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The Fourth State

Newsletter of the Institute For Plasma Research, Gandhinagar, Gujarat (India)



IPR @ National Technology Week - New Delhi

IPR participated in the National Technology Week celebrations that was organized at the Pragati Maidan, New Delhi during 11-14 May, 2023. The event was inaugurated by Hon. Prime Minister Shri Narendra Modi. During the inauguration, he also inaugurated several projects including the LIGO-India project. Over 15 departments under the union government participated in the technology exhibition that was organized as part of the event. IPR participated in this exhibition as part of the DAE pavilion. Over 10 working models of plasma and related technologies were on display. Nine students of BSc Physics (Hons) from Delhi University were selected and trained to explain the exhibits to the visiting public. Over a lakh people visited the exhibition. Click [HERE](#) for more details.

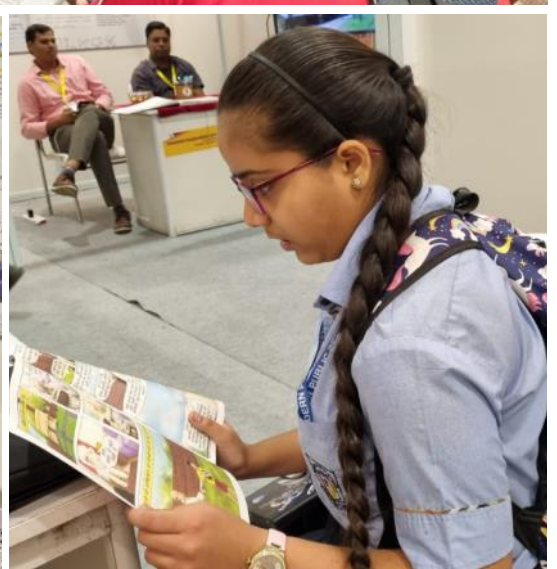


Hon. Prime Minister Shri Narendra Modi inaugurating the National Technology Week 2023 at New Delhi



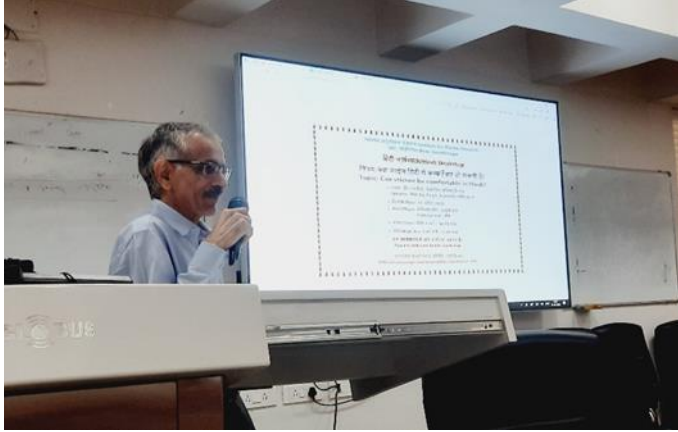
(L) Hon. MoS for Science & Technology and Earth Sciences, Dr. Jitendra Singh visiting the IPR stall in the DAE pavilion





Images from the National Technology Week 2023 Exhibition

दिनांक 21.04.2023 को प्लाज़्मा अनुसंधान संस्थान के सेमिनार हॉल में हिन्दी कार्यशाला आयोजित की गई। कार्यशाला का मुख्य विषय था “क्या साइंस हिंदी में कम्फर्टेबल हो सकती है? इस कार्यशाला में श्री राज सिंह, वैज्ञानिक अधिकारी-एच एवं सह अध्यक्ष, राभाकास ने प्रशिक्षण सत्र के प्रारंभ में राजभाषा कार्यान्वयन नीति पर प्रकाश डाला। उन्होंने राजभाषा संबंधी संवैधानिक व्यवस्था समझाते हुए अनुच्छेद 343 से 351, राष्ट्रपति का आदेश-1960, राजभाषा अधिनियम – 1963, राजभाषा संकल्प/राजभाषा नियम – 1976 आदि से उपस्थित श्रोतागण को अवगत कराया गया। उन्होंने विज्ञान जैसे जटिल विषय को सरलता से हिंदी में प्रस्तुत करने के लिए उपलब्ध विभिन्न टूल्स के प्रयोग का उल्लेख किया। एक वैज्ञानिक अनुसंधान संस्थान में हिन्दी में कार्य बढ़ावा देने हेतु नए तरीकों को अपनाने पर विस्तार से चर्चा की और उपस्थित कार्मिकों को हिंदी में कार्य करने हेतु प्रेरित किया। श्री राज सिंह जी ने बताया कि किस प्रकार अन्य देशों ने अपनी मातृभाषा में विभिन्न अनुसंधान क्षेत्रों में कार्य किया और नोबल पुरस्कार प्राप्त किया है। उन्होंने बताया कि अंग्रेजी के अलावा भी अन्य भाषाओं में विज्ञान के कार्य किए जा रहे हैं। हिंदी आम बोलचाल की भाषा है और इसमें विज्ञान की जानकारी सरलता से प्रदान की जा सकती है और हिंदी ही नहीं बल्कि अन्य क्षेत्रीय भाषाओं में विज्ञान के बारे में आसानी से समझाने की आवश्यकता है। उन्होंने विज्ञान को हिंदी में सहज रूप से प्रस्तुत करने पर जोर दिया। यह भी बताया कि विज्ञान में हो रहे हैं अनुसंधान को मूल रूप से हिन्दी में तैयार करना चाहिए और अंग्रेजी के प्रचलित शब्दों को हिंदी लिपि में ज्यों का त्यों प्रयोग करना चाहिए। विज्ञान की जानकारी सरल हिंदी भाषा में प्रस्तुत करने की आवश्यकता है, क्योंकि भारत के बड़े भू-भाग में हिन्दी बोलचाल की भाषा है और आम जन की भाषा होने के कारण विज्ञान संबंधी ज्ञान को आसानी से लोगों तक पहुंचाया जा सकता है। यह कार्यशाला उपस्थित श्रोतागण के लिए काफी ज्ञानवर्धक रही।



हिन्दी कार्यशाला में प्रशिक्षण देते हुए श्री राज सिंह

उपलब्धि - राजभाषा शील्ड



नगर राजभाषा कार्यान्वयन समिति गांधीनगर की 20वीं छमाही बैठक दिनांक 28 अप्रैल 2023 को बड़ौदा एपैक्स अकादमी गांधीनगर में आयोजित हुई। श्री दीपांकर गुहा, अध्यक्ष, नराकास, गांधीनगर ने इस बैठक की अध्यक्षता की एवं बैठक में उपस्थित नराकास, गांधीनगर के विभिन्न केन्द्रीय कार्यालयों/संगठनों/बैंको से उपस्थित कार्यालयाध्यक्षों, राजभाषा अधिकारियों एवं प्रतिनिधियों को संबोधित किया। इस बैठक में श्री पुनीत कुमार मिश्र (राजभाषा एवं संसदीय समिति, प्रधान कार्यालय) द्वारा सदस्य कार्यालयों की छमाही रिपोर्ट की समीक्षा की गई एवं राजभाषा विषयक अद्यतन जानकारी प्रदान की गई व मार्गदर्शन दिया गया। श्री लक्ष्मी कांत, उप महाप्रबंधक बैंक ऑफ बड़ौदा द्वारा राजभाषा कार्यान्वयन पर महत्वपूर्ण

चर्चा की गई। इस बैठक में आईपीआर की ओर से डॉ. सुब्रतो मुखर्जी, डीन प्रशासन एवं डॉ. संध्या देवे, हिंदी अधिकारी ने भाग लिया। बैठक के अंत में वर्ष 2022 के लिए राजभाषा शील्ड प्रतियोगिता के अंतर्गत नराकास, गांधीनगर के सदस्य कार्यालयों को राजभाषा कार्यान्वयन में उत्कृष्ट कार्य हेतु पुरस्कृत किया। राजभाषा कार्यान्वयन के लिए प्लाज़्मा अनुसंधान संस्थान को वर्ष 2022 के लिए राजभाषा शील्ड प्रतियोगिता में प्रथम पुरस्कार के रूप में शील्ड एवं प्रमाण पत्र प्राप्त हुआ।

Fire Service Week (FSW) is observed every year to enhance general public awareness about the necessity of minimizing losses due to fire. 14th April is observed as the “Martyr’s Day” to pay homage to those brave firefighters who sacrificed their lives while discharging their duties.

This year’s theme for the FSW “**Awareness in Fire Safety for Growth of National Infrastructure (AGNI)**”.

As part of the FSW, IPR conducted various activities such as ;

- Training-cum-demonstration on fire alarm & detection system imparted to the security personnel at IPR.
- Practical demonstration of operation of fire extinguishers was conducted for employees and security personnel at IPR, FCIPT and ITER-India office.
- Practical demonstration of operation of the fire hydrant system was conducted for employees and security personnel at IPR and ITER-India Laboratory Building.



(L) Training being imparted to security personnel on fire alarm & detection System (R) Demonstration of fire extinguishers at ITER-India Office Building



Images of the various training programs organized as part of the Fire Service Week at IPR

IPR, in association with L D College of Engineering, Ahmedabad conducted a 2-day program to celebrate the National Technology Day at the LDCE campus at Ahmedabad during 18-19 May, 2023. This is the second year in succession that IPR and LDCE are jointly conducting this state level programme. The guests of the event were Shri Niles M. Desai (Director SAC-ISRO), and Dr. Shashank Chaturvedi (Director IPR). The NTD2023 showcased several competitive events such as quiz, Skit, Elocution, Code and circuit debugging, technical models and Drafting Dynamics. Student participants from engineering colleges across Gujarat also exhibited their scientific projects at the event. IPR Outreach Division also organized an exhibition on plasma and applications. Click [HERE](#) for more details

The concluding session and prize distribution was held on 19th May and Dr. P. K. Atrey, Dean R&D, IPR graced the occasion and distributed prizes to the winners of the various competitions organized as part of the event.



View of the exhibition of Plasma as well as the technical models by engineering students.



Director, IPR lighting the lamp and addressing the gathering during inauguration of the event



The inauguration of NTD-2023 in progress



(L) "B-Chai Pitch" interaction of students with start-up entrepreneurs



(L) Circuit debugging (M) Code debugging (R) Technical exhibits of students in progress



Student volunteers from LDCE explaining the IPR exhibits to visitors



IPR ORD members with the NTD 2023 organizing team from LDCE



Concluding session of NTD-2023



Prize distribution of NTD-2023

IPR @ Conferences



Dr. Mukesh Ranjan delivered an invited lecture entitled "Nanostructuring using Ion Beams for Surface wettability and sensing applications" at the International Conference for Emerging Technologies (ICAMET-2023) organized by Netaji Subash Chandra Bose University of Technology (NSUT), New Delhi during May 4-6, 2023.



Dr. Manoj Kumar Gupta and Dr. Mukesh Ranjan were invited to judge the entries of the state level Kendriya Vidyalaya Science competition. The program was inaugurated by Dr. Narotam Sahoo (Member-secretary of GUJCOST). Recommended students will participate at National level science projects competitions of Kendriya Vidyalayas.

IPR has been granted two Indian patents entitled:

A Wideband Hybrid High Power MW Level CW Radio Frequency (RF) Combiner / Splitter - Patent No. 426278 (Indian App. No. 201821011151 dated 26-Mar-2018).

Inventors: Mr. Akhil Jha, Mr. P. Ajesh, Dr. J.V.S. Harikrishna, Mr. Rohit Anand, Mr. Paresh Vasava, Mr. Manojkumar Patel, Mr. R. G. Trivedi and Mrs. Aparajita Mukherjee

The wideband combiner either splits or combines input RF power (based on input configuration) up to level of 4.5 MW in matched load continuous wave conditions. This type of design is unique in terms of matched & mismatched load performance at this high-power level.

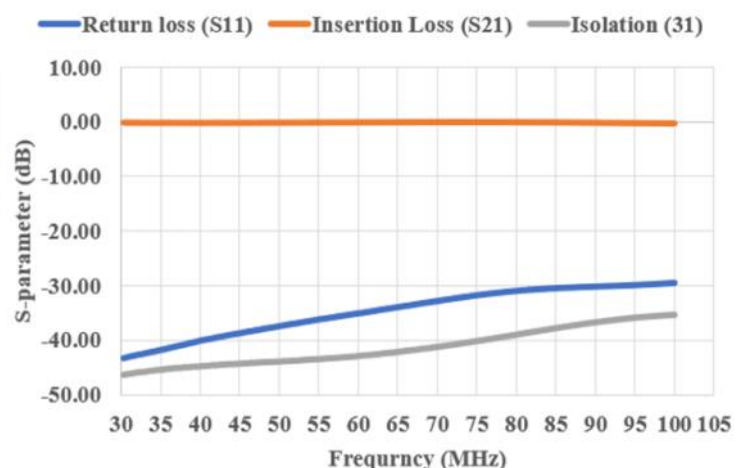
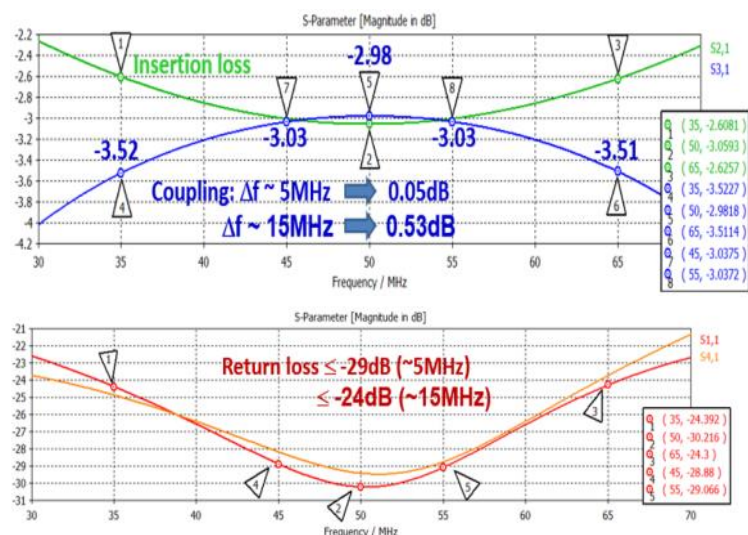
MW Level CW Single Pole Double Throw (SPDT) Coaxial Radio Frequency (RF) Switch - Patent No. 426292 (Indian App. No. 201821011443 dated 27-Mar-2018).

Inventors: Mr. P. Ajesh, Mr. Akhil Jha, Mr. Rohit Anand, Mr. Paresh Vasava, Mr. Hrushikesh Dalicha, Mr. Hriday Patel, Mr. Kumar Rajnish, Mr. R G Trivedi, Mrs. Aprajita Mukherjee

MW Level CW Single Pole Double Throw (SPDT) Coaxial Radio Frequency (RF) Switch is unique in terms of its moving mechanism which leads to drastic reduction in volume and weight (~5 times) for continuous wave power handling of 3 MW. Due to the fact that these components were developed indigenously, the cost of these innovations is significantly lower than its imported equivalents.



(L) The Combiner/Splitter (R) The SPDT switch



(L) S parameter response of Combiner/Splitter (R) S parameter response of SPDT switch

Date	Institution	Visitors
11-Apr-2023	Vishwakarma Govt. Engineering College, Chandkheda	55 students of BE(EC) and 2 faculty
12-Apr-2023	L. D. College of Engineering, Ahmedabad	75 students of BE (IT) and 6 faculty
21-Apr-2023	AAHWAN Group, Odisha (through GUJCOST)	6
01-May-2023	Indian Institute of Public Health (IIPH), Gandhinagar	27 students of MBBS
03-May-2023	Vishwakarma Govt. Engineering College, Chandkheda	76 students of BE(Elec) and 2 faculty
22-May-2023	Students of Advanced BSc Course, St, Xavier's College, Ahd	28 BSc Physics students and 2 faculty



Students Indian Institute of Public Health (IIPH), Gandhinagar during their visit to FCIPT



Students and faculty from Vishwakarma Govt. Engineering College, Chandkheda, Ahmedabad during their visit to IPR



Students of the Advanced BSc Course at St.Xavier's College, Ahmedabad, during their visit to IPR

CPP-IPR's Outreach Cell conducted a **"One Day Workshop on Plasma Physics and its Applications"** on 26th April, 2023 at Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya (PDUAM), Tulungia, in Bongaigaon district of Assam. PDUAM is a Model College established under the co-venture of the Central Government and the Government of Assam. The programme was attended by 22 teachers and 55 students of various departments of the college. 2 teachers and 10 students from Abhayapuri College, Abhayapuri also attended the programme. During the technical session, Dr. Rakesh Moulick gave a talk on introduction to plasma physics, followed by a talk on basics of experimental plasma physics by Dr. Ngangom Aomoa and a talk on fusion technology by Dr. B. J. Saikia. After the talks, the participants were shown a glow discharge plasma and a plasma globe, and the role and working principle of the various components of the set-ups were explained to them.



Images from the one-day workshop on plasma conducted by CPP-IPR at Bongaigaon (Assam)

- ♦ **Mr. Amal S**, gave a talk on "Simulation and Implementation of a 350kV, 50mA High Voltage DC Generator for Particle Accelerator Applications" at 4th IEEE International Conference Power, Instrumentation, Control, and Computing (PICC 2023), Government Engineering College, Thrissur, 19-21 April 2023
- ♦ **Dr. Hardik Vyas**, Pandit Deendayal Energy University, Gandhinagar, gave a talk on "Investigation on Friction Welding of Pipes for Dissimilar Metals" on 21st April 2023
- ♦ **Dr. Bill Amatucci Robert**, Naval Research Laboratory in Washington, USA, gave a talk on "Laboratory Simulation of Basic Space Plasma Phenomena" on 24th April 2023 (**Colloquium #324**)
- ♦ **Dr. Gurudas Ganguli**, Naval Research Laboratory in Washington, USA, gave a talk on "NRL Current Sheet Model: Kinetic Effects of Plasma Compression" on 25th April 2023 (**Colloquium #325**)
- ♦ **Dr. Abin Rejeesh AD**, gave a talk on "Numerical modelling of an arc plasma and its interaction with the anode" on 26th April 2023
- ♦ **Dr. Shatadru Chaudhuri**, Jadavpur University, Kolkata, gave a talk on "Dynamics of Incoherent Nonlinear Waves in Plasmas" on 27th April 2023
- ♦ **Mr. Vinay Menon**, gave an invited talk on "A multi-physics approach to the design of a fusion reactor" at 7th National Finite Element Developers' /FEAST^{SMT} Users' Meet (NAFED07), Indian Institute of Technology, Delhi, on 30th April 2023
- ♦ **Dr. Akash Vyas**, SVNIT, Surat, gave a talk on "Investigation on Metallurgical, Mechanical, Corrosion and Erosion Behaviour of Laser Cladded High Entropy Alloy Coatings" on 1st May 2023
- ♦ **Dr. Dhyey Raval**, gave a talk on "Design and Characterization of RF power measurement device for multi electrode large area plasma source" on 2nd May 2023
- ♦ **Dr. Ruchi Mishra**, Babasaheb Bhimrao Ambedkar University, Lucknow, gave a talk on "Study of Drug-DNA interaction using Quantum Mechanics Tools" on 4th May 2023
- ♦ **Dr. Mukesh Ranjan**, gave a Keynote address on "Nanostructuring for surface wettability and sensing applications" at International Conference on Advanced Materials for Emerging Technologies (ICAMET- 2023), New Delhi, 04-06 May 2023
- ♦ **Ms. Sukriti Hans**, gave a talk on "Nanopatterns Formation by Low-Energy Ions: Experiment and Simulation" on 16th May 2023
- ♦ **Ms. Swapnali Khamaru**, gave a talk on "Exploring electron plasmas confined in toroidal magnetic field: A 3D particle-in-cell simulation study" on 22nd May 2023

Upcoming Events

- ♦ Plasmonically Powered Processes (GRS) Gordon Research Seminar: Fundamentals and Applications of Plasmon-Driven Processes, Ventura, United States, 3-4 June 2023; <https://www.grc.org/plasmonically-powered-processes-grs-conference/2023/>
- ♦ 5th IAEA Technical Meeting on Fusion Data Processing, Validation and Analysis, Ghent University, Belgium, 12-15 June 2023; <https://www.iaea.org/events/evt2103268>
- ♦ International Joint Conference on Neural Networks (IJCNN 2023) with Special session for "Machine Learning and Fusion Energy", Queensland, Australia, 18-23 June 2023; <https://2023.ijcnn.org/>
- ♦ Summer School of Plasma Diagnostics (PHDIAFUSION 2023), Poland, 19-23 June 2023; <https://phdia2023.ifj.edu.pl/>
- ♦ IEEE Pulsed Power Conference (2023 PPC), San Antonio, Texas, USA, 25-29 June 2023; <https://ppc2023.org/index.php>
- ♦ 12th ITER International School: The Impact and Consequences of Energetic Particles in Fusion Plasmas, Aix-en-Provence, France, 26-30 June 2023; <https://iis2023.sciencesconf.org/>

MoU for SERS Sensor

Recently IPR has signed a MoU with M/s. Lab-India, Mumbai for the template of Surface Enhanced Raman Scattering (SERS) based sensing. SERS template technology is developed by Team of Mr. Sooraj KP, Mr. Sebin Augustine, Dr. Mahesh Saini and Dr. Mukesh Ranjan from SSMAS/Plasma Surface Engineering Division (PSED)/IPR. Developed SERS templates has the capability to detect various molecules under very low concentrations and has been tested for various food adulterants. Under the MoU SERS template will be tested for various industry relevant molecules.



Title	Page No
IPR @ National Technology Week - New Delhi	1-2, 12
प्लाज़्मा अनुसंधान संस्थान में आयोजित हिन्दी कार्यशाला	03
उपलब्धि - राजभाषा शील्ड	03
Fire Service Week @ IPR	04
IPR-LDCE National Technology Day 2023	05-07
IPR @ Conferences	07

Title	Page No
Grant Indian Patents to IPR	08
Academic Visits to IPR	09
Outreach Activities @ CPP- IPR	10
Past & Upcoming Events @ IPR	11
MoU for SERS Sensor	11
KYC	12

Know Your Colleague



Mr. Chiragkumar H Dodiya joined IPR in 2011 in the Magnet group of SST-1 after completing his B.E. in Electrical from North Gujarat University. Currently, he is working in Magnet System Division as Technical Officer – C. As part of his work, Chirag has participated in SST-1 Plasma Campaigns and contributed to the development of induced voltage acquiring scheme for PF coils of SST-1. He has also contributed to the Installation, testing, and commissioning of a 30kA 30V DC Power supply. He also looks after the operation and maintenance of 12kV tan delta tester for insulation characterization. He has experience related to High current DC power supplies for magnets and LT Electrical distribution. Currently, he is working on the development and operation of high-current power supplies as well as pulsed power supplies to be used for the HTS test facility as well as SST-1 magnet division.

Plasma Exhibition @ National Technology Week Exhibition, New Delhi



IPR Team with the student volunteers from Delhi University at the National Technology Week Exhibition at New Delhi

The IPR Newsletter Team

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