defence ministry's Telegram messaging app cited Defence Minister Andrei Belousov as saying.

Belousov said he met with China's central military commission vice chairman, Zhang Youxia for "very substantive" talks.

China's Defence Ministry said after the meeting that both sides hope to deepen and expand military relations and maintain high-level exchanges.

Belousov's visit to Beijing took place as China's military vowed to take further action against Taiwan if needed after staging a day of war games it said were a warning to "separatist acts" and which drew condemnation from the Taiwanese and U.S. governments.

China and Russia declared a "no limits" partnership in February 2022 when President Vladimir Putin visited Beijing less than three weeks before his forces launched a full-scale invasion of Ukraine, triggering the deadliest land war in Europe since World War Two.

In May this year, Putin and China's Xi Jinping pledged a "new era" of partnership between the two most powerful rivals of the United States, which they cast as an aggressive Cold War hegemon sowing chaos across the world. Putin and Xi also agreed to deepen their "strategic partnership", Belousov said, without providing detail, adding he is confident that "fruitful work and the adoption of significant, weighty decisions are ahead."

Russia said last week it was standing alongside China on Asian issues, including the criticism of the U.S. drive to extend its influence and "deliberate attempts" to inflame the situation around Taiwan.

The U.S. says China is supporting Russia's war effort in Ukraine by supplying so-called dual use goods, including microelectronics, that can help it build weapons. China says it has not provided weaponry to any party, and that normal trade with Russia should not be interrupted or restricted.

<https://economictimes.indiatimes.com/news/defence/russia-china-bolster-defence-ties-at-substantive-talks/articleshow/114249628.cms>



Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 15 Oct 2024

Rare Observation in Hidden Structure in Crystals Brings New Paradigms in Material Design for Advanced Energy Solutions

Researchers have made a rare observation where the local crystal structure symmetry or the arrangement of atoms in the immediate vicinity of a given atom, in a crystal, reduces upon warming, contrary to the usual trend of symmetry of crystal structures increasing with rising temperatures. The study underlines the significance of chemical design in triggering unconventional phenomena in crystalline materials useful for phononics, thermoelectrics and solar thermal conversion.

Symmetry breaking plays a crucial role in fundamental chemistry and physics. A familiar manifestation of this phenomenon is the transition of a gas to a liquid and eventually to a solid upon cooling, with each phase transition involving a reduction in symmetry. Thermodynamic factors like entropy (measure of disorder) and enthalpy (measure of total energy stored) of a system determines how the system responds to changing conditions like temperature fluctuations. Traditionally, it is believed that as a material is heated, it tends to adopt a higher crystal symmetry due to the favourable increase in entropy.

However, recent findings by Prof. Kanishka Biswas, Ms. Ivy Maria, Dr. Paribesh Acharyya and other team members at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, an autonomous institute of Department of Science and Technology, challenge this conventional understanding, especially at the local structural level of a crystal.

Local structure of a crystal is the arrangement of atoms in the immediate vicinity of a given atom in a crystal, typically within the collection of the first and second nearest neighbour atoms around a specific atom, technically known as the first and second atomic coordination environments respectively. In an ideal crystal, the local structure mirrors the global structure, but in certain rare cases, they can diverge. This is precisely what the team observed in an all-inorganic two-dimensional halide perovskite, $\text{Cs}_2\text{PbI}_2\text{Cl}_2$ that belongs to the family of Ruddlesden-Popper halide perovskites (class of materials with a specific crystal structure).

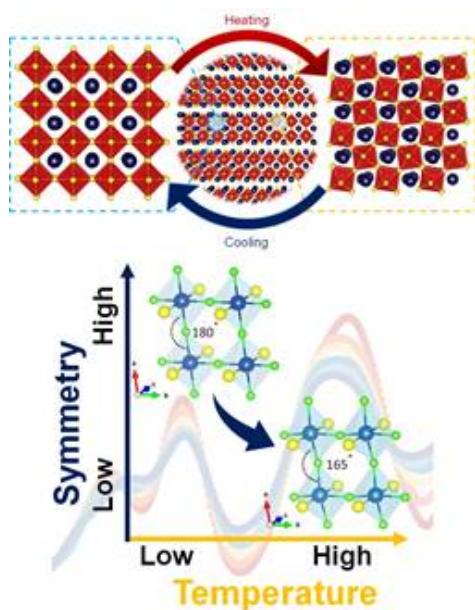
Contrary to the usual trend where heating increases symmetry, this compound exhibits a decrease in local symmetry with rising temperature, while the global crystal symmetry remains unchanged.

This occurs due to configurational averaging, where the distorted local symmetries average out at longer length scales, leaving the global structure intact. This phenomenon of local symmetry breaking upon heating is termed "emphanisis," meaning "appearing out of nothing." The team employed an advanced synchrotron X-ray technique which simultaneously reveals both the local and global structures of solids from their X-ray diffraction patterns, to investigate emphanisis.

The synchrotron X-ray experiments were done in DESY, Hamburg, Germany under the India-DESY collaboration supported by Department of Science & Technology (DST), India. The researchers traced this unusual local symmetry breaking to the stereochemically active lone pair of lead in the compound.

Interestingly, Cs₂PbI₂Cl₂ accommodates two types of structural distortion -- static distortions in chlorine atoms and dynamic distortions in lead atoms. These distortions result from the complex interplay between different structure-distorting effects driven by the interactions between the mixed halide (Cl and I) motif and the active lone electron pair of lead in Cs₂PbI₂Cl₂. The distortions happen because of a competition between a mix of structure-distorting forces that arise because of interaction of different parts of the material (the mixed anions- Cl and I) with the lone electron pair on the lead atoms in Cs₂PbI₂Cl₂.

The high temperature "emphanitic" phase is characterized as a disordered distorted state, existing at the intersection of an ordered undistorted state and an ordered distorted state. "Emphanisis" is a promising strategy for achieving intrinsically low lattice thermal conductivity in crystalline materials. Such materials are highly sought after for their fundamental importance and diverse applications, including phononics, thermoelectrics, solar thermal conversion, and various heat management systems. The study now published in *Advanced Materials*, underscores the fundamental and functional significance of chemical design in creating unconventional phenomena in crystalline materials. The findings suggest that understanding these thermodynamic subtleties can lead to intriguing structural transformations with broad applications.



Schematic representations showing the evolution of local structure of a system exhibiting emphanisis.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2064973>



Tue, 15 Oct 2024

A New Photocatalyst can Efficiently Degrade Broad-Spectrum Antibiotics

Scientists have developed an efficient photocatalyst that can degrade in sulfamethoxazole, a broad-spectrum antibiotic to less hazardous chemicals and reduce health and environmental concerns associated with antibiotic contamination.

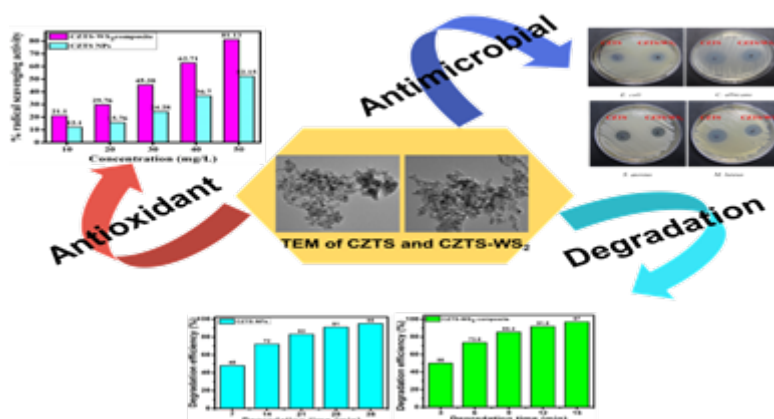
Antibiotic contamination has several adverse effects, including antibiotic resistance, ecological impact, human health concerns, etc. Hence, there is a need to find ways to mitigate this environmental issue.

A team of scientists from Institute of Advanced Study in Science and Technology (IASST), Guwahati, an autonomous institute of Department of Science and Technology have synthesized copper zinc tin sulfide Cu_2ZnSnS_4 (CZTS) nanoparticles (NPs) and copper zinc tin sulfide - tungsten disulfide CZTS- WS_2 composite. The team led by Prof. Devasish Chowdhury utilised hydrothermal reaction of zinc chloride, copper chloride, tin chloride and tungsten disulfide forming a composite that is efficient photocatalyst in degrading sulfamethoxazole, an antibiotic.

Broad-spectrum antibiotics like sulfamethoxazole (SMX) have long been used to treat human illnesses like urinary and respiratory tract infections. However, more than 54 % of SMX was released into the environment along with the faeces and urine of the patients.

“CZTS and its nanocomposites are a multifunctional quaternary semiconductor nanomaterial made up of earth-abundant, inexpensive, and non-toxic components possessing remarkable photostability making it extremely valuable in light-harvesting and photocatalyst applications,” said Prof. Chowdhury.

The team consisting of Nur Jalal Mondal, Rahul Sonkar, Mridusmita Barman and Dr. Mritunjoy Prasad Ghosh, established that the CZTS- WS_2 composite exhibits good photocatalytic activity for the breakdown of sulfamethoxazole.



The developed catalyst could be recovered and used repeatedly without losing its effectiveness, which is very important from an economic point of view.

Liquid chromatography–mass spectrometry (LC-MS) a popular analytical chemistry technique that can separate and identify the degraded product was used to analyze the intermediates and degraded products of the antibiotics' degradation reaction. The study published in Journal of Photochemistry & Photobiology A, determined that the majority of intermediates were less hazardous than sulfamethoxazole. In addition, the CZTS-WS2 composite demonstrated more than 80% radical scavenging efficiency and antibacterial capabilities.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2064969>

THE  **HINDU**

Mon, 15 Oct 2024

Leading Indian woman scientist is International Brain Research Organisation's president-elect

A leading Indian woman scientist, Shubha Tole has been appointed as the president-elect of the International Brain Research Organisation (IBRO). She is the first scientist from a developing country to be appointed to the top position. The IBRO governing council represents 69 scientific societies and federations from 57 countries worldwide. It recently elected new officers during its annual assembly in Chicago, USA. Ms. Tole, currently serves as the dean of graduate studies at Mumbai's premier scientific research institute – Tata Institute of Fundamental Research.

The International Brain Research Organization is the global federation of neuroscience organizations which promote and support neuroscience around the world through training, teaching, collaborative research, advocacy and outreach. While speaking exclusively to The Hindu, Ms. Tole said, "Leadership position offers the opportunity to have impact on a wider range of issues and expands the range of people one can help. The importance of women role models cannot be under-emphasized in these matters."



This is the exclusive interview she gave to The Hindu after being appointed to the position.

How significant is it for an Indian scientist to be appointed to IBRO?

I left India to join a PhD program at Caltech when I was 21. I returned after PhD (Caltech) and postdoc (University of Chicago) when I was 31. It is now 25 years since I've been running my lab at TIFR. My lab was the first one in India to explore the development of the vertebrate brain using modern transgenic approaches. Now, there is a growing neuroscience community in India that includes my own trainees having returned and set up their own labs in leading research and teaching institutions.

I actively mentor younger faculty and promote the sharing of reagents, training opportunities and collaborations within the country. I am vocal on social media about issues that are important for Indian science to thrive. Whenever I am invited to give a scientific talk in any University/ Institution I offer a second talk about Career Planning/ Women in Science/ Mentorship/ How Graduate Programs could better support students. In this sense, I promoted DEI initiatives long before this was articulated as a desirable policy.

I have served in international organizations for some time now. I am currently the President of the International Society for Developmental Neuroscience; in the past, I served on the Ethics and Scientific Publications committees of the Society for Neuroscience and also on the Board of Directors of the ALBA Network. My election as IBRO's President-elect is in a sense a recognition of this kind of engagement with the scientific and student community worldwide - something I have been doing outside of my research for my entire career.

How important is this appointment for women scientists across the world?

It is always meaningful for women to be elected to positions of leadership. Fortunately, in the biological sciences, this is not as rare an occurrence as it is in other STEM fields. But, a leadership position offers the opportunity to have an impact on a wider range of issues and expands the range of people one can help. The importance of women role models cannot be underemphasized in these matters.

How do you foresee your contribution to IBRO?

The experiences of challenges and creative solutions, interactions with the local community and shared efforts to overcome hurdles - all these are what I will contribute to my role in IBRO. In electing its first President-elect from outside Europe/ North America, IBRO is demonstrating its truly global identity. It is a privilege to serve the global neuroscience community through an organization like IBRO that has a network to reach aspiring and practising neuroscientists worldwide, including those from regions that may not have easy access to resources or networking opportunities.

<https://www.thehindu.com/sci-tech/science/leading-indian-woman-scientist-is-international-brain-research-organisations-president-elect/article68757842.ece>

Centre sets up AI hubs for research on health, agriculture, sustainable cities

The Centre on Tuesday (October 15, 2024) announced setting up of three centres of excellence (CoE) in artificial intelligence (AI) in healthcare, agriculture and sustainable cities. While the CoE in healthcare will be led by the All India Institute of Medical Sciences (AIIMS) and Indian Institute of Technology (IIT) in Delhi, the IIT in Ropar, Punjab will lead the CoE in agriculture. IIT Kanpur has been given the charge of developing CoE in sustainable cities. The CoEs will function with industries and start-ups.

Announcing the decision, Union Education Minister Dharmendra Pradhan said the AI-CoEs were going to be solution providers and would create a new generation of employment providers and wealth creators. The Union Budget of 2023-24 had proposed the setting up of AI-CoEs with a financial outlay of ₹990 crore over the period of 2023-24 to 2027-28. To oversee its implementation, an industry-heavy apex committee had also been constituted, co-chaired by Sridhar Vembu.

“With the unveiling of the centres, significant strides have been taken to strengthen Bharat’s credentials in the global AI landscape,” Mr. Pradhan said and hoped that the CoEs would be a key element of global public policy and also emerge as solution providers of the world. Complimenting the panel headed by Dr. Vembu for their efforts towards the implementation of these COEs in AI, he said these institutions would give further impetus to the start-up ecosystem in the country, help create a new generation of job and wealth creators and establish new paradigms of global public good.

Union Higher Education Secretary K. Sanjay Murthy said the CoEs would promote multidisciplinary research with the right kind of collaboration among like-minded resources and this could result in achieving optimum results.

He noted that the competitive-based challenge methods developed in educational institutions had ensured progress towards resolving common problems. Dr. Vembu said these projects would holistically benefit the health of villages, cities, and the people of the country.

“The CoEs will bootstrap numerous efforts, create companies, nurture talent, and generate opportunities for our talent pool,” he said.

<https://www.thehindu.com/news/national/centre-sets-up-ai-hubs-for-research-on-health-agriculture-sustainable-cities/article68757384.ece>

ISRO to launch European Proba-3 mission on November 29 to create artificial eclipse

The European Space Agency's (ESA) groundbreaking Proba-3 mission has successfully completed its final test before being shipped to India for launch by the Indian Space Research Organisation (ISRO).

This dual-satellite mission, designed to create an artificial solar eclipse in space, demonstrated its operational readiness by receiving commands from its science team and transmitting images back, mirroring its planned in-orbit functionality.

Proba-3's innovative approach involves two satellites flying in precise formation, with one casting a shadow on the other to block out the Sun's disk.

This technique will allow for prolonged observation of the Sun's corona, a feat previously unachievable in space missions.

The test, conducted over 12 hours, simulated part of Proba-3's highly elliptical 19.5-hour orbit around Earth. It focused on the six-hour period around the orbit's apogee, where the formation flying and solar corona observations will occur.

The Royal Observatory of Belgium in Brussels sent payload operation requests to ESA's control center in Redu, which then transmitted commands to the spacecraft in a cleanroom at Redwire Space in Kruibeke.

This final System Validation Test (SVT) was crucial in verifying the mission's operational chain, involving actual ground segment facilities, software, and personnel who will oversee the mission.

It demonstrated the ability to send commands for in-flight calibration, scientific observation, and command updates, providing flexibility for responding to exceptional solar events.

Proba-3 system engineers highlighted the importance of these tests in ensuring smooth data flow between the ground segment and satellites, emphasizing the mission's highly automated ground and flight system.

With testing complete, Proba-3 is scheduled to be shipped to the Satish Dhawan Space Centre in India on October 21, with a planned launch by PSLV-XL launcher on November 29.

This mission represents the latest in ESA's family of experimental minisatellites, pushing the boundaries of space technology and solar observation.

<https://www.indiatoday.in/science/story/isro-to-launch-european-proba-3-mission-on-november-29-to-create-artificial-eclipse-2617131-2024-10-15>

