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Flight Testing of DRDO's Laser Guided ATGM

The indigenously developed Laser Guided Anti Tank Guided Missile (ATGM) was successfully test fired today on 1st Oct 2020 defeating a target located at longer range. The test was conducted from MBT Arjun at KK ranges (ACC&S) Ahmednagar in continuation of successful trial done on 22nd Sep 2020.

The ATGM employs a tandem HEAT warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles in ranges from 1.5 to 5 km. It has been developed with multiple-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun.

This Laser Guided Missile has been developed by Armament R&D Establishment (ARDE), Pune in association with High Energy Materials Research Laboratory (HEMRL), Pune and Instruments Research & Development Establishment (IRDE), Dehradun.

Raksha Mantri Shri Rajnath Singh congratulated DRDO for this successful feat. Secretary DD R&D and Chairman DRDO congratulated DRDO personnel for this achievement which paves the way for Atmanirbhar Bharat pledge of Hon'ble Prime Minister Shri Narendra Modi.

https://pib.gov.in/PressReleasePage.aspx?PRID=1660687

Press Information Bureau
Government of India

संरक्षण मंत्रालय

Thu, 01 Oct 2020 5:24PM

डीआरडीओ के लेजर गाइडेड एटीजीएम का उड़ान परीक्षण

स्वदेशी रूप से निर्मित लेजर गाइडेड एंटी टैंक गाइडेड मिसाइल (एटीजीएम) का आज 1 अक्टूबर, 2020 को लंबी रेंज पर स्थित एक टारगेट को भेदते हुए सफलतापूर्वक परीक्षण किया गया। यह परीक्षण 22 सितंबर 2020 को किए सफल परीक्षण की निरंतरता में केके रेंजेज (एसीसीएंडएस) में एमबीटी अर्जुन से किया गया।

एटीजीएम 1.5 से 5 किमी के रेंज में एक्सप्लोसिव रिएक्टिव आर्मर (ईआरए) संरक्षित बख्तरबंद वाहनों को भेदने के लिए एक क्रमबद्ध हीट वारहेड तैनात करती है। इसे मल्टी प्लेटफार्म लांच क्षमता के साथ विकसित किया गया है और वर्तमान में एमबीटी अर्जुन से की 120 एमएम राइफल्ड गन से इसका तकनीकी मूल्यांकन परीक्षण किया जा रहा है।

इसका लेजर गाइडेड मिसाइल का विकास पुणे स्थित हाई एनर्जी मैटेरियल्स रिसर्च लैबोरेटरी (एचईएमआरएल) तथा देहरादून स्थित इंस्ट्रूमेंट्स रिसर्च एंड डेवलपमेंट इस्टैब्लिशमेंट (आईआरडीई) के सहयोग से पुणे स्थित आर्मामेंट आरएंडडी इस्टैब्लिशमेंट (एआरडीई) द्वारा किया गया है।

रक्षा मंत्री श्री राजनाथ सिंह ने इस सफल उपलब्धि के लिए डीआरडीओ को बधाई दी। डीडी आरएंडडी तथा डीआरडीओ के अध्यक्ष ने इस उपलब्धि के लिए डीआरडीओ के कार्मिकों को बधाई दी जो माननीय प्रधानमंत्री श्री नरेन्द्र मोदी के आत्म निर्भर भारत के संकल्प के लिए रास्ता प्रशस्त करती है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1660781

Press Information Bureau
Government of India

రక్షణ మంత్రిత్వ శాఖ

Thu, 01 Oct 2020 5:24PM

డిఆర్డిఓ లేజర్ గైడెడ్ ఏటిజిఎం పరీక్ష

దేశీయంగా అభివృద్ధి చేసిన లేజర్-గైడెడ్ యాంటీ ట్యాంక్ గైడెడ్ క్షిపణి (ఎటిజిఎం) 2020 అక్టోబర్ 1 న విజయవంతంగా పరీక్షించారు. 2020 సెప్టెంబర్ 22 న విజయవంతమైన ట్రయల్ కొనసాగించడానికి కెకె శ్రేణుల (ఎసిసి & ఎస్) అహ్మద్‌నగర్ వద్ద ఎంబిటి అర్జున్ నుండి ఈ పరీక్ష జరిగింది.

1.5 నుండి 5 కిలోమీటర్ల పరిధిలో పేలుడు రియాక్టివ్ ఆర్మర్ (ఈఆర్ఏ) రక్షిత సాయుధ వాహనాలను ఓడించడానికి ఎటిజిఎం రెండు వైపులా ఉష్ణప్రజ్వలమైన వార్‌హెడ్‌ను ఉపయోగిస్తుంది. ఇది బహుళ-ప్లాట్‌ఫాం ప్రయోగ సామర్థ్యంతో అభివృద్ధి చేయబడింది మరియు ప్రస్తుతం ఎంబిటి అర్జున్ యొక్క 120 మిమీ రైఫిల్డ్ గన్ సాంకేతిక మూల్యాంకన పరీక్షల్లో ఉంది.

ఈ లేజర్ గైడెడ్ క్షిపణిని పూణేలోని హై ఎనర్జీ మెటీరియల్స్ రీసెర్చ్ లాబొరేటరీ (హెచ్ఇఎంఆర్ఎల్), ఇన్స్ట్రుమెంట్స్ రీసెర్చ్ అండ్ డెవలప్మెంట్ ఎస్టాబ్లిష్మెంట్ (ఐఆర్డిఇ), డెహ్రాడూన్‌ల సహకారంతో ఆర్మేమెంట్ ఆర్ అండ్ డి ఎస్టాబ్లిష్మెంట్ (ఎఆర్డిఇ) అభివృద్ధి చేసింది. ఈ పరీక్ష విజయవంతం అయినందుకు రక్షణ మంత్రి శ్రీ రాజనాథ్ సింగ్ అభినందన తెలిపారు. గౌరవ ప్రధాని శ్రీ నరేంద్ర మోడీ ఆత్మనిర్భర్ భారత్ ప్రతిజ్ఞకు మార్గం సుగమం చేసిన ఈ సాధనకు డిడి ఆర్ అండ్ డి కార్యదర్శి, చైర్మన్ డిఆర్డిఓ సిబ్బందిని అభినందించారు.

https://pib.gov.in/PressReleasePage.aspx?PRID=1660924

ZEENEWS

Fri, 02 Oct 2020

DRDO successfully test fires laser-guided anti-tank guided missile

It was the second such successful test firing of the missile, having a range of up to 5 km, in the last 10 days, officials said

Edited By Ananya Das

Highlights

1. ***An indigenously developed laser-guided anti-tank guided missile (ATGM) was successfully test fired, defeating a target located at longer range.***
2. ***It was the second such successful test firing of the missile, having a range of up to 5 km, in the last 10 days, officials said.***
3. ***The weapon was test fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar.***

An indigenously developed laser-guided anti-tank guided missile (ATGM) was successfully test fired on Thursday in Maharashtra's Ahmednagar, defeating a target located at longer range. It was the second such successful test firing of the missile, having a range of up to 5 km, in the last 10 days, officials said.

The weapon was test fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar, in continuation of successful trial done on September 22.

The ATGM employs a tandem heat warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles in ranges from 1.5 to 5 km, the Defence Ministry said in a statement. It said the ATGM has been developed with a capability to launch from multiple platforms and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun.

The Arjun is a third generation main battle tank developed by the DRDO.

Defence Minister Rajnath Singh congratulated the Defence Research and Development Organisation (DRDO) on the successful test firing of the ATGM. Secretary DD R&D and Chairman DRDO congratulated DRDO personnel for this achievement which paves the way for Atmanirbhar Bharat pledge of Prime Minister Narendra Modi.

Pune-based Armament Research and Development Establishment (ARDE) developed the ATGM in association with High Energy Materials Research Laboratory (HEMRL), Pune and Instruments Research and Development Establishment (IRDE), Dehradun.

India on September 30, successfully test-fired a new version of the surface-to-surface supersonic cruise missile BrahMos having a range of around 400 km from an integrated test range at Balasore in Odisha. The missile, featuring a number of indigenously developed sub-systems, was flight tested from a land-based mobile launcher for a designated range at 10:30 am from the integrated test range in Balasore.

The range of the new land-attack version of the missile has been extended to 400 km from the original 290 km and its speed has been maintained at Mach 2.8 which is nearly three times that of sound. India has already deployed a sizeable number of the original BrahMos missiles and other key assets in several strategic locations along the de-facto border with China in Ladakh and Arunachal Pradesh.

The test-firing of the missile comes at a time India and China are locked in a bitter border standoff in eastern Ladakh. "BrahMos surface-to-surface supersonic cruise missile featuring indigenous booster and airframe section along with many other 'Made in India' sub-systems was successfully flight tested for designated range at 1030 hours today," the defence ministry had said.

In a statement, it had also said the successful launch has paved the way for the serial production of the indigenous booster and other indigenous components of the powerful BrahMos weapons system.

Prime Minister Narendra Modi had congratulated scientists and engineers after India successfully test-fired a new version of the surface-to-surface supersonic cruise missile BrahMos having a range of around 400 km.

"Brahmos Supersonic Cruise Missile has achieved yet another milestone with successful test launch showcasing enhanced operational capabilities and additional indigenous technologies. Congratulations to all the scientists and engineers. DRDO, BrahMosMissile," he had tweeted.

Defence Minister Rajnath Singh congratulated all the team members of the Defence Research and Development Organisation and BrahMos for the mission. "Congratulations to Team DRDO and Brahmos for the successful flight testing of BRAHMOS Supersonic Cruise Missile with Indigenous Booster and Air Frame for designated range. This achievement will give a big boost to India's Atmanirbhar Bharat Pledge," he tweeted.

Union Home Minister Amit Shah complimented DRDO for the successful test-firing of the BrahMos supersonic cruise missile and said the state-of-the-art weapon is a testimony of India's defence potential. The BrahMos supersonic cruise missile with several indigenous features was successfully test-fired from a test range in Odisha and it has been termed as a major step towards achieving 'Atmanirbhar Bharat' pledge.

"India is extremely proud of DRDO for successfully testing the indigenously developed extended range BrahMos supersonic cruise missile. This state-of-the-art weapon is a testimony of India's defence potential and PM Narendra Modi ji's resolve towards an Aatmanirbhar Bharat," Shah tweeted.

BrahMos Aerospace, an India-Russian joint venture, produces the supersonic cruise missile that can be launched from submarines, ships, aircraft, or from land platforms.

In May 2019, the Indian Air successfully test-fired the aerial version of the BrahMos missile from a Su-30 MKI fighter aircraft. The BrahMos missile provides the IAF a much-desired capability to strike from large stand-off ranges on any target at sea or on land with pinpoint accuracy by day or night and in all weather conditions.

The IAF is also integrating the Brahmos supersonic cruise missile on over 40 Sukhoi fighter jets which is aimed at bolstering overall combat capability of the force.

https://zeenews.india.com/india/drdo-successfully-test-fires-laser-guided-anti-tank-guided-missile-atgm-2313871.html

REPUBLICWORLD.COM

Fri, 02 Oct 2020

DRDO test fires laser-guided anti-tank guided missile, 2nd such successful test in a week

DRDO successfully test-fired an indigenously developed laser-guided anti-tank guided missile (ATGM) on Thursday from MBT Arjun Tank in Maharashtra's Ahmednagar

By Pritesh Kamath

Defence Research and Development Organisation (DRDO) successfully test-fired an indigenously developed laser-guided anti-tank guided missile (ATGM) on Thursday in Maharashtra's Ahmednagar. The missile was test-fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar to practice defeating a target located at longer range.

The laser-guided missile has been developed by Armament R&D Establishment (ARDE), Pune in association with High Energy Materials Research Laboratory (HEMRL), Pune and Instruments Research & Development Establishment (IRDE), Dehradun.

"The ATGM employs a tandem HEAT warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles in ranges from 1.5 to 5 km. It has been developed with multiple-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun," the release by Defence Ministry said.

The primary purpose of ATGMs, which can be both medium and long-range, is to destroy armoured vehicles including tanks. The missiles use several types of guidance systems to do this, including laser, TV cameras and wire guiding. Some are flexible enough to be used via an aircraft, by the infantry and through land vehicles. The test-firing on October 1 was in continuation of a successful trial done on September 22, 2020.

BrahMos test firing

This week, India successfully test-fired the extended range BrahMos supersonic cruise missile which can hit targets at over 400 km range. Test carried out under PJ-10 project of Defence Research and Development Organisation under which the missile was launched with an indigenous booster. Prime Minister Narendra Modi and Defence Minister Rajnath Singh both congratulated the DRDO team on the achievement.

India had entered into an agreement with Russia in 1998 and created a joint entity called ‘BrahMos Aerospace’. The name ‘BrahMos’ is a portmanteau of India's Brahmaputra River and Russia's Moskva River. The first-ever successful launch of BrahMos was on June 21, 2001. India and Russia are now planning to develop a new generation of Brahmos missile with 600 km-plus range.

ABHYAS test firing success

On September 22, the DRDO had also conducted a successful flight test of ABHYAS - High-speed Expendable Aerial Target (HEAT) from the Interim Test Range, Balasore in Odisha. ABHYAS is launched using a twin underslung booster and is powered by a small gas turbine engine and has MEMS-based Inertial Navigation System (INS) for navigation along with the Flight Control Computer (FCC) for guidance and control. The vehicle is programmed for fully autonomous flight while check out of air vehicle is done using laptop-based Ground Control Station (GCS).

During the test campaign, the user requirement of 5 km flying altitude, vehicle speed of 0.5 Mach, an endurance of 30 minutes, and 2g turn capability of the test vehicle, were successfully achieved.

https://www.republicworld.com/india-news/law-and-order/drdo-test-fires-laser-guided-anti-tank-guided-missile-2nd-such-succes.html

The Indian EXPRESS

Fri, 02 Oct 2020

DRDO successfully test fires laser-guided anti-tank guided missile from Arjun Tank

"The ATGM employs a tandem heat warhead to defeat explosive reactive armour (ERA)protected armoured vehicles in ranges from 1.5 to 5 km," the Defence Ministry said in a statement

New Delhi: An indigenously developed laser-guided anti-tank guided missile was successfully test fired on Thursday in Maharashtra's Ahmednagar, officials said.

It was the second such successful test firing of the missile, having a range of upto 5 km, in the last 10 days, they said.

The weapon was test fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar on Tuesday, the officials said.

"The ATGM employs a tandem heat warhead to defeat explosive reactive armour (ERA) protected armoured vehicles in ranges from 1.5 to 5 km," the Defence Ministry said in a statement.

It said the ATGM has been developed with a capability to launch from multiple platforms and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun.

The weapon was test fired from an MBT Arjun Tank at KK Ranges in Armoured Corps Centre and School (ACC&S) in Ahmednagar on Tuesday, the officials said. (Photo: Creative Commons)

The Arjun is a third generation main battle tank developed by the DRDO.

Defence Minister Rajnath Singh congratulated the Defence Research and Development Organisation (DRDO) on the successful test firing of the ATGM.

The ministry said the defence minister congratulated the DRDO on successful test firing of the missile.

Pune-based Armament Research and Development Establishment (ARDE) developed the ATGM in association with High Energy Materials Research Laboratory and Instruments Research and Development Establishment (IRDE).

https://indianexpress.com/article/world/drdo-successfully-test-fires-laser-guided-anti-tank-guided-missile-from-arjun-tank-6663728/

The EurAsian Times

Fri, 02 Oct 2020

With Chinese Type-55 Tanks In Radar, Indian DRDO tests Cannon-Launched Missiles

In two major feats achieved by the Indian defence sector today, the defence ministry placed an order of INR 409 crore for the purchase of multi-mode hand grenades and also saw another successful test firing of cannon launched anti-tank guided missile, a major step towards the ambitious indigenization process.

This was the second test launch of a cannon-launched anti-tank guided missile within 10 days, the first being the one carried out on September 22nd.

The missile was test-fired from Arjun tank, India's indigenously-developed main battle tank which had earlier failed to fire the previously-chosen LAHAT anti-tank guided missile satisfactorily six years ago.

This was reportedly the only major hurdle in the acceptance of Arjun Mk-2 tanks in the Indian Army, and DRDO pledged to develop their own version of a laser-guided cannon-launched anti-tank guided missile.

The new missile was tested in the KK ranges (ACC&S) Ahmednagar. With the successful trials of the new DRDO-developed missile, the Indian Army could now rely on its Arjun tanks' 120mm rifled cannon to reliably fire such missiles giving it a big boost in capability, and subsequently, order more Arjun Mk-2 tanks.

Stating the missile's specifications, the press release said "The ATGM employs a tandem HEAT warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles in ranges from 1.5 to 5 km. It has been developed with multiple-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun".

As for the new 409-crore contract for the grenades, a deal for 1,000,000 "multi-mode hand grenades" was signed with Economic Explosive Ltd (EEL), (Solar Group) Nagpur. These grenades have a dual-mode capability and offer greater combat effectiveness than the earlier world-war-2 era grenades used by the Indian Army.

As claimed by the company, the grenade's dual functionality is achieved by the addition of a fragments sleeve to the main body. This addition of fragment sleeve enhances the grenade's anti-personnel capability, increasing the original 5-meter lethal radius to 10 metres. This is called the "defensive mode" of the grenade.

When used in the offensive mode, the grenade is used without its Fragmenting Sleeve and is used for 'Low-Intensity Conflict' as it offers stunning effect only. This mode is used while the soldier is in attacking mode. Lethal radius is achieved up to 5m from the point of burst.

"This is a flagship project showcasing public-private partnership under the aegis of Government of India (DRDO & MoD) enabling 'AtmaNirbharta' in cutting edge ammunition technologies and accomplishes 100% Indigenous Content," mentioned the MoD press release.

https://eurasiantimes.com/with-chinese-type-55-tanks-in-radar-indian-drdo-tests-cannon-launched-missiles/

FINANCIAL EXPRESS
Read to Lead

Fri, 02 Oct 2020

ATAGS- A forward step towards Atamnirbharta in defence

ATAGS consists of duel power system where hydraulics is used for mobility and gun In/out action whereas electrical power is used for Gun laying and Ammunition Handling System

By Lt Gen J P Singh

The Advanced Towed Artillery Gun System (ATAGS) program commenced in 2012 by DRDO, with two strategic partners Bharat Forge Limited and Tata Power SED. This product was developed in a record time of30 months and has gone through extensive trials over the last four years and performed admirably with remarkable consistency. ATAGS is one of the most advanced and the world's first gun which can fire BMCS zone 7. It has achieved a firing range of 48 km which is a record of sorts in the 155mm family.

ATAGS consists of duel power system where hydraulics is used for mobility and gun In/out action whereas electrical power is used for Gun laying and Ammunition Handling System.

ATAGS consists of duel power system where hydraulics is used for mobility and gun In/out action whereas electrical power is used for Gun laying and Ammunition Handling System. The system is configured with an all- electric drive that will ensure maintenance free and reliable operation over longer periods of time. The gun system has automatic setting up, laying with high end INS system and automated ammunition handling system which loads shell, charge and primer simultaneously with manual back up for laying system. The gun system has advanced hydraulic drive system which provides effective maneuverability in different terrains such as on road, cross country, desert and high altitude areas. The high power Auxiliary Power Unit (made in India) provides effective self-propelled speed, rapid deployment and short response time.

ATAGS has greater than 95% indigenous content. The complete supply chain from raw material to end product lies within the country making it a true embodiment of Make in India' in Defence Systems. The ATAGS gun system comprises 7463 components of which 4977 are manufactured parts involving about 30,000 manufacturing processes and more than 2,00,000 inspection parameters.

The project now in TRL stage 10 (as per DRDO TRL stages) has been put through mandatory trials over the period of last five years and has completed them successfully. Earlier this month, it entered into its last stages of trials, viz- PSQR (Preliminary Staff Qualitative Requirements) trial, which is done prior to induction of the system. The Gun has already been through rigorous pre-PSQR trials with the user and DRDO team. In these trials BFL Developed Gun system fired a total of 130+ rounds, mostly in Zone 7, and the feedback was that the system has either met the parameters. The Gun fielded by TATA Aerospace and Defence Limited too succeeded in firing 99 rounds. At the 100th round which was fifth of the rapid fire practice, the gun tube sheared off, thus creating the first unfortunate incident during the entire process of design and development. The cause is being investigated. Some experts blame it on ammunition, while the others wish to look at the tube and the immense pressures it has to withstand. It must be noted that the guns which have till now fired almost 2000 rounds between them can easily withstand pressures up to 560 mega pascals and are the only ones to fire munitions with Zone 7.

As part of the development process, an investigation to identify and rectify the causes is a must. However, it would be premature and detrimental to the cause of building Atamnirbhar Bharat to

delay or disrupt the process of development of ATAGS. ATAGS is the first weapon platform which has been designed and developed from scratch and can boast of being truly Indian. Developed by DRDO and two Indian industry partners nurturing a well-established ecosystem of Indian vendors and sub vendors, ATAGS is nation's pride. We own the design, its IP and all the data which is nearly impossible to get. Assistance from abroad comes at a hefty price and it will be foolhardy not to build on the success that we have achieved so far, notwithstanding minor setbacks. These are well within our capability to resolve.

While it is true that most of the guns that have undergone trials and even during practice fires guns coming from US, France, Germany, Israel, Czech Republic have all had similar incidents and at Lower Zones of firings involving Lower pressures. Blaming higher pressure of ATAGS thus is a bit far-fetched. In almost every case the investigation reports pointed towards ammunition. It is worth mentioning that none of these guns were fired at Zone-7 and neither of them fired as many rounds as ATAGS.

It is in fact a good opportunity to examine the quality and suitability of ammunition which is being produced in India. Without insinuating, or casting aspersions on any organization, it must be noted that India is relatively new to making artillery munitions, fuses and charges (BMCS in this case). Given the extremely high pressures, every part of the munition, be it the shell, driving bands of the projectile or the fuse which has to withstand extremely high angular velocity, every component and subcomponent must respond with zero error. This precision and expertise comes with real time experience and trials. It is unlikely that a foreign vendor will part with core technologies or data to make India Atamnirbhar. In the nation's interest and of course for the Indian Army's sake, let us learn to take such incidents in our stride and make a firm resolve to press ahead with determination. India's ATAGS must succeed.

(The author is former Deputy Chief of Army Staff. Views expressed are personal.)

https://www.financialexpress.com/defence/atags-a-forward-step-towards-atamnirbharta-in-defence/2095691/

Fri, 02 Oct 2020

DRDO ने लेजर गाइडेड एटीजीएम मिसाइल का किया सफल परीक्षण, पिछले 10 दिनों में दूसरी कामयाबी

अधिकारियों के मुताबिक, मिसाइल का पिछले दस दिनों में इस तरह का दूसरा सफल परीक्षण था। इस मिसाइल की रेंज पांच किलोमीटर तक है

नई दिल्लीः महाराष्ट्र के अहमदनगर में गुरुवार को स्वदेश निर्मित लेजर गाइडेड एंटी टैंक गाइडेड मिसाइल (एटीजीएम) का सफल परीक्षण किया गया। अधिकारियों ने बताया कि मिसाइल का पिछले दस दिनों में इस तरह का दूसरा सफल परीक्षण था। इसकी रेंज पांच किलोमीटर तक है।

अधिकारियों ने बताया कि अहमदनगर के बख्तरबंद कोर केंद्र और स्कूल (एसीसीएंडएस) में हथियार का परीक्षण एमबीटी अर्जुन टैंक से मंगलवार को किया गया। रक्षा मंत्रालय ने बयान जारी कर कहा, ''एटीजीएम विस्फोटक प्रतिक्रिया बख्तर से सुरक्षित बख्तरबंद वाहनों को डेढ़ से पांच किलोमीटर के रेंज में पराजित कर सकता है।''

अधिकारियों ने बताया कि एटीजीएम को कई प्लेटफॉर्म से लांच करने

की क्षमता के साथ बनाया गया है और वर्तमान में एमबीटी अर्जुन के 120 एमएम राइफल से इसका तकनीकी परीक्षण जारी है। अर्जुन, डीआरडीओ की तरफ से विकसित तीसरी पीढ़ी का मुख्य युद्धक टैंक है। एटीजीएम के सफल परीक्षण पर रक्षा मंत्री राजनाथ सिंह ने रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) को बधाई दी है।

https://www.abplive.com/news/india/drdo-successfully-tested-laser-guided-tank-piercing-missile-1584827

DNA
DAILY NEWS & ANALYSIS

Fri, 02 Oct 2020

Defence Ministry places order for 10 lakh multi-mode hand grenades for the Army

These grenades replace the obsolete World War-II design in service with the forces. The new grenades have a distinctive make and are extremely effective in both offensive and defensive modes

In a fillip to the "Make in India" initiative, the defence ministry on Thursday signed a deal worth Rs 409 crore with a Nagpur-based company for the supply of 10,00,000 multi-mode hand grenades to the Indian Army. Earlier similar products were mostly imported to meet the demands.

These grenades replace the obsolete World War-II design in service with the forces. The new grenades have a distinctive make and are extremely effective in both offensive and defensive modes.

A statement released by the ministry said, "Providing a further boost to the 'Make in India' initiative of Government of India in the Defence Sector, Acquisition Wing of Ministry of Defence (MoD) today signed a contract with M/s Economic Explosive Ltd (EEL), (Solar Group) Nagpur for the supply of 10,00,000 Multi-Mode Hand Grenades to the Indian Army at an approximate cost of Rs 409 Crores. These grenades will be replacing the hand grenade design of World War-II vintage, in use with the Indian Army."

"The multi-mode hand grenade has been designed by DRDO/Terminal Ballistic Research Laboratories (TBRL) and is being produced by M/s EEL, Nagpur. The grenades have a distinctive design, in that, they can be used in both Offensive and Defensive Modes," the statement added.

The new hand grenades, called multi-mode hand grenades (MMHG) have been designed by the DRDO and is entirely made in India. The complete supply of the hand grenades to the armed forces will take about two years.

It is for the first time that a privately owned company will supply completely built ammunition to the defence forces thus reducing its dependency on Ordnance Factory Board (OFB). According to some sources, the costing of the new grenades is relatively less than the production cost of OFB.

https://www.dnaindia.com/india/report-defence-ministry-places-order-for-10-lakh-multi-mode-hand-grenades-2846785

Fri, 02 Oct 2020

Defence Ministry signs contract for supply of multi-mode hand grenades to Indian Army

The contract was signed by the Acquisition Wing of Defence Ministry

Edited By Ananya Das

Highlights

1. ***In yet another boost to 'Make in India', the Ministry of Defence on Thursday signed a contract worth Rs 409 crore with a Nagpur-based company.***
2. ***As per the contract, the company will supply 10,00,000 multi-mode hand grenades to the Indian Army.***
3. ***The contract was signed by the Acquisition Wing of Defence Ministry.***

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"This is a flagship project showcasing public-private partnership under the aegis of Government of India (DRDO & MoD) enabling "AtmaNirbharta" in cutting edge ammunition technologies and accomplishes 100 per cent indigenous content," it further added.

https://zeenews.india.com/india/defence-ministry-signs-contract-for-supply-of-multi-mode-hand-grenades-to-indian-army-2313898.html

Hindustan Times

Thu, 01 Oct 2020

India moves terrain-hugging Nirbhay missiles with 1,000-km range to defend LAC

The Nirbhay subsonic cruise missile will be inducted into the army and navy after the seventh trial next month

By Shishir Gupta

New Delhi: India will formally induct the Nirbhay subsonic cruise missile into the Indian Army and Navy after the seventh trial scheduled next month but has already moved a limited number of the missiles to the Line of Actual Control where Indian soldiers are locked in a tense standoff with China's PLA.

Nirbhay long-range, sub-sonic cruise missile roars off the launch pad for its successful test in 2019

The 1,000 km range solid rocket booster missile has a single shot kill ratio of more than 90 per cent. It has been developed by the Defence Research and Development Organisation (DRDO), people familiar with the development told Hindustan Times hours after India test-fired an extended-range BrahMos surface-to-surface supersonic cruise missile that can hit targets 400 km away.

The Defence Acquisition Council headed by defence minister Rajnath Singh has cleared the formal induction of the Nirbhay subsonic missile. The military, however, did not wait for the formality to deploy the new missile and has already moved some of them to defend the LAC against China.

The missile, which travels at a speed of 0.7 Mach, has both terrain-hugging and sea-skimming capability that helps it avoid detection and counter-measures.

At the LAC, the PLA's western theatre command has deployed stand-off weapons up to 2,000 km range and long-range surface-to-air missiles in Tibet and Xinjiang after the Ladakh stand-off started in May this year. The Chinese deployment is not limited to occupied Aksai Chin but is located in depth positions from Kashgar, Hotan, Lhasa and Nyingchi along the 3,488 km Line of Actual Control (LAC).

Officials said Wednesday's testing of the 400-km range BrahMos missiles with an indigenous airframe and booster is significant since it clears the decks for India to have the next class of supersonic long-range tactical cruise missile. The Brahmos has a liquid-fuelled booster capable of ranges over 500 km.

These new-age weapons will be based on solid-fuelled ducted ramjet (SFDR) technology that can be used for air-to-air missiles as well as long-range supersonic cruise missiles. The technology has been tested by the DRDO twice - on 30 May 2018, and 8 February 2019.

"The new class of cruise missile will have a solid rocket booster along with supersonic speed using SFDR technology. The range of missiles can be decided on the basis of mission objectives," said an Indian missile expert.

It is understood that the new class of cruise missiles (yet to be named) will have a better circular error of probability than the BrahMos with a heavy conventional warhead to target airbases and ships of the adversary.

https://www.hindustantimes.com/india-news/india-moves-terrain-hugging-nirbhay-missiles-with-1-000-km-range-to-defend-lac/story-yf5IrC1IhjVjbVv1aOJWSO.html

DNA
DAILY NEWS & ANALYSIS

Thu, 01 Oct 2020

This Indian BrahMos supersonic cruise missile with increased firepower can easily penetrate Chinese defence

On the one hand, there is tension on the border with China, on the other hand, the Indian Army is also strengthening its defence capability

By Ravi Dubey

DRDO is conducting new tests to strengthen the army. Under this, DRDO increased the firepower of the BrahMos supersonic cruise missile and launched it with indigenous boosters. Also successfully tested it.

BrahMos supersonic cruise successfully tested with an extended-range missile, which can hit targets at distances over 400 km. The missile was launched with indigenous boosters under DRDO's PJ-10 project. DRDO has increased its firepower by making indigenous boosters under the PJ-10 project in the 300 km BrahMos missile with a range of firepower. This was the second test of the extended range version of the BrahMos supersonic missile.

Indian Army and Navy conduct experiments

BrahMos is a short-range supersonic cruise missile. It can be released from a submarine, a warship, from an aircraft, or even from the ground. Russia's NPO Machinostroyenia and India's Defence Research and Development Organization have jointly developed it. It is based on the technology of Russia's P-800 Onkis cruise missile. Sea and land versions of BrahMos have already been successfully tested and assigned to the Indian Army and Navy. BrahMos is the most modern missile system ever developed by India and Russia and has made India a leader in missile technology.

BrahMos is the world's best missile technology: The BrahMos supersonic cruise missile flies rapidly at low altitudes and is not tracked by radar. The specialty of BrahMos is that it can be fired from land, by air, by submarine, by a warship, from anywhere. Not only this, in addition to the conventional launcher, this missile can also be fired from the vertical launcher. The maneuverable version of BrahMos has recently been successfully tested, increasing the firepower of this missile even further. The name BrahMos is named on the Brahmaputra in India and the Muskwa River in Russia. Russia is providing missile technology in this project and India has developed the ability to guide during the flight. In the case of a quick attack, no missile of the world survives before the technique of BrahMos.

BrahMos supersonic cruise missile export permission: The first and successful test of the BrahMos supersonic cruise missile was conducted by India on 18 December 2009 in the Bay of Bengal. The Russian government has allowed BrahMos to export to a third country. Russia has also released a list of 100 defence companies that want to start a project like BrahMos with India. Several countries, including the Philippines, Vietnam, Egypt, and Oman, have shown interest in purchasing BrahMos missiles even before the export permission was granted.

Features of BrahMos missile

It can change the route in the air itself and also able to penetrate the moving target.- It can be fired vertically or directly from the projector.- This missile technology can be used by three Army,

Navy, and Air Force.- It can fly at an altitude of 10 meters and is not under the grip of radar.- Is able to spoof other missile detection systems, impossible to hit it.- Brahmos's hit capacity is almost twice as much as that of Tom Hawk of America.- Unlike common missiles, it draws energy from the Ramjet technology by pulling air.- This missile can destroy its target by generating 1200 units of energy.

https://www.dnaindia.com/india/report-this-indian-brahmos-supersonic-cruise-missile-with-increased-firepower-can-easily-penetrate-chinese-defence-2846396

Defence News

Defence Strategic: National/International

THE ECONOMIC TIMES

Fri, 02 Oct 2020

Air Marshal Amit Dev takes over as AOC-n-C of Indian Air Force's Eastern Air Command

Synopsis

An alumnus of Defence Services Staff College and National Defence College, Air Marshal Amit Dev was commissioned into the fighter stream of IAF in December 1982 as a fighter pilot and has built a distinguished career spanning nearly 38 years.

Shillong: Air Marshal Amit Dev Thursday took over as Air Officer Commanding-in-Chief of the Indian Air Force's Eastern Air Command from Air Marshal R D Mathur, Defence spokesperson said. An alumnus of Defence Services Staff College and National Defence College, Air Marshal Amit Dev was commissioned into the fighter stream of IAF in December 1982 as a fighter pilot and has built a distinguished career spanning nearly 38 years, they said.

Air Marshal Amit Dev takes over as Air Officer Commanding-in-Chief, Eastern Air Command in Shillong

Defence spokesperson Wing Commander Ratnakar Singh said prior to his present appointment Air Marshal Amit Dev was Air officer-in-charge of personnel at Air Headquarters Vayu Bhawan in Delhi following his posting as director general of air operations at Air Headquarters.

Air Marshal Amit Dev has flying experience of more than 2500 hours, including operational flying on MiG 21 and MiG 27 fighter aircraft, the IAF official said.

https://economictimes.indiatimes.com/news/defence/air-marshal-amit-dev-takes-over-as-aoc-n-c-of-indian-air-forces-eastern-air-command/articleshow/78428943.cms

FINANCIAL EXPRESS
Read to Lead

Fri, 02 Oct 2020

Indian Air Force to have more fighter squadrons in this decade, says Deputy IAF Chief

Talking about the 114 fighter aircraft deal which is underway, he said, "The `Make in India' initiative as mentioned in the recently released Defence Acquisition Procedure (DAP) 2020 will be taken into consideration."

By Huma Siddiqui

The number of fighter squadrons in the Indian Air Force is expected to improve in a decade's time, says the Deputy Chief of Air Force Air Marshal Sandeep Singh. In his address at a webinar which was jointly organized by Centre for Air Power Studies and Society of Indian Defence Manufacturers, the deputy Chief of IAF said, "The IAF will have around 37-38 fighter squadrons in a decade." The IAF currently has around 30 squadrons as against the authorized strength of 42 fighter squadrons.

Talking about the 114 fighter aircraft deal which is underway, he said, "The `Make in India' initiative as mentioned in the recently released Defence Acquisition Procedure (DAP) 2020 will be taken into consideration."

Stating that the fleet will be much more capable by then, he said, "Our adversaries are also getting technologically superior and more number of aircraft."

Based on the new DAP, which will be applicable soon, to seek higher levels of production technology and use of indigenous systems and materials where possible for the 114 fighter deal, the IAF has already realigned their Statement of Case (SoC). And, as has been reported recently, the IAF is expected to approach the government for accord of the Acceptance of Necessity (AoN). Once the AoN is issued, the formal procurement process would begin. The new DAP 2020 comes into effect from October 1, 2020.

Modernization of the Fighter Fleet

According to Air Marshal Sandeep Singh, "The rate at which the drawdown is taking place the Mig-21s will have to go. And the other fighters are getting upgraded which are making them more capable. Assuming there are no delays in the Light Combat Aircraft (LCA) variant, by the end of the decade the IAF will hit around 37-38 squadrons." Also, the Advanced Medium Combat Aircraft (AMCA) induction is expected to start by the end of the decade.

Stating that the fleet will be much more capable by then, he said, "Our adversaries are also getting technologically superior and more number of aircraft."

Leasing of Midair Refueller

Due to the financial crunch, the purchase of mid-air refuelling aircraft has been delayed. Now the IAF is mulling on dry leasing these platforms. "Those companies which have been approved under the DAP 2020, could be aggregators of these platforms which have been allowed under the new procedure," the deputy chief said.

Though the IAF has six Russian IL-78 tankers, it has been trying to get six more but the deal has been getting delayed repeatedly.

UAVs

In face of the increasing threat of drones and with various agencies looking for counter-drone systems, according to the top officer of the IAF, "the Anti-drone systems should be under a national policy as it would be required by various agencies."

The decision to purchase 127 Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicles (UAV), is expected to be taken soon. Since the IAF is the lead service, it has to decide whether it is 'Buy Indian' or 'Buy and Make Indian' of the procurement procedure.

https://www.financialexpress.com/defence/indian-air-force-to-have-more-fighter-squadrons-in-this-decade-says-deputy-iaf-chief/2096074/

THE ECONOMIC TIMES

Fri, 02 Oct 2020

CCS clears Rs 7796 crore communication network for Indian Army, to be done by ITI

By Manu Pubby

Synopsis

The defence ministry has said that the new Army Static Switched Communication Network (ASCON) will provide a "big boost to the operational capability of the defence forces", given the current operational situation on the border with China and provides an opportunity to the PSU to give an "impetus to the Indian economy".

New Delhi: The Cabinet Committee on Security (CCS) has cleared a project to establish a secure communication network for the Indian Army that will include modern optical fibre cable links to forward areas, with Public Sector Undertaking ITI set to implement the Rs 7,796 crore plan.

The defence ministry has said that the new Army Static Switched Communication Network (ASCON) will provide a "big boost to the operational capability of the defence forces", given the current operational situation on the border with China and provides an opportunity to the PSU to give an "impetus to the Indian economy".

Officials aid that the project will provide better survivability, responsiveness and high bandwidth in any operational scenario and enhance the communication coverage of network close to international boundaries, like the LAC, where tensions have been simmering with China

The project will lead to a complete upgrade of military communication systems that will shift to Internet Protocol (IP) / Multi Protocol Label Switching (MPLS) Technology. "Optical Fibre Cable (OFC), Microwave Radio and Satellite will be used as communication media," the defence ministry said.

Officials aid that the project will provide better survivability, responsiveness and high bandwidth in any operational scenario and enhance the communication coverage of network close to international boundaries, like the Line of Actual Control (LAC), where tensions have been simmering with China since May.

"The project would augment the communication network of Indian Army in the sensitive forward operational areas which in turn will provide a major boost to the operational preparedness of the Indian Army especially keeping in view the current operational situation at LAC," the ministry has said.

The network will extend the high bandwidth communication to the remote operational areas in Central and Eastern Sectors and enhance communication reach to the forward locations in the Western border too.

The project will have indigenous content of about 80 percent, with official saying that it would come as a boost for the industry as well. "The project involves execution of civil works, laying of OFC, tower construction, etc. and with utilization of local resources, hiring of manpower, it would generate employment opportunities especially to the people in remote border areas, support and

boost rural economy, assist in upliftment of the local of the local economies, provide skill development during the prolonged period of execution and maintenance of the network," the ministry has said.

https://economictimes.indiatimes.com/news/defence/ccs-clears-rs-7796-crore-communication-network-for-indian-army-to-be-done-by-iti/articleshow/78428003.cms

FINANCIAL EXPRESS
Read to Lead

Fri, 02 Oct 2020

OFB offers its Close Quarter Carbines for the Indian Army

The OFB in 2017 had failed to provide a carbine as per the requirement of the Indian Army, which is why the decision to import them through FTP was taken

By Huma Siddiqui

Days after the Ministry of Defence decided to cancel the Close Quarter Carbine deal with the UAE based company Caracal, the Rifle Factory Ishapore (RFI), under Ordnance Factory Board (OFB) has decided to jump in the race to make these in India. Financial Express Online had reported recently that the Indian Army was trying to buy 93,895 CQBs through the Fast Track Procedure (FTP) since 2018. Now, the government has decided to take the `Atmanirbhar' way and these CQBs are expected to be made in India. The OFB in 2017 had failed to provide a carbine as per the requirement of the Indian Army, which is why the decision to import them through FTP was taken.

Now, the RFI which is located on the outskirts of Kolkota has developed an advanced 5.56 mmx45 mm carbine that is undergoing evaluation. This factory has been the key supplier of the 5.56 mm Insas Rifle to the Army. Reports suggest that the RFI based in Kolkota was manufacturing 100,000 for the Indian Army and the central and state police forces at one time and is soon going to start manufacturing components for the AK 203 Assault Rifles.

What has OFB told the Financial Express Online

OFB has claimed earlier that they could make rifles but failed. What is different this time?

The official spokesperson of the OFB says, "Indian army time and again, has altered its requirements/specifications vis-a-vis other security forces insofar as small arms/rifles are concerned. Since independence, and through all the wars that India has fought, OFB has supplied small arms, ammunition and artillery weapon platforms to the Indian Army. INSAS was the bedrock of the Indian army's small arms repertoire."

OFB has made rifles meeting international standards. 7.62 x 51 mm assault rifle, 5.56 x 51 mm assault rifle, 5.56 x 51 Excalibur Rifle, 7.62 x 51 sniper Rifle, 5.56 x 30 mm carbine, 7.62 x 39 mm Trichy Assault Rifle are some major examples."

"All these Rifles have been evaluated by MHA and are being used by the state police forces to their satisfaction. These rifles meet international specifications and the MHA units including the elite ones like BSF, CRPF, Assam Rifles, ITBP are happy with the weapons," he states.

Will the private sector be involved in manufacturing the Close Quarter Carbines?

"It is worth mentioning that import centric procurements are very difficult to conclude and the procurement actions get dropped at various stages. The same is evident from the huge number of unsuccessful RFPs issued by the Indian Army which could not see the light of the day.

OFB has incomparable and unmatched facilities insofar as developing and manufacturing of small arms is concerned. Therefore, the question of seeking help from the private sector does not arise," the OFB spokesperson says.

Call for Corporatization grows louder … the other side has another view

A change of gear is required which will help in increasing the productivity and improve the quality of the product being manufactured in these factories.

However, a source told Financial Express Online, "Due to nature of its business of manufacturing Arms and Ammunition, OFB is dependent upon the orders from the Services, either Indian or Foreign (in case of exports). OFB, as well as DPSUs, have witnessed the outright preference for imported arms/ ammunition/weapon platforms by army/airforce/paramilitary forces of our country in the past."

In his view, "Any organization engaged solely in defence production, irrespective of whether it a government department or a DPSU or a Private company, remains largely dependent on the support from the users (Indian Armed / Paramilitary Forces) due to the nature of its products/business. We can see from the history of most of the DPSUs that their performance on various business success parameters is entirely dependent upon the order book from the services."

"As a corporate entity with commercial accounting under the provisions of Company Act, OFB will find the cost of maintaining war reserve capacity unviable and could have a very adverse effect on defence preparedness of the country."

Another important and vital aspect with adverse effects will be customized long term support to the users, country's armed forces.

"Military equipment like battle tanks, self-propelled guns and howitzers have a service life of 30-40 years or more. Bofors guns and modified T-72 tanks manufactured several decades back are still being used by the army, as frontline weapons. And, OFB caters to the needs of the army for spares and special subsystems even after closure of production lines of the weapon system. And the spares are supplied on the demand of the users till the end of its service life, 40 years and beyond. For the want of one spare part or subsystem, the whole battle tank becomes inoperative."

Adding, "OFB has taken the full responsibility for complete lifetime support of its equipment. And there have been instances when only very few numbers of a spare were needed by the user and our factories restarted the production line at considerable cost, but supplied the required meagre quantity to the army to make the war equipment operational as was witnessed during Operation 'Parakram' and on other occasions."

On the call for an indefinite strike on Oct 12, he says, "Gaining the support and confidence of OFB employees at all levels for this transition will remain a crucial determinant for the success of this experiment. This cannot be disregarded and needs to be addressed with the utmost sensitivity."

OFB hits back at its main customer – the Indian Army

Reacting to reports in a section of the media referring to accidents involving ammunition manufactured by OFB, on Thursday came out with its version.

The said reports state that between 2014 and 2020, there have been 403 accidents where ammunition from OFB was involved. And this according reports caused the exchequer a loss of Rs 960 crores which in turn could have financed the purchase of 100 artillery guns.

According to OFB, out of the accidents between January 2015 to December 2019, only 19% of the cases are attributable to the OFB. In its response, it specifies that between 2011 and 2018, there have been more than 125 accidents involving ammunition procured from sources other than OFB, both domestic and foreign.

https://www.financialexpress.com/defence/ofb-offers-its-close-quarter-carbines-for-the-indian-army/2096417/

THE ECONOMIC TIMES

Fri, 02 Oct 2020

Pentagon okays $90 mn sale of spares, support for C-130J Super Hercules aircraft to India

Synopsis

In its notification to the Congress, the Defence Security Cooperation Agency said the proposed sale will support the foreign policy and national security of the US by helping to strengthen the US-India strategic relationship and improve the security of a major defence partner.

Washington: The Pentagon has approved India's request to buy USD 90 million worth of equipment, spare parts and logistical support for its fleet of C-130J Super Hercules cargo aircraft.

In its notification to the Congress, the Defence Security Cooperation Agency said the proposed sale will support the foreign policy and national security of the US by helping to strengthen the US-India strategic relationship and improve the security of a major defence partner, which continues to be an important force for political stability, peace, and economic progress in the Indo-Pacific and South Asia region.

An Indian Air Force (IAF) C-130 aircraft takes part in a day and night exercise during the Exercise Vayu Shakti 2019

The items ordered by India are aircraft consumable spares and repair/return parts; ground support and equipment; Cartridge Actuated Devices/Propellant Actuated Devices (CAD/PAD) fire extinguisher cartridges; flare cartridges; BBU-35/B cartridge impulse squibs.

India has also ordered for one spare AN/ALR-56M Advanced Radar Warning Receiver chipset; spare AN/ALE-47 Countermeasures Dispenser System shipset; ten Lightweight Night Vision Binocular (F5032); ten AN/AVS-9 Night Vision Goggle (NVG)(F4949); GPS and Electronic Warfare.

It is also seeking instruments and lab equipment support; joint mission planning system; cryptographic device spares and loaders; software and software support; publications and technical documentation; personnel training and training and training equipment; contractor engineering, technical and logistical support, and other related elements of programme support.

According to the notification, the proposed sale ensures that the previously procured aircraft operates effectively to serve the needs of the Indian Air Force, Army and Navy transport requirements, local and international humanitarian assistance and regional disaster relief.

This sale of spares and services will enable the Indian Air Force to sustain a higher mission-ready status fleet, it said.

India will have no difficulty absorbing this additional sustainment support, it said, adding that the proposed sale of this equipment and support worth USD 90 million will not alter the basic military balance in the region.

Notification of such major sales is mandatory under the Arms Export Control Act. Lawmakers have 30 days to review the proposed sale. The sale would be executed by defence major Lockheed-Martin.

India is one of the 17 countries to whom the US has sold its C-130J Super Hercules aircraft. The Indian Air Force currently operates a fleet of five C-130J-30s. India has placed order for additional six C-130J-30s Super Hercules aircraft.

"From the highest landing strip in the world to austere runways almost destroyed by natural disasters, the C-130J goes where other airlifters can't, won't or don't go. It's a workhorse that's in operation around the world, flying in every environment and mission scenario required every day and everywhere," Lockheed says on its website.

In the summer of 2013, Indian Air Force performed the highest landing of a C-130J at the Daulat Beg Oldi airstrip in Ladakh at the height of 16,614 ft. The aircraft was used extensively by the US in Afghanistan and Iraq.

https://economictimes.indiatimes.com/news/defence/pentagon-okays-90-mn-sale-of-spares-support-for-c-130j-super-hercules-aircraft-to-india/articleshow/78441629.cms

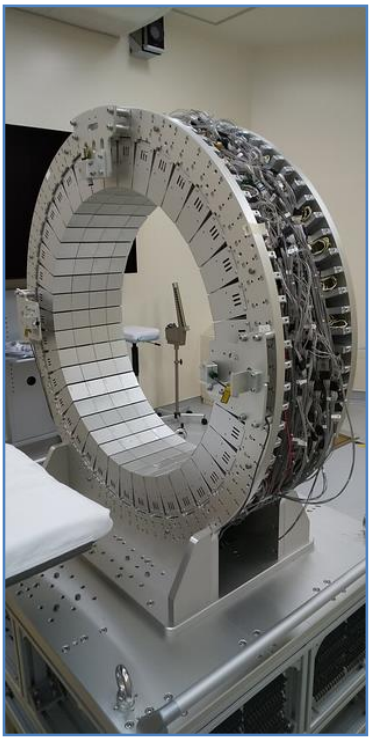
Science & Technology News

PHYS.ORG

Fri, 02 Oct 2020

Timing the life of antimatter particles may lead to better cancer treatment

Experts in Japan have devised a simple way to glean more detailed information out of standard medical imaging scans. A research team made up of atomic physicists and nuclear medicine experts at the University of Tokyo and the National Institute of Radiological Sciences (NIRS) has designed a timer that can enable positron emission tomography (PET) scanners to detect the oxygen concentration of tissues throughout patients' bodies. This upgrade to PET scanners may lead to a future of better cancer treatment by quickly identifying parts of tumors with more aggressive cell growth.



Researchers at the University of Tokyo and National Institute of Radiological Sciences have designed a way to detect the absolute oxygen concentration in patients' bodies, which may lead to more effective cancer treatment. The results are published in Communication Physics. Credit: Taiga Yamaya, CC-BY

"Patients' experience in this future PET scan will be the same as now. Medical teams' experience of conducting the scan will also be the same, just with more useful information at the end," said nuclear medicine physician Dr. Miwako Takahashi from the NIRS, a co-author of the research publication in *Communication Physics*.

"This was a quick project for us, and I think it should also become a very fast medical advance for real patients within the next decade. Medical device companies can apply this method very economically, I hope," said Assistant Professor Kengo Shibuya from the University of Tokyo Graduate School of Arts and Sciences, first author of the publication.

PET scans

The positrons that PET scans are named for are the positively charged antimatter forms of electrons. Due to their tiny size and extremely low mass, positrons pose no danger in medical applications. Positrons produce gamma rays, which are electromagnetic waves similar to X-rays, but with shorter wavelengths.

When receiving a PET scan, a patient receives a small amount of very weakly radioactive liquid, often composed of modified sugar molecules, usually injected into their blood. The liquid circulates for a short period of time. Differences in blood flow or metabolism affect how the radioactivity is distributed. The patient then lies in a large, tube-shaped PET scanner. As the radioactive liquid

emits positrons that then decay into gamma rays, rings of gamma-ray detectors map the locations of gamma rays emitted from the patient's body.

Doctors request PET scans when they need information about not just the structure, but also the metabolic function of tissues inside the body. Detecting oxygen concentration using the same PET scan would add another layer of useful information about the body's function.

Oxygen concentration measured in nanoseconds

The life of a positron is a choice of two very short paths, both of which begin when a positron is "born" as it is released from the radioactive PET scan liquid. On the shorter path, the positron immediately collides with an electron and produces gamma rays. On the slightly longer path, the positron initially transforms into another type of particle called a positronium, which then decays into gamma rays. Either way, the lifetime of a positron inside a human body is not longer than 20 nanoseconds, or one fifty-millionth of a second.

"The outcome is the same, but the lifetime is not. Our proposal is to distinguish the lifetimes of positrons using a PET scan with a timer so that we can map oxygen concentrations inside patients' bodies," said Shibuya.

Shibuya and his colleagues developed a life expectancy chart for positrons using a miniaturized PET scanner to time the formation and decay of positrons in liquids with known concentrations of oxygen.

The research team's new results reveal that when oxygen concentration is high, the shorter path is more likely. Researchers predict that their technique will be able to detect the absolute oxygen concentration in any tissue of a patient's body based on the lifetime of positrons during a PET scan.

Detecting the lifetime of positrons is possible using the same gamma-ray detectors that PET scans already use. The research team predicts that the majority of work to transfer this research from the lab to the bedside will be on upgrading gamma-ray detectors and software so that the gamma-ray detectors can record not just location, but accurate time data as well.

"It should not be much of a cost increase for development of instruments," said Professor Taiga Yamaya, a co-author of the research publication and leader of the Imaging Physics Group at the NIRS.

Enhanced PET scans for more effective cancer treatment

Medical experts have long understood that low oxygen concentrations in tumors can impede cancer treatment for two reasons: First, a low oxygen level in a tumor is often caused by insufficient blood flow, which is more common in fast-growing, aggressive tumors that are harder to treat. Second, low oxygen levels make radiation less effective because the desired cancer cell-killing effects of radiation treatment are achieved in part by the radiation energy converting oxygen present in the cells into DNA-damaging free radicals.

Thus, detecting the concentration of oxygen in body tissues would inform medical experts how to more effectively attack tumors inside patients.

"We imagine targeting more intense radiation treatment to the aggressive, low-oxygen concentration areas of a tumor and targeting lower-intensity treatment to other areas of the same tumor to give patients better outcomes and less side effects," said Takahashi.

Shibuya says that the team of researchers was inspired to put into practice a theoretical model about the ability for positrons to reveal oxygen concentration published last year by researchers in Poland. The project went from concept to publication in just a few months even with COVID-19 pandemic-related restrictions.

Shibuya and colleagues are now aiming to expand their work to find any other medical details that may be revealed by the lifetime of a positron.

More information: Kengo Shibuya, Haruo Saito, Fumihiko Nishikido, Miwako Takahashi, and Taiga Yamaya. 2020. Oxygen sensing ability of positronium atom for tumor hypoxia imaging. *Communication Physics*. DOI: 10.1038/s42005-020-00440-z

https://phys.org/news/2020-10-life-antimatter-particles-cancer-treatment.html

PHYS.ORG

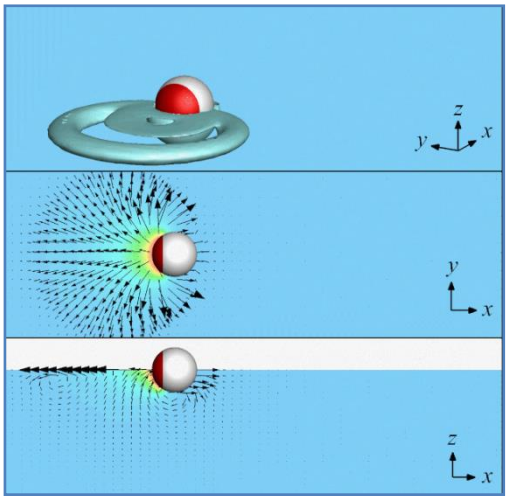
Fri, 02 Oct 2020

What tiny surfing robots teach us about surface tension

By Kelley Christensen

Propelled by chemical changes in surface tension, microrobots surfing across fluid interfaces lead researchers to new ideas.

Spend an afternoon by a creek in the woods, and you're likely to notice water striders—long-legged insects that dimple the surface of the water as they skate across. Or, dip one side of a toothpick in dish detergent before placing it in a bowl of water, and impress your grade schooler as the toothpick gently starts to move itself across the surface.



This animation demonstrates the flow pattern around a chemically active Marangoni surfer. Credit: Saeed Jafari Kang and Hassan Masoud

Both situations illustrate the concepts of surface tension and propulsion velocity. At Michigan Technological University, mechanical engineer Hassan Masoud and Ph.D. student Saeed Jafari Kang have applied the lessons of the water strider and the soapy toothpick to develop an understanding of chemical manipulation of surface tension.

Their vehicle? Tiny surfing robots.

"During the past few decades, there have been many efforts to fabricate miniature robots, especially swimming robots," said Masoud, an assistant professor in the mechanical engineering-engineering mechanics department. "Much less work has been done on tiny robots capable of surfing at the interface of water and air, what we call liquid interfaces, where very few robots are capable of propelling themselves."

Beyond the obvious implications for future Lucasfilm droids designed for ocean planets (C-H2O?), what are the practical applications of surfing robots?

"Understanding these mechanisms could help us understand colonization of bacteria in a body," Masoud said. "The surfing robots could be used in biomedical applications for surgery. We are unraveling the potential of these systems."

Hunting for Answers and the Marangoni Effect

During his doctoral studies and postdoc appointment, Masoud conducted research to understand the hydrodynamics of synthetic microrobots and the mechanisms by which they move through fluid. While helping a colleague with an experiment, Masoud made an observation he couldn't explain. An aha! moment came shortly thereafter.

"During a conversation with a physicist, it occurred to me that what we had observed then was due to the release of a chemical species that changed the surface tension and resulted in motion of particles that we observed," Masoud said.

That knowledge has led Masoud to continue analyzing the propulsion behavior of diminutive robots—only several microns in size—and the Marangoni effect, which is the transfer of mass and momentum due to a gradient of surface tension at the interface between two fluids. In addition to serving as an explanation for tears of wine, the Marangoni effect helps circuit manufacturers dry silicon wafers and can be applied to grow nanotubes in ordered arrays.

For Masoud's purposes, the effect helps him design surfing robots powered by manipulating surface tension chemically. This solves a core problem for our imagined C-H2O: How would a droid propel itself across the surface of water without an engine and propeller?

Detailed in research findings published recently in the journal *Physical Review Fluids*, Masoud, Jafari Kang and their collaborators used experimental measurements and numerical simulations to demonstrate that the microrobot surfers propel themselves in the direction of lower surface tension—in reverse of the expected direction.

"We discovered that negative pressure is the primary contributor to the fluid force experienced by the surfer and that this suction force is mainly responsible for the reverse Marangoni propulsion," Masoud said. "Our findings pave the way for designing miniature surfing robots. In particular, knowing that the direction of propulsion is altered by a change in the surrounding boundary can be harnessed for designing smart surfers capable of sensing their environment."

Stability Studies on the Horizon

While Masoud's work focused on understanding how microrobots can chemically manipulate their environment to create propulsion, future studies will zero in on the stability of these tiny surfers. Under what conditions are they stable? How do multiple surfers interact with each other? The interactions could provide insight into the swarm dynamics commonly seen in bacteria.

"We have just scratched the surface of learning the mechanisms through which the surfers—and other manipulators of surface tension—move," Masoud said. "Now we are building understanding toward how to control their movement."

More information: Saeed Jafari Kang et al. Forward, reverse, and no motion of Marangoni surfers under confinement, *Physical Review Fluids* (2020). DOI: 10.1103/PhysRevFluids.5.084004

https://phys.org/news/2020-10-tiny-surfing-robots-surface-tension.html

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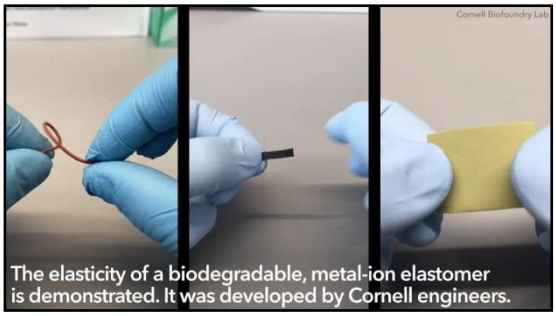
Fri, 02 Oct 2020

Metal-ion breakthrough leads to new biomaterials

By Syl Kacapyr

Metals such as iron and calcium play a crucial role inside the human body, so it's no surprise that bioengineers would like to integrate them into the soft, stretchy materials used to repair skin, blood vessels, lungs and other tissue.



Designing elastomers—a type of polymer with rubber-like properties—is a laborious process that yields a product with limited versatility. But Cornell engineers have developed a new framework that makes elastomer design a modular process, allowing for the mixing and matching of different metals with a single polymer.

The framework is detailed in "Chelation Crosslinking of Biodegradable Elastomers," published Sept. 22 in *Advanced Materials*.

The framework was conceived when researchers from Cornell's Biofoundry Lab sought to create an elastic vascular graft that could help repair heart tissue using copper. Yadong Wang, the McAdam Family Foundation Professor of Cardiac Assist Technology in the Meinig School of Biomedical Engineering, and postdoctoral associate Ying Chen wanted to incorporate copper into their graft because of its role in inducing angiogenesis—the process by which new blood vessels grow from existing ones.

Mixing copper and other metal ions with polymers has remained a niche area of chemistry, so there was no blueprint for Chen to follow. Instead, she set out to engineer a biocompatible and biodegradable elastomer from scratch.

Chen's key breakthrough was crosslinking her polymer with copper ions using chelating ligands—molecules that tightly bind a metal ion using two or more bonds, "like how a crab claw pinches an object," said Wang. While chelation bonds are considered to be of moderate strength in chemistry, elastomers have many crosslinking molecules, so a multitude of chelating ligands can work together to form a strong molecule.

And because one ligand can bind multiple metal ions, it can yield a wide range of mechanical properties—such as stiffness and toughness—as well as biomedical properties. For example, a polymer's copper ions could be replaced with zinc, or a combination of copper and zinc could be used—a tandem that is present in an important enzyme for fighting human aging.

"The discovery was pretty exciting," Chen said. "I just wanted to move on with my copper elastomer because I'm focused on tissue engineering, but Professor Wang was saying, 'Slow down, we need to test how powerful this platform is and what we can do with it.'"

As proof of concept, Chen engineered six unique elastomers using one polymer and six different metals, and then made a seventh elastomer using a calcium-magnesium mix. It was the first time anyone had demonstrated a biodegradable metal-ion elastomer—let alone seven of them.

"When Ying showed me what she had done, I said, 'This material is amazing,'" Wang said. "There's so much you can do with just this one simple design. Using many different types of metal ions, one polymer can turn into eight, nine, 10 different elastomers."

The research team also performed mechanical and biocompatibility experiments on their elastomers, testing for the materials' stress, strain and ability to be used with living tissue. The durability and biocompatibility of the elastomers matched that of more traditional biomaterials used in medicine.

"The copper material was very elastic," Chen said. "It can be stretched at least hundreds of times without rupturing."

Now that the platform has published, Chen is focusing her research on the copper elastomer graft and its ability to repair blood vessels and heart tissue. In the meantime, she hopes other engineers will use her platform to create new materials for improving soft tissue reconstruction and regeneration.

Wang shares the same hope, and said possible applications for the framework are not limited to blood vessels and other tissues, but could potentially be used for industrial elastomers such as eco-friendly tires that biodegrade.

"We are just scratching the surface," he said.

More information: Ying Chen et al, Chelation Crosslinking of Biodegradable Elastomers, *Advanced Materials* (2020). DOI: 10.1002/adma.202003761

Journal information: *Advanced Materials*

https://phys.org/news/2020-10-metal-ion-breakthrough-biomaterials.html

PHYS.ORG

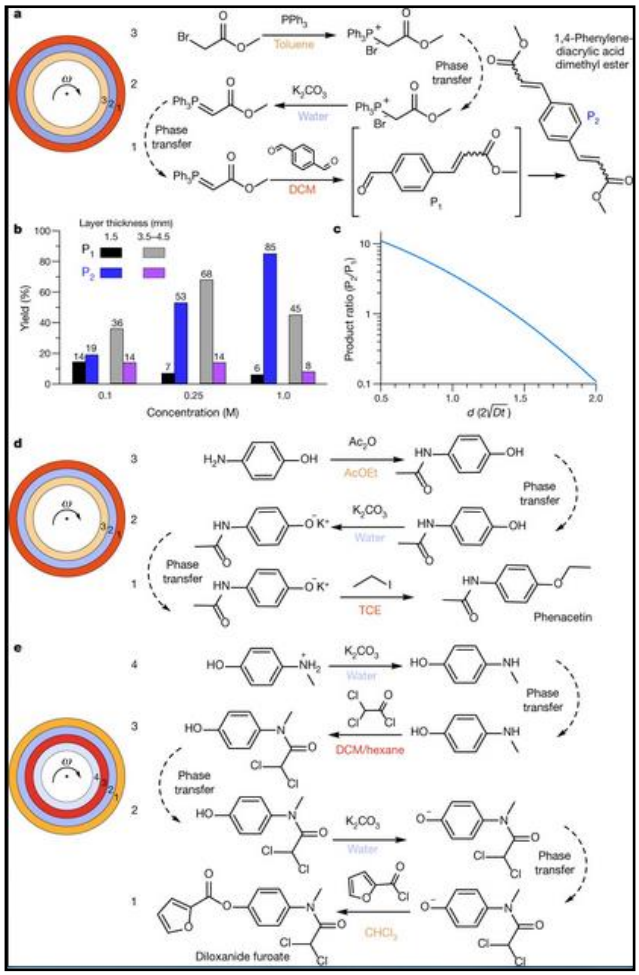
Fri, 02 Oct 2020

A new way to automate sequences of chemical reactions

By Bob Yirka

A team of researchers from Ulsan National Institute of Science and Technology in Korea and the Polish Academy of Sciences has developed a new way to automate sequences of chemical reactions. In their paper published in the journal *Nature*, the group describes their new spinning device that performs multiple reactions and separations.

Historically, chemistry has been a very labor-intensive pursuit, with chemists mixing chemicals step by step to achieve certain reactions and eventually end products. Thus, scientists have been looking for ways to automate as much of the process as possible. The result has been the development of systems such as flow reactors. Unfortunately, these systems require a high degree of engineering prowess. In this new effort, the researchers have developed a new device to replace such systems, which allows for partially automating sequences of chemical reactions.



Multistep organic syntheses in concentric-liquid reactors. Credit: Nature (2020). DOI: 10.1038/s41586-020-2768-9

The new system looks and behaves much like a centrifuge. Chemicals are put into the device and spun. Those chemicals that are most dense wind up on the outer edges; those that are less dense wind up on the inner core. When multiple chemicals are added, the device produces gradient layers of chemicals. The device spins at 750 to 5,400 rpm, depending on the chemicals used.

Once all the chemical layers form, the chemist adds reagents, setting off a chain of events. Reactions in the innermost ring result in products that react with the next ring, and so on, until the chain reaches the outer layer. Once that reaction is complete, the desired product is left at the outer layer where it can be collected. For the device to work as desired, the speed of rotation and the order and timing of chemical and reagent additions must be calculated in advance and performed accurately.

The researchers tested their device by performing multiple reactions and separations to create several desired products, including synthesis of small molecule products. They found it could also be used to move compounds between layers. They suggest their device could be used to automate a wide range of reaction sequences.

More information: Olgierd Cybulski et al. Concentric liquid reactors for chemical synthesis and separation, *Nature* (2020). DOI: 10.1038/s41586-020-2768-9

Journal information: *Nature*

https://phys.org/news/2020-10-automate-sequences-chemical-reactions.html

TIMESNOWNEWS.COM

Fri, 02 Oct 2020

Common low-cost enzyme may potentially treat COVID-19: Study

The antioxidant enzyme is also commonly used worldwide in food production and as a dietary supplement

New Delhi: Catalase, a commonly used low-cost enzyme, holds potential as a therapeutic drug to treat COVID-19 symptoms, and suppress the reproduction of the novel coronavirus inside the body, according to a study.

Common low-cost enzyme may potentially treat COVID-19: Study | Photo Credit: iStock Images

Catalase is produced naturally and used by humans, animals, and plants. Inside cells, the enzyme kick starts the breakdown of hydrogen peroxide, which can be toxic, into water and oxygen.

The antioxidant enzyme is also commonly used worldwide in food production and as a dietary supplement.

"There is a lot of focus on vaccines and antiviral drugs, and rightly so," said Yunfeng Lu from the University of California, Los Angeles (UCLA) in the US.

"In the meantime, our research suggests this enzyme could offer a very effective therapeutic solution for treatment of hyperinflammation that occurs due to SARS-CoV-2 virus, as well as hyperinflammation generally, said Lu, a senior author of the study published in the journal Advanced Materials.

The team, including researchers from the Chinese Academy of Medical Sciences, and Jinan University, China developed the drug-delivery technology used in the experiments.

Three types of tests were conducted, each addressing a different symptom of COVID-19.

The researchers demonstrated the enzyme's anti-inflammatory effects and its ability to regulate the production of cytokines, a protein that is produced in white blood cells.

Cytokines are an important part of the human immune system, but they can also signal the immune system to attack the body's own cells if too many are made -- a so-called "cytokine storm" that is reported in some patients diagnosed with COVID-19.

The researchers also showed that catalase can protect alveolar cells, which line the human lungs, from damage due to oxidation.

The experiments showed that catalase can repress the replication of SARS-CoV-2 virus in rhesus macaques, a type of monkey, without noticeable toxicity.

"This work has far-reaching implications beyond the treatment of COVID-19. Cytokine storm is a lethal condition that can complicate other infections, such as influenza, as well as non-infectious conditions, like autoimmune disease," said Gregory Fishbein a pathologist at UCLA.

https://www.timesnownews.com/health/article/common-low-cost-enzyme-may-potentially-treat-covid-19-study/660694

livemint

Fri, 02 Oct 2020

ICMR, Biological E develop horse antiserum for covid-19 treatment

By Leroy Leo

- ***The bio-medical research agency said that it could be a potential treatment and prevention of covid-19 and an alternative to convalescent plasma therapy***

New Delhi: The Indian Council of Medical Research on Thursday announced that it has, along with Hyderabad-based Biological E, developed blood serum of horses that contain antibodies against covid-19 after conducting a study which highlighted it as.

The bio-medical research agency said that it could be a potential treatment and prevention of covid-19 and an alternative to convalescent plasma therapy, which is blood serum of humans who have recovered from the respiratory disease.

The ICMR has also published a pre-print of a research study on Research Square (MINT_PRINT)

"Although, plasma recovered from patients experiencing covid-19 could serve similar purpose, the profile of antibodies, their efficacy and concentration keep varying from one patient to another and therefore make it an unreliable clinical tool for patient management," ICMR said in a tweet.

"Standardization achievable through equine sera-based treatment modality thus stands out as yet another remarkable public health initiative supported by ICMR in the time of covid-19."

The ICMR has also published a pre-print of a research study on Research Square. The study was co-authored by Gajanan Sapka, a scientist at ICMR's National Institute of Virology in Pune, and Anil Yadav, head of Biological E's anti-sera department, along with about a dozen other officials from NIV and Biological E. The study has not yet been peer-reviewed.

As part of the study, 10 healthy horses were immunized with inactivated SARS-CoV-2 virus and after 21 days of immunization, plasma samples were tested, and results of the plasma samples indicated presence of SARS-CoV2 specific antibodies.

"Equine hyper-immune serum overcomes the challenge of limited availability of convalescent plasma from recovered patients. Monoclonal antibodies on the other hand are laborious and expensive to generate," the study said.

Purified antibodies obtained from hyper-immune horse serum has been an effective and time-tested approach in various infections such as diphtheria, tetanus, rabies, as well as bites from snakes, scorpions and spiders. More recently, it has been used to treat infections such as the first SARS in 2003, MERS, Ebola and avian influenza virus.

https://www.livemint.com/news/india/icmr-biological-e-develop-horse-antiserum-for-covid-19-treatment-11601566121443.html

The Indian EXPRESS

Fri, 02 Oct 2020

From cough sounds to saliva, the faster, cheaper Covid-19 tests undergoing trials in India

Covid-19 Tests: India, which has scaled up testing to a daily average of 10 lakh samples, is testing a host of new technologies and simpler ways to detect the novel coronavirus - from saliva, cough sounds and even breath

By Abhishek De

New Delhi: While testing remains the first line of defence against Covid-19 until a vaccine becomes accessible to the masses, there is a need for fast, accurate and cost-effective tests that don't require a lab for processing or any specialised equipment to ramp up detection of cases.

India, which has scaled up testing to a daily average of 10 lakh samples — a three fold rise from mid-July, is testing a host of new technologies and simpler ways to detect the novel coronavirus – from saliva, cough sounds and even breath. These tests will enable people to collect their own samples unlike the invasive and uncomfortable nasal or throat swabs that are used for RT-PCR tests.

These are new type of Covid-19 tests undergoing trials in India

Cough Against Covid

Mumbai-based Wadhwani Institute for Artificial Intelligence, with support from the Bill and Melinda Gates Foundation, is developing an AI-powered technology that can detect Covid-19 in cough sounds even in asymptomatic cases. The technology, which works on a basic smartphone, will require a user to record a cough sound and report the symptoms they are experiencing.

In a yet-to-be-peer-reviewed research paper, the study, conducted on 3,621 individuals across four states, demonstrated how solicited-cough sounds collected over the phone and analysed by the AI model had a detectable Covid-19 signature. For the study, each individual was required to cough, recite the numbers from one to ten and breath deeply.

To analyse the audio samples, the research team developed an end-to-end convolutional neural network (CNN)-based framework that ingests audio samples as spectrograms and directly predicts a binary classification label indicating the probability of the presence of Covid-19. When used as a screening layer before the RT-PCR test, the tool was found to improve the testing capacity of a healthcare system by 43 per cent, assuming a disease prevalence of 5 per cent.

Speaking with *indianexpress.com*, Dr Rahul Panicker, Chief Research and Innovation Officer, said, "Testing capacity for Covid-19 has been a major challenge globally. This prompted us to think about how we could use AI to develop non-invasive Covid-19 testing that was affordable and accessible to a large population. We believe it will help healthcare and civic authorities expand testing and also focus their resources better, by filtering out patients with Covid-19 – like symptoms but without the infection."

IISc-Bengaluru 'Coswara' project

Researchers at Indian Institute of Science (IISc) are also working on a tool for Covid-19 diagnosis based on cough and speech sounds. IISc received nod from the Indian Council for Medical Research (ICMR) to collect respiratory sound data by tying up with hospitals treating Covid-19 patients in the last week of May.

The diagnosis tool will be released as a web/mobile application.

The user can record her/his voice samples for analysis and this will be used to predict whether or not the sample is similar to Covid-19 infection.

"As the major symptoms of the disease include respiratory problems, the project aims to detect and quantify the biomarkers of the disease in the acoustics of these sounds. The project requires

participants to perform a recording of breathing sounds, cough sounds, sustained phonation of vowel sounds and a counting exercise," PTI quoted a researcher as saying.

Israel-India working on saliva, breath, voice Covid-19 tests

Israel and India are conducting trials at Delhi's Dr Ram Manohar Lohia hospital on four rapid tests that can detect the coronavirus in under a minute.

One technology is a voice test that uses artificial intelligence to identify changes in the patient's voice. "It plays on the fact Covid attacks the respiratory system. One could even do the diagnosis through a cell phone," a statement said.

A second technology involves a breath analyser test that requires the patient to blow into a tube. Using terahertz spectroscopy, the sample is deposited on a chip that detects the virus. NanoScent, the Israeli firm making the breath analyser test kits, said trials in Israel showed 85 per cent accuracy.

The two other technologies involve isothermal testing that enables identification of the coronavirus in a saliva sample and a test using polyamino acids that seeks to isolate proteins related to Covid-19. The US FDA has authorised at least five diagnostic tests that use saliva samples.

'Gargle and spit' Covid-19 test

A small study conducted at AIIMS, New Delhi, on 50 Covid-19 positive patients has showed that gargled water samples may be a viable alternative to swab collection, which requires training and exposes healthcare workers, for detection of SARS-CoV2.

For the study, published in the Indian Journal of Medical Research, paired nasal and oropharyngeal swab and gargle samples were taken within 72 hours of their diagnosis. The samples were processed using RT-PCR test. The study showed that all gargle samples were positive and comparable to their corresponding swab samples irrespective of the symptoms and duration of illness.

"Majority (72 per cent) of the patients reported moderate-to-severe discomfort with swab collection in comparison to 24 per cent reporting only mild discomfort with gargle collection," the study said.

Schools in Canada have already started using 'gargle and spit' Covid-19 test for students. For the test, children gargle a saline solution for 30 seconds, which sweeps up tissues that may hold virus particles, and then spit into a tube.

https://indianexpress.com/article/explained/faster-cheaper-coronavirus-covid-19-tests-india-saliva-cough-sounds-6663609/

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