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समाचार पत्रों से चयित अंश Newspapers Clippings

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

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DRDO News

DRDO On Twitter



DRDO
@DRDO_India



Saluting the contributions of India's first Chief of Defence Staff (CDS) General Bipin Rawat on being conferred with [#PadmaVibhushan](#) posthumously. His vision and drive for indigenous defence systems will remain a motivating force.

[#PeoplesPadma](#)
[#PadmaAwards2022](#)

10:28 PM · Mar 21, 2022 · Twitter for Android



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Defence Geoinformatics Research Establishment (DGRE), a Chandigarh based DRDO lab is organising a five day International training course on 'Mountain Geohazard Assesment and Management' from 21 Mar' 2022 at its Manali centre, Himachal Pradesh.
[@PMOIndia](#) [@DefenceMinIndi](#)



4:43 PM · Mar 21, 2022 · Twitter for Android



पत्र सूचना कार्यालय
भारत सरकार
रक्षा मंत्रालय

Mon, 21 Mar 2022 2:13PM

भारतीय सैन्य दल संयुक्त सैन्य अभ्यास “लामितिये – 2022” के लिए सेशेल्स पहुंचा

भारतीय सेना और सेशेल्स रक्षा बलों (एसडीएफ) के बीच 9वां संयुक्त सैन्य अभ्यास लामितिये-2022, सेशेल्स रक्षा अकादमी (एसडीए) सेशेल्स में 22 मार्च से 31 मार्च 22 तक आयोजित किया जा रहा है। भारतीय सेना और सेशेल्स रक्षा बल दोनों की एक-एक इन्फैंट्री प्लाटून कंपनी मुख्यालय के साथ इस अभ्यास में भाग लेंगी। इस अभ्यास का उद्देश्य अर्ध-शहरी वातावरण में शत्रु बलों के खिलाफ विभिन्न अभियानों के दौरान प्राप्त किए गए अनुभवों को साझा करने और संयुक्त अभियान शुरू करने के लिए क्षमता में वृद्धि करना है। भारतीय सैन्य दल में 2/3 गोरखा राइफल्स समूह (पीरकंठी बटालियन) के सैनिक शामिल हैं। यह दल 21 मार्च, 2022 को सेशेल्स पहुंच गया है।

सैन्य अभ्यास - 2022 एक द्विवार्षिक प्रशिक्षण कार्यक्रम है, जिसका 2001 से सेशेल्स में आयोजन किया जा रहा है। यह उल्लेखनीय है कि विभिन्न देशों के साथ भारत द्वारा किए जा रहे सैन्य प्रशिक्षण अभ्यास की श्रृंखला में सेशेल्स के साथ आयोजित किया जा रहा यह लामितिये अभ्यास मौजूदा वैश्विक स्थिति और हिन्द महासागर क्षेत्र में बढ़ती हुई सुरक्षा चिंताओं की पृष्ठभूमि में दोनों देशों के लिए सामने आ रही सुरक्षा चुनौतियों के संदर्भ में बहुत अहम और महत्वपूर्ण है।

इस 10 दिनों तक चलने वाले संयुक्त अभ्यास में क्षेत्र प्रशिक्षण अभ्यास, युद्ध चर्चा, व्याख्यान, प्रदर्शन शामिल हैं जो दो दिवसीय प्रमाणीकरण अभ्यास के साथ समाप्त होगा। इस संयुक्त प्रशिक्षण अभ्यास का उद्देश्य दोनों सेनाओं के बीच कौशल, अनुभव और अच्छी प्रक्रियाओं के आदान-प्रदान के द्वारा द्विपक्षीय सैन्य संबंधों की स्थापना करना और उन्हें बढ़ावा देना है। दोनों पक्ष संयुक्त परिचालन आयोजित करने के लिए नई पीढ़ी के उपकरणों और प्रौद्योगिकी का पता लगाने और प्रदर्शन करते हुए, अर्ध शहरी वातावरण में आने वाले संभावित खतरों को समाप्त करने के लिए अच्छी तरह से विकसित सामरिक अभ्यासों की एक श्रृंखला का संयुक्त रूप से प्रशिक्षण, नियोजन और निष्पादन करेंगे। अर्ध-शहरी वातावरण में शत्रु दलों का मुकाबला करने में सामरिक कौशल को बढ़ाने और दोनों बलों के बीच अंतर-संचालन बढ़ाने पर पूरा ध्यान केन्द्रित किया जाएगा।

भारतीय सैन्य दल के कंपनी कमांडर मेजर अभिषेक नेपाल सिंह ने कहा कि यह द्विवार्षिक सैन्य अभ्यास, सेशेल्स में आयोजित एक निर्गामी आउटबाउंड अभ्यास है, जिसने दोनों सेनाओं के बीच द्विपक्षीय सैन्य सहयोग और अंतर-संचालनता को मजबूत बनाने में काफी योगदान दिया है। हम विचार-विमर्श और सामरिक अभ्यासों पर आधारित अनेक स्थितियों के माध्यम से उप-पारंपरिक संचालनों में नई प्रौद्योगिकी के समावेश के साथ-साथ मान्य अभ्यासों और प्रक्रियाओं को समाविष्ट करने के लिए व्यावहारिक पहलुओं को साझा करने के लिए भी तत्पर हैं। इस संयुक्त सैन्य अभ्यास से भारतीय सेना और सेशेल्स रक्षा बलों (एसडीएफ) के बीच रक्षा सहयोग के स्तर को बढ़ाने और दोनों देशों के बीच द्विपक्षीय संबंधों को आगे बढ़ाने में मदद मिलेगी।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807638>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:13PM

Indian military contingent arrives at Seychelles for joint military exercise LAMITIYE – 2022

The 9th Joint Military Exercise LAMITIYE-2022 between the Indian Army and Seychelles Defence Forces (SDF) is being conducted at Seychelles Defence Academy (SDA), Seychelles from 22 March to 31 March 22. An Infantry Platoon strength each from both the Indian Army and Seychelles Defence Forces (SDF) along with Company Headquarters will be participating in this exercise which is aimed at sharing experiences gained during various operations against hostile forces in Semi-Urban environment and enhance capability to undertake joint operations.

The Indian Army contingent comprising troops from the 2/3 GORKHA RIFLES group (PIRKANTHI Battalion) arrived at Seychelles on 21 March 2022.

Exercise LAMITIYE-2022 is a biennial training event which is being conducted in Seychelles since 2001. Notably, in the series of military training exercises undertaken by India with various countries; Exercise LAMITIYE with Seychelles is crucial and significant in terms of security challenges faced by both the Nations in the backdrop of current global situation and growing security concerns in the Indian Ocean Region.

The 10 days long joint exercise will include field training exercises, combat discussions, lectures, demonstrations and culminate with a two days validation exercise. The objective of the joint training exercise is to build and promote bilateral military relations in addition to exchanging skills, experiences and good practices between both the armies. Both sides will jointly train, plan and execute a series of well-developed tactical drills for neutralisation of likely threats that may be encountered in Semi Urban environment, while exploiting and showcasing new generation equipment and technology for conducting joint operations. Due emphasis will be laid on enhancing tactical skills in combating hostile forces in Semi-Urban environment and on increasing interoperability between forces.

Major Abhishek Nepal Singh, Company Commander of Indian Army contingent stated, “The biennial exercise, which has largely contributed to strengthen bilateral military cooperation & interoperability between both armies, is an outbound exercise being held in Seychelles. We look forward to share practical aspects to comprehend and put in practice the validated drills, procedures as well as amalgamation of new technology in sub-conventional operations through numerous situation based discussions and tactical exercises”.The joint military exercise will enhance the level of defence co-operation between Indian Army and Seychelles Defence Forces (SDF) and will further manifest in enhancing the bilateral relations between the two countries.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807591>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:38PM

Setting up of new Defence undertakings

Seven new Defence Public Sector Undertakings have been set up with effect from 1st October 2021, by converting 41 production units of erstwhile Ordnance Factory Board (OFB), for manufacturing of modern weapons and armament indigenously, during the last five years. Further, the Defence Industry Sector, which was hitherto reserved for the public sector, was opened up to 100% for Indian private sector participation in May 2001. In the last five years, Government has issued a total of 214 Defence Industrial Licenses to the private sector as well, out of them 43 industries have reported commencement of production.

The Government has taken several policy initiatives in the past few years under 'Make in India' program and brought in reforms to enhance the capacity of manufacturing undertakings and private industries functioning in the country by encouraging indigenous design, development and manufacture of defence equipment. Following steps have been taken by Government:

- Announcement of 18 major platforms for industry led design and development.
- Notification of two 'Positive Indigenisation Lists' of total 209 items of Services and one 'Positive Indigenisation List' of total 2851 items of Defence Public Sector Undertakings (DPSUs), for which there would be an embargo on the import beyond the timelines indicated against them.
- Launch of an indigenization portal namely SRIJAN to facilitate indigenisation by Indian Industry including MSMEs.
- Launch of Innovations for Defence Excellence (iDEX) scheme involving start-ups & Micro, Small and Medium Enterprises (MSMEs).
- Simplification of Industrial licensing process with longer validity period.
- To provide autonomy and enhance efficiency and unleash new growth potential in the Ordnance Factories, the Government has corporatized OFB and converted it into seven new Defence Public Sector Undertakings.
- Simplification of Make Procedure.
- Implementation of Public Procurement (Preference to Make in India) Order 2017.

- Establishment of two Defence Industrial Corridors, one each in Uttar Pradesh and Tamil Nadu.

The capital budget for procurement from domestic industries is continuously increasing. In the last few years, it has gone up from 58% of total capital budget to 68% for the year 2022-23 amounting to Rs. 84597.89 Crore. In addition to it, Government of India has also funded some DPSUs & Ordnance Factories in last five years to enhance their manufacturing capacity which is as follows:

- A total of Rs 90.08 crore has been invested under Repair & Refurbishment of Machinery and Infrastructure (RRMI) Scheme in Hindustan Shipyard Limited (HSL).
- Rs 880 crore has been provided to Goa Shipyard Limited (GSL) under Infrastructure Augmentation Plan as Government funding.
- A total expenditure of Rs 5,263.92 crore has been incurred by erstwhile OFB under modernisation [Renewal & Replacement (RR), New Capital (NC) P&M, Capital Civil Works].
- An amount of Rs 2,765.95 crore has also been released to the 7 new companies during the current financial year for capital works and equity.

There has been a decline in percentage of capital expenditure on procurement of Defence equipment from foreign vendors from 48% in 2018-19 to 36% in 2020-21.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Ms Saroj Pandey in Rajya Sabha on March 21, 2022.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807602>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:42PM

Defence exports

Many reforms/steps have been taken up by the Government to boost Defence exports and enhance ease of doing business in recent times. These are as follows:

- Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET) Category 6 titled “Munitions List” that was hitherto “Reserved” has been populated and Military Stores list notified vide Notification No.115(RE-2013)/2009-2014 dated 13th March 2015 stands rescinded.
- The Director General of Foreign Trade (DGFT) vide Public Notice No. 4/2015-20 dated 24th April, 2017 has delegated its authority and notified Department of Defence Production(DDP) as the Licensing Authority for export items in Category 6 of SCOMET. The export of items specified in Category 6 (Munitions List) except those covered under Notes 2 & 3 of Commodity Identification Note (CIN) of the SCOMET is now governed by the Standard Operating Procedure issued by the Department of Defence Production (DDP), Ministry of Defence.
- Standard Operating Procedure (SOP) for the export of munitions list items have been simplified and placed on the website of the DDP.

- A completely end-to-end online portal for receiving and processing export authorisation permission has been developed. The applications submitted on this portal are digitally signed and the authorisation are also issued digitally, at faster pace.
- In repeat orders of same product to the same entity, consultation process has been done away with and permission is issued immediately. For the repeat order of same product to different entity, the consultation earlier done with all stakeholders is now limited only with MEA.
- In Intra-Company business (which is especially relevant for outsourcing of work by defence related parent company abroad to its subsidiary in India), the earlier requirement of getting End User Certificate (EUC) from the Government of importing country has been done away with and 'Buying' Company is authorized to issue the EUC.
- The requirement of Government signed EUC in cases of providing engineering services (ToT related to Munitions List) to Wassenaar Arrangement (WA) Countries has been dispensed with.
- Legitimate export of systems/platforms for civil end use to WA Member countries is considered subject to submission of EUC or import certificate or equivalent document issued by the Government of importing country.
- The legitimate export of the parts and components of small arms and body armour for civil use are now being permitted after prior consultation with MEA.
- For export of items for exhibition purposes, the requirement of consultation with stakeholders has been done away with (except for select countries).
- Powers have been delegated to DRDO and CMDs of DPSUs for exploring export opportunities and participation in global tenders.
- New simplified End User Certificate Format for Parts & Components has been provided in SOP.
- Validity of Export Authorization for export of parts & components has been increased from 02 years to date of completion of order/component whichever is later.
- A new provision for re-exporting parts and components for undertaking repair or rework to provide replacement for a component under warranty obligation is inserted in the SOP as a sub-classification of repeat orders.
- MHA vide Notification dated 1.11.2018 has delegated its powers to Department of Defence of Production to issue export license under Arms Rules 2016 in Form X-A, for parts & components of small arms. With this the Department of Defence Production becomes the single point of contact for exporter for export of parts and components of Small Arms & Ammunitions.
- The Government has notified the Open General Export License (OGEL) - one time export license, which permits the industry to export specified items to specified destinations, enumerated in the OGEL, without seeking export authorisation during the validity of the OGEL. OGEL has been integrated with end to end online Portal.
- Scheme for Promotion of Defence Exports has been notified to provide an opportunity to the prospective exporters an option to get their product certified by the Govt. and provides access to the testing infrastructure of Ministry of Defence for initial validation of the product and its subsequent field trials. The certificate can be produced by the prospective exporter for marketing their products suitably in the global market.
- A separate Cell has been formed in the Department of Defence Production to co-ordinate and follow up on export related action including enquiries received from various countries, sharing the leads with private sector & public sector companies and facilitate exports.

- In order to boost defence exports, regular webinars are being organized with Friendly Foreign Countries (FFCs) under the aegis of DDP, MoD through Indian Missions abroad and Industry Associations with active participation from Indian Defence Industries.
- A Scheme to provide financial support to Defence Attaches for taking up actions for promoting exports of India made defence products both of public and private sector in the countries to which they are attached has been notified.
- To enhance functional autonomy, efficiency and unleash new growth potential and innovation in Ordnance Factories, the Government has corporatized 41 Ordnance Factories into seven Defence Public Sector Units (DPSUs), 100% Government owned corporate entity (ies). India is exporting various defence items including major items to different countries all over the world. At present, India is exporting defence items to about 80 Friendly Foreign Countries (FFCs). India is also involved in negotiations to deepen defence ties with FFCs. However, due to strategic reasons, the names of countries cannot be divulged. This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Ram Shakti in Rajya Sabha on March 21, 2022.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807608>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:38 PM

Expansion activities in BEL

As part of expansion of the existing unit, BEL has taken up establishment of an Advance Night Vision Products Factory in Nimmaluru Village, Pamarru Mandal, Krishna District of Andhra Pradesh in an area of around 50 acres, to cater to the futuristic requirements for Night Vision Products. The new factory is likely to create direct and indirect employment for around 500 people.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Kanakamedala Ravindra Kumar in Rajya Sabha on March 21, 2022.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807603>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:41PM

Defence corridor projects in Tamil Nadu

The Defence Industrial Corridors (DICs) have been established in Uttar Pradesh and Tamil Nadu with an aim to attract over Rs 10,000 crore investment in each of the two Defence-Industrial Corridors. As per information received from Government of Uttar Pradesh, for Uttar Pradesh Defence Industrial Corridor (UPDIC), 63 Memoranda of Understanding

(MoUs) have been signed as on date with potential investment of Rs 8,764 crore. Current actual investment in Uttar Pradesh Defence Industrial Corridor is Rs 1,552 crore. Further, as per information received from Government of Tamil Nadu, in Tamil Nadu Defence Industrial Corridor (TNDIC), arrangements have been made through MoUs etc. for potential investment of Rs 11,103 crore by 39 industries. Current actual investment in Tamil Nadu Defence Industrial Corridor is Rs 2,217 crore. The respective State Governments provide and support development of infrastructure facilities like connecting Roads, Electricity, Water and Sewage systems etc. for the development of the corridors.

The Memorandum presented by the Minister of Industries in Tamil Nadu to the Union Minister of Defence in September, 2021 contained proposals for setting up of Testing and Certification infrastructure, DRDO labs, Commercial Production units for AEWCS, Transfer of Defence land, and formation of Joint Venture (JV) with HAL etc. The concerned Department/ Organisations have been advised to take appropriate action as per their extant guidelines and procedures.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri P Wilson in Rajya Sabha on March 21, 2022.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807606>



Press Information Bureau
Government of India

Ministry of Defence

Mon, 21 Mar 2022 2:39PM

Private participation in Defence industry

Defence Industry sector, which was hitherto reserved for the public sector, was opened up to 100% for Indian private sector participation in May, 2001. So far, Government has issued a total of 568 Defence Industrial Licenses to 351 companies. Out of these, a total of 113 companies covering 170 Defence Industrial Licenses have conveyed commencement of production.

As per the condition stipulated in the License, the Defence Industry is required to provide the standards and testing procedures for equipment to be produced to the Government nominated Quality Assurance Agency. The nominated Quality Assurance Agency inspects the finished products and conducts surveillance and audit of the quality assurance procedures.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Tiruchi Siva in Rajya Sabha on March 21, 2022.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1807604>



Mon, 21 Mar 2022

Shortage of semiconductor chips, talent retention: Defence PSUs face tests amid push for self-reliance

Shortage of semiconductor chips, delayed approval in key projects, talent retention and procurement through Government e-Marketplace (GeM) are some of the challenges being faced by India's Defence Public Sector Undertakings (DPSUs) amid push for self-reliance in the sector, a parliamentary panel has noted.

The standing committee on defence, in one of its latest reports, noted that while the first two comprises the major challenges which Bharat Electronics Limited (BEL) is facing, the others, along with enhancing of exports, are among Bharat Earth Movers Limited (BEML's) major challenges. Similarly, the roadblocks faced by the Hindustan Aeronautics Limited (HAL) include getting supporting platforms for up to 40 to 50 years or even beyond, which is expensive, extensive testing and economy of scale—implying adequate orders to break even—and competition from established players in the export market.

Other challenges faced by the Hindustan Shipyard Limited (HSL), Mishra Dhatu Nigam Limited (MIDHANI) and Bharat Dynamics Limited (BDL) include idling of submarine refit facilities since the last two years, carrying forward legacy liabilities including negative net worth, volatility in price of imported input raw material volatile and limited availability, pending permission from the Foreign Original Equipment Manufacturers (OEMs) to export missiles.

<https://www.news18.com/news/india/shortage-of-semiconductor-chips-talent-retention-defence-psus-face-tests-amid-push-for-self-reliance-4893467.html>



Tue, 22 Mar 2022

HAL expects Safran MOU to yield \$1 bn plus revenue in 5 years

Hindustan Aeronautics Limited (HAL) has signed a memorandum of understanding (MoU) with a French aerospace engine firm Safran Helicopter Engines to extend its cooperation and explore opportunities for new helicopter engines in civil and military markets. In an interview with CNBC-TV18, R Madhavan, CMD, Hindustan Aeronautics, sheds light on the joint venture and resulting opportunities. Madhavan affirmed that MoU with Safran could yield revenue of over USD 1 billion in the next 5 years. He also explained that the company will be looking at newer products through the joint venture with Safran.

“It will have more than a billion-dollar of revenue in about five years' time from now and yearly revenues are also good; we are assessing that in peak, it will produce about 150 engines in a year starting with 50 engines in the coming year, 23-24 onwards,” he said. On the order book at hand, Madhavan said that most of it can be executed in FY23-24. Additionally,

he mentioned that he expects to see a growth in the range of 6-7 percent in the current fiscal (FY22).

He said, “We feel that our position is quite strong and this year also, we will have a growth which is at least 6-7 percent over last year and we intend to continue with the same growth rate next year also.”

<http://www.indiandefensenews.in/2022/03/hal-expects-safran-mou-to-yeild-1-bn.html>

Science & Technology News



पत्र सूचना कार्यालय
भारत सरकार

विज्ञान एवं प्रौद्योगिकी मंत्रालय

Tue, 21 Mar 2022

स्व-संचालित फ्लेक्सिबल-पीजो-स्पिंट्रॉनिक नैनोडिवाइसेस में संभावित अनुप्रयोगों के साथ 2डी मोनोलेयर्स की भविष्यवाणी की गई

भारतीय वैज्ञानिकों की एक टीम ने कम्प्यूटेशनल रूप से दो आकर्षक 2डी मोनोलेयर्स की भविष्यवाणी की है, जो अगली पीढ़ी की स्व-संचालित सामग्रियों में अनुप्रयोगों के लिए काफी संभावनाएं हैं जो तनाव की प्रतिक्रिया में चक्रीय धाराओं को विकसित करते हैं।

आवेश के अलावा, इलेक्ट्रॉनों को चक्रण कही जाने वाली एक और प्रकार की स्वतंत्रता मिली हुई होती है। इलेक्ट्रॉन की स्वतंत्रता की स्पिन डिग्री (स्पिन-अप और स्पिन-डाउन) एक उसका आंतरिक गुणधर्म है और इससे इलेक्ट्रॉनिक आवेश (चार्ज) की गति की तुलना में किसी चुंबकीय क्षेत्र की उपस्थिति में हेरफेर करना अपेक्षाकृत आसान है। हाल के प्रयोगों ने प्रदर्शित किया है कि नई सामग्रियों में स्पिन डिग्री की स्वतंत्रता का उपयोग बड़ी मात्रा में डेटा को लंबे समय तक संग्रहीत करने का सबसे तेज़ और सबसे प्रभावी तरीका हो सकता है और यह उपकरण अगली पीढ़ी की उच्च गति क्वांटम जानकारी के लिए आगे का मार्ग प्रशस्त कर सकता है। स्पिंट्रॉनिक्स अगली पीढ़ी के डेटा भंडारण उपकरणों की ओर ले जाने वाली सूचनाओं को इकट्ठा करने और संग्रहीत करने के लिए इलेक्ट्रॉनों के स्पिन का उपयोग करता है। चुंबकीय सेंसर अनुप्रयोग और सैद्धांतिक भविष्यवाणियां इन गुणों का उपयोग करके नई सामग्रियों को डिजाइन करने में प्रयोगवादियों और प्रौद्योगिकीविदों को मूल्यवान मार्गदर्शन प्रदान कर सकती हैं।

वर्तमान कार्य में विज्ञान और प्रौद्योगिकी विभाग के एक स्वायत्त शासी संस्थान नैनो विज्ञान और प्रौद्योगिकी संस्थान, मोहाली (पंजाब) के प्रो. अबीर डी सरकार और उनके शोध (पीएच.डी.) छात्र, मनीष कुमार मोहंता और फातिमा आई.एस. नैनो ने पत्रिका 'एसीएस एपल' मेटर. इंटरफेस. में स्थिर, हेक्सागोनल, बकलड जेडएनएक्स (एक्स:एस,एसई अथवा टीई) मोनोलयर्स के एक नए वर्ग का प्रस्ताव दिया है। इनमें से, जेडएनटीई और इसके आइसोइलेक्ट्रॉनिक सहयोगी सीडीटीई एक मजबूत स्पिन-ऑर्बिट युग्मन (कपलिंग) का प्रदर्शन करते हैं।

सीडीटीई और जेडएनटीई मोनोलयर्स में पीजोइलेक्ट्रिक गुणधर्म का लाभ उठाते हुए, तनाव के अनुप्रयोग पर एक बड़ा पीजो वोल्टेज उत्पन्न किया जा सकता है, जो बाहरी वोल्टेज स्रोत को प्रतिस्थापित कर सकता है। पीजोइलेक्ट्रिकिटी के एक साथ युग्मन, कम यांत्रिक कठोरता, और स्पिन बैंड के गति-निर्भर विभाजन से अगली पीढ़ी के ऐसे स्व-संचालित लचीले-पीजो-स्पिट्रॉनिक उपकरण (डिवाइसेस) विकसित होते हैं, जो पहले एक-आयामी जिंक ऑक्साइड (जेडएनओ) नैनोवायर्स के लिए प्रस्तावित थे। वर्तमान टीम द्वारा इस अवधारणा को सैद्धांतिक रूप से 2डी सेमीकंडक्टर्स तक बढ़ा दिया गया है।

आईएनएसटी टीम ने पहले संश्लेषित एक अलग पैटर्न वाली प्रचुर संरचनाओं से हेक्सागोनल बकलड 2डी सेमीकंडक्टर्स जेडएनटीई और सीडीटीई मोनोलयर्स तैयार किए। मजबूत स्पिन-ऑर्बिट कपलिंग (एसओसी) दिखाने के अलावा, ये अर्धचालक (सेमीकंडक्टर्स) अत्यधिक लचीले पाए जाते हैं। इन मोनोलयर्स में प्राप्त इस तरह के उत्कृष्ट परिणाम अगली पीढ़ी के स्व-संचालित लचीले-पीजो-स्पिट्रॉनिक उपकरणों में अनुप्रयोगों के लिए उनकी अत्यधिक क्षमता का संकेत देते हैं।

ऐसा पहली बार है जब 2डी सेमीकंडक्टर्स में स्पिन-ऑर्बिट कपलिंग, पीजोइलेक्ट्रिकिटी और द्वि-परमाणु परत मोटे अर्धचालकों में लचीलेपन का एक साथ संयोजन (कम्बीनेशन) बताया गया है। विस्तृत बैंडगैप बाह्य व्यतिक्रमों (एक्सटर्नल पर्ट्यूरबेशन्स) के माध्यम से अपने इलेक्ट्रॉनिक गुणों में मॉड्यूलेशन के लिए पर्याप्त जगह प्रदान करता है।

अगली पीढ़ी के स्पिट्रॉनिक उपकरणों में कम बिजली की खपत और स्पिन अभिविन्यास (ओरिएंटेशन) पर सटीक नियंत्रण की आवश्यकता होती है। स्व-संचालित डिवाइस से अतिरिक्त लाभ मिलेंगे। इस संबंध में, अर्धचालक के गुण नई प्रौद्योगिकियों के विकास या मौजूदा को आगे बढ़ाने में निर्णायक भूमिका निभाते हैं। उच्च पीजोइलेक्ट्रिक गुणांक (कोएफिशिएन्ट) और मजबूत एसओसी वाले नए 2डी सेमीकंडक्टर्स स्व-संचालित अगली पीढ़ी के स्पिट्रॉनिक उपकरणों के लिए एक नया अवसर उपलब्ध करा सकते हैं। वैज्ञानिक और औद्योगिक अनुसंधान परिषद (काउंसिल ऑफ साइंटिफिक एंड इंस्ट्रियल रिसर्च - सीएसआईआर), भारत और डीएसटी-इंस्पायर (आईएनएसपीआईआईआई) अनुदान द्वारा वित्त पोषित इस अनुसंधान में जेडएनटीई और सीडीटीई मोनोलयर्स की भविष्यवाणी की गई है जो सभी अनूठे गुणों-जैसे कि लचीलापन, पीजोइलेक्ट्रिकिटी और ट्यून करने योग्य असाधारण गति पर निर्भर स्पिन बैंड (रश्बा प्रॉपर्टीज) को जोड़ती है।

प्रो. डी सरकार ने कहा कि, "हमारे कम्प्यूटेशनल निष्कर्षों से प्रयोगकर्ताओं को वांछित कार्यक्षमता के साथ नैनो-डिवाइस बनाने के लिए प्रेरणा मिलने की उम्मीद है।"

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2D monolayers with potential applications in Self-Powered Flexible-Piezo-Spintronic Nanodevices predicted

A team of Indian Scientists have computationally predicted two fascinating 2D monolayers having great potential for applications in next-generation self-powered materials which develop spin currents in response to strain.

Apart from the charge, electrons are gifted with another degree of freedom, namely, the spin. The spin degree of freedom (spin-up and spin-down) of an electron is an intrinsic property and relatively easier to manipulate in the presence of a magnetic field as compared to the motion of the electronic charge. Recent experiments have demonstrated that the usage of the spin degree of freedom in new materials can be the fastest and most effective way to store a large amount of data for a long time and can pave the way forward for next-generation high-speed quantum information devices. Spintronics utilizes the spin of electrons to gather and store information that leads to the next-generation data storage devices. Magnetic sensor applications and theoretical predictions can provide valuable guidance to experimentalists and technologists in designing new materials using these properties.

In the present work, Prof. Abir De Sarkar and his Ph.D. students, Manish Kumar Mohanta & Fathima I. S. from Institute of Nano Science and Technology, Mohali, an autonomous institute of the Department of Science & Technology (DST), Govt. of India, have proposed a new class of stable, hexagonal, buckled ZnX (X: S, Se, or Te) monolayers in the journal 'ACS Appl. Mater. Interfaces. Among these, ZnTe and its isoelectronic partner, CdTe, exhibit strong spin-orbit coupling.

Taking advantage of the piezoelectric property in CdTe and ZnTe monolayers, a large piezo voltage can be generated upon the application of strain, which may replace the external voltage source. The simultaneous coupling of piezoelectricity, low mechanical stiffness, and momentum-dependent splitting of spin bands lead to next-generation Self-Powered Flexible-Piezo-Spintronic Devices, which previously proposed for one-dimensional ZnO nanowires. This concept has been extended theoretically to 2D semiconductors by the present team.

The INST team designed hexagonal buckled 2D semiconductors ZnTe and CdTe monolayers from the previously synthesized bulk structures having a different pattern. Apart from showing strong spin-orbit coupling (SOC), these semiconductors are found to be highly flexible. Such exquisite results obtained in these monolayers indicate their great potential for applications in next-generation self-powered flexible-piezo-spintronic devices.

This is the first time such a simultaneous combination of spin-orbit coupling, piezoelectricity, and flexibility in two-atomic layer thick semiconductors has been reported in 2D semiconductors. The wide bandgap provides ample room for modulation in its electronic properties via external perturbations.

Next-generation spintronic devices demand low power consumption and precise control over the spin orientation. Self-powered devices will bring additional bonuses. In this regard, the properties of semiconductors play a decisive role in the development of new technologies or in advancing the existing ones. New 2D semiconductors having strong SOC with high piezoelectric coefficients can open a new avenue for self-powered next-generation spintronics devices. The ZnTe and CdTe monolayers predicted in the research funded by Council of Scientific and Industrial Research (CSIR), India and DST – INSPIRE grant combine all these novel properties, such as flexibility, piezoelectricity and tunable giant momentum dependent splitting of spin bands (Rashba properties).

“Our computational findings are expected to motivate the experimentalists to fabricate nano-devices with the desired functionality.”, said Prof. De Sarkar.

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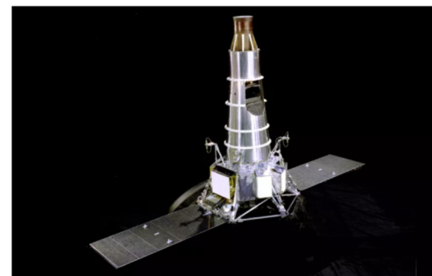
Tue, 21 Mar 2022

On this day in space! March 21, 1965: NASA launches ranger 9 to the moon

On March 21, 1965, NASA launched the Ranger 9 spacecraft on a mission to crash into a lunar crater.

Ranger 9 was the last flight of NASA's Ranger Program. The spacecraft would study the crater Alphonsus by crashing directly into it and taking pictures along the way.

After launching on an Atlas-Agena rocket, Ranger 9 spent nearly three days making its way over to the moon. During the last 20 minutes of its flight, it took around 6,000 high-quality images of the moon. It then plowed into the Alphonsus crater at a speed of nearly 9,000 miles per hour.



<https://www.space.com/39251-on-this-day-in-space.html>

