

International Workshop on Physics of Semiconductor Devices: IWPSD 2017

Solid State Physics Laboratory (SSPL), a premier semiconductor research laboratory of DRDO is organising the 19th International Workshop on Physics of Semiconductor Devices (IWPSD 2017) jointly with Indian Institute of Technology (IIT), Delhi in association with Society for Semiconductor Devices, Semiconductor Society (India) and Society for Information Display. Chairman ISRO and Secretary Department of Space Dr. AS Kiran Kumar will formally inaugurate the event on 12 December 2017 at IIT Delhi in presence of Chairman DRDO & Secretary Department of Defence R&D Dr. S Christopher.

The biennial event IWPSD is considered as a prominent international forum on Advanced Semiconductor Technologies. The event held in India provides an opportunity for Indian researchers to interact with internationally acclaimed experts. Scientists and academicians from international and national educational institutes, government laboratories and leading industries interact to discuss state-of-the-art in advanced semiconductor R&D. The workshop has always received wide international participation and serves as the principal forum for dissemination of semiconductor research in South Asian region.

Semiconductor devices are used in the technological aids related to defence and space applications in addition to day-to-day consumer electronics.

The four day workshop has a strong technical program covering most of the emerging semiconductor R&D fields with five parallel sessions which will cover topics of current interest including VLSI technologies, Sensors, GaN (Gallium Nitrite) Materials and Devices, Opto-electronics, Crystal Growth & Epitaxy, Photovoltaics, Display Technologies, 2D materials & Organic Semiconductors and Semiconductors for Quantum Computing etc. Special emphasis will be given on the role of semiconductor technologies in space, defence and civilian applications.

Many renowned scientists and technologists from USA, Europe, Asia Pacific and other countries are participating in this event. Over 130 internationally acclaimed plenary/invited speakers will deliver talks on research in their field of expertise. In addition about 500 researchers from national Institutes like TIFR, NPL, IISc, IITs, NITs, CEERI etc. and other prominent Central and State universities would be participating in the workshop and over 500 research papers will be presented.

A number of prominent Industries in the area of semiconductor R&D are showcasing their products on the occasion. A special industry session is also being organized to promote Make in India theme. The workshop would also provide a platform for exploring possibility of establishing semiconductor manufacturing in India by Indian and foreign ventures.

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Int'l workshop on Physics of Semiconductor Devices organised at IIT Delhi

New Delhi : A four-day 19th International Workshop on Physics of Semiconductor Devices (IWPSD-2017) began on Tuesday at IIT Delhi. Chairman Indian Space Research Organisation (ISRO) and Secretary, Department of Space A.S. Kiran Kumar formally inaugurated the event.

The main objective of the workshop is to provide an international forum to deliberate and share the emerging semiconductor Research and Development (R&D) fields in electronics; Very-large-scale integration (VLSI) technologies, Sensors, GaN (Gallium Nitride) Materials and Devices, Crystal Growth and Epitaxy, Photovoltaics, Organic Semiconductors and Semiconductors for Quantum Computing among other.

Special emphasis was given on the role of semiconductor technologies in defence, space and other civilian applications.

A number of prominent Industries in the area of semiconductor R&D showcased their products along with a special industry session, mainly organized to promote 'Make in India' theme for exploring possibility of establishing semiconductor and electronics chips manufacturing in India.

A.S. Kiran Kumar in his inaugural address emphasized the need for creating and adopting indigenous technologies. He highlighted that many of the devices used in space missions are being fabricated at GAETEC (A DRDO unit), but the scope is tremendous.

Chairman DRDO and Secretary Department of Defence R&D Dr S Christopher presided over the function.

While extending all possible help to establish the semiconductor foundry/chip manufacturing in India, he expressed the hope that the electronics chip manufacturing industries would explore the incentives under 'Make in India' and tap the huge Indian Electronics market particularly the solar power and LED lighting.

Scientific Advisor to Raksha Mantri Dr G Satheesh Reddy stressed the need for development of navigation grade sensors, MEMs pressure sensors and accelerometers, T/R modules based on GaN technology, large format and low pitch IR detectors.

Director IIT, Delhi Prof. V Ramgopal Rao mentioned that IWPSD is the oldest international conference held in India in the area of semiconductor technology.

Renowned scientists and technologists from USA, Europe, Asia Pacific and other countries and over 130 internationally acclaimed plenary speakers were invited on the occasion. (ANI)



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Wrapped in Secrecy: New report reveals India's Push For Building a Nuclear Submarine Fleet

India's costliest defence project — a Rs 90,000 crore push to develop and construct a fleet of nuclear-powered and nuclear-armed submarines monitored directly by National Security Adviser Ajit Doval — has been making progress away from media glare.

The effort has borne fruit in recent years in the form of INS Arihant – India's first indigenously built SSBN – a submarine that is powered by a nuclear reactor and is equipped with nuclear-tipped ballistic missiles. The second Arihant class submarine, INS Arighat, was launched by Defence Minister Nirmala Sitharaman during a low profile ceremony at the Ship Building Centre (SBC) drydock in Visakhapatnam on 19 November, a report by Sandeep Unnithan of *India Today* has revealed.

A high-profile launch of Arighat, a move that could have helped the government given elections in Gujarat, was rejected by the Prime Minister's Office to maintain a high level of secrecy, the report has revealed. Arighat would undergo extensive sea trials for three years before being commissioned into the Indian Navy. Two other SSBNs, which are still unnamed, will be launched by 2020 and 2022. The two boats will displace 1,000 tonnes more than the Arihant class and will be equipped with eight ballistic missiles or twice

the Arihant's missile load. The design was tweeted a decade ago to make space for additional missiles after the then finance minister P Chidambaram questioned the utility of having just four nuclear-tipped missiles on a boat worth billions.

The nuclear reactor for these submarines has been developed by the Atomic Research Centre, and the Defence Research and Development Organisation (DRDO) has developed submarine-launched ballistic missiles (SLBMs) to arm the boats.

It doesn't end here. On 1 December, Navy Chief Admiral Sunil Lanba revealed that a Rs 60,000 crore project to build six indigenous nuclear-powered attack submarines (SSNs) had been kicked-off by the Navy. SSNs are conventionally armed submarines powered by nuclear reactors. Unlike the SSBNs, these boats do not carry nuclear-tipped missiles. Design work for the submarines, displacing around 6,000 tonnes, is currently underway at the submarine design centre in Gurgaon.

The Navy is also working on a new series of 13,500-tonne ballistic missile submarines. The boats, built under this project, will be capable of carrying 12 nuclear-tipped missiles, compared to four carried by the Arihant-class submarines. Submarines developed under this project, the report says, will be on par with those fielded by the five permanent members of the United Nations. To be built at least a decade from now, the submarines will have 80 per cent. indigenous component.

India is, therefore, working on three different nuclear submarine projects at the same time. Although the effort behind the projects is indigenous with 60 per cent of the component for the Arihant-class being sourced from local manufacturers, the Navy has benefited from close design and technical cooperation with Russia. New Delhi is currently in talks with Moscow to lease another Akula-class submarine to replace the existing INS Chakra after its lease ends in 2022. INS Chakra, having suffered damage in an incident earlier this year, is currently non-operational.

Another important development comes in the form of Project Varsha. The project involves the construction of a nuclear submarine base for the Navy, reportedly at the cost of Rs 30,000 crore by 2022. The base will have concrete pens to securely house one of India's costliest and most-advanced defence platforms.

Induction of these submarines, many of which are expected to be in active service by the end of the next decade, will strengthen India's nuclear triad – the ability to launch a nuclear attack from land, air and sea. Although the naval variant of the triad is currently operational with INS Arihant in service, it is not as strong as that of China's. The People's Liberation Army Navy has at least four SSBNs in service.

The push for nuclear submarines also assumes greater importance as India has reportedly decided to hold back on its plan to build a nuclear-powered aircraft carrier. A platform that is powered by nuclear reactors can remain operational for an extended period without breaks. Therefore, if India decides to have a conventional aircraft carrier, its reach would remain limited. Nuclear-powered submarines will be the only platforms that would provide the Indian Navy with the option to reach far-off waters.

Additionally, nuclear propulsion helps submarines move faster underwater, making them difficult to locate and track.

While the platforms are being designed and built, India has also been working on the armament. The DRDO has made progress on the K-series missiles, named after former president A P J Abdul Kalam. As part of the series, DRDO has developed K-15 (also called B-05) missile with a range of 750-km. While the K-15 has entered series production, the next missile in the series – K-4 – is in the trial phase.

The fourth test of the K-4, which has a range of around 3,500 km, is expected sometime in December, the *India Today* report says. This will be followed by tests of K-5 missile, a 5,000 km SLBM. Work on the fourth missile in this series – K-6 – began at DRDO's Hyderabad-based Advanced Naval Systems in February. The missile is reported to have a range of 6,000 km.