

The editorial committee of the IPR newsletter wishes to thank all the IPR staff members for their encouragement and support that they have given to the revived newsletter. We hope that this will continue for all the forthcoming issues of "The Fourth State". Please feel free to send any comment / suggestion to the committee at <newsletter@ipr.res.in> for improvement of the look and contents of the newsletter.

66th Republic Day Celebrations at IPR

66th Republic Day of the nation was celebrated with gaiety and enthusiasm with large number of IPR families attending the programs. Prof. Dhiraj Bora hoisted the national flag and received the guard of honour on the occasion. The day also saw the culmination of the month long sports activities organized by the Staff Club. Over three hundred staff and their families participated in various categories of sports events. Cultural programs included singing, dancing and especially the exciting fancy dress program where kids stole the show. Plasma Cricket Trophy, Volley Ball and Badminton tournaments, Athletic events such as Race, Disk Throw, Long Jump etc. were the sports events . Lots of prizes were distributed and the Music Chair winners were given the titles Republic Man, Republic Women and Republic Child. The event concluded with a "Republic Day Walk".



Exciting programmes marked the Republic Day Celebrations. Images show Prof. Dhiraj Bora leading the "Republic Day Walk", kids in fancy dress competition and some of the winners from the various tournaments conducted by the Staff Club in its month long sports competitions.

Cross-Disciplinary Plasma Science Laboratory @ CPP-IPR

The Cross-Disciplinary Plasma Science (CDPS) Laboratory at CPP-IPR was set up initially in the year 1994 with funding from North Eastern Council, Govt of India, under a project titled "Development of a Device for Plasma Assisted Hardening of Agricultural and Domestic Implements." Later it was upgraded by funding received from DAE-BRNS under another project, namely, "Development of duplex plasma based surface modification process involving dc pulsed magnetron sputtering and plasma nitriding with surface characterization."

Presently, the primary objectives of the laboratory are to exploit the industrial applicability of plasma technologies. The laboratory aims to develop technology for surface modifications of important industrial machinery parts, agricultural implements and cutting tools in cold plasma environment.

Among several possibilities for high-speed steels (HSS), one of the most promising combinations, is plasma nitriding of the substrate followed by physical vapour deposition (PVD) of a thin hard coating. For this purpose, the existing Plasma Nitriding reactor was upgraded to Duplex Processing Reactor with the assembling of a DC planar Magnetron for sputter coating of the pre-nitrided steels.

Some significant results of this laboratory are hardening of SS304 and the subsequent coating of TiN on the plasma nitrided substrate using planar DC magnetron. It results in a more corrosion-resistant, surface-hardened substrate. Basic studies of the DC planar magnetron discharge using the Langmuir probe and the ion acoustic wave has also been performed recently to obtain significantly good results.



(L-R) The experimental setup in the CDPS Laboratory, Top view of the planar magnetron and the duplex treated substrates

Donation Drive @ CPP

On the initiative of the research scholars, CPP-IPR conducted a donation drive to help the victims of the December 2014 militant attacks in Assam, in which more than 80 people were killed and lakhs of people were displaced from their homes.

During the donation drive, CPP-IPR employees and research scholars contributed warm clothes and money for the victims. Five carton boxes of warm clothes and Rs. 15,500/- were collected. The money was used for buying blankets, mosquito nets, children's socks and candles as well as food items like rice, dal, biscuits etc. All these were submitted to the news channel DY365, which have been organizing the donation drive, collecting clothes and dry food items from Guwahati area and delivering them to the affected areas.



(L-R) Rakesh Moulick, Daizy Kalita, Ananya Phukan, Ng. Aomoa, Nayan Talukdar, and Suramoni Borthakur with the collected relief items.

The relief items loaded for dispatch to the affected areas.

The Vibrant Gujarat Exhibition -2015 : IPR Participation

The Vibrant Gujarat Exhibition (Global Trade Show 2015) was held during 7-13 January 2015 at the newly constructed Exhibition Centre, Gandhinagar. The exhibition was inaugurated on 7th January 2015 by Hon. Minister of External Affairs Smt. Sushma Swaraj and Hon.Chief Minister of Gujarat Smt. Anandiben Patel. Exhibition featured close to 1300 stalls in 15 exhibition halls sprawling 1,25,000 sq.m., making it the country's biggest exhibition venue. Not only national & international companies but Indian government ministries, departments, academic institutions, NGOs, event partner countries etc. also participated in the programme promoting awareness on their areas of work. IPR had a stall in this exhibition disseminating information and awareness among the public on fusion related work. The stall consisted on informative posters on IPR/FCIPT/ITER-India activities and models of SST-1, ITER Cryostat base, Angora wool processing system and the Plasma Pyrolosis System. Additionally leaflets were distributed and also feedback taken from the visitors . The public consisting of students, parents, industry representatives, academic faculty, general public etc. showed keen interest on the ongoing works and asked several queries which the volunteers from IPR/FCIPT/ITER-India were glad to answer. The whole event had witnessed a footfall of over 2 million people in the week long exhibition and the IPR stall also elicited a very good response from the visitors.



Images of the IPR / ITER-India / FCIPT combined pavilion at the Vibrant Gujarat 2015 event.



IPR @ Conferences

Mr. Kedar Bhope of the Divertor & First wall Tech. Development Division delivered an oral presentation on contributed paper entitled "*Ultrasonic Inspection of High Heat Flux (HHF) tested Tungsten Monoblock Type Divertor Test Mock ups*" under the category of Ultrasonic in National Seminar and Exhibition on Non-Destructive Evaluation (NDE-2014) during 4-6 December 2014 held at Pune, India Hosted by ISNT Pune chapter and Same paper is awarded with **2nd price** for Best Oral Presentation

DAE Jubilee National Science Day @ IPR

As part of the Diamond Jubilee celebrations of DAE,IPR organized National Science Day-2015 at its campus at Bhat, Gandhinagar from January 9-10, 2015. Various events like exhibition of Science Models from schools, demonstration of fundamental scientific principles and ideas by IPR staff, poster presentations, Science quiz, Essay competitions, Eloquence competitions for students etc. were organized to motivate the young minds towards science and technologies. More than 600 students from various schools from all over Gujarat participated in this programme. The campus was open for public visit from 10.00 am to 4.00pm for the two days and free transportation was provided from RTO circle, Ahmedabad to IPR . School students as well as common public were given guided tour of IPR to acquaint them with the research work being done and the cutting edge technologies being developed and used at the Institute in the field of Plasma and controlled thermo-nuclear fusion. They were also shown the first Indian tokomak Aditya and the superconducting Steady State Tokamak-1. The event was inaugurated by Prof. Dhiraj Bora, Director. Prizes and certificates were given to the winners during the concluding session. The social outreach programme envisaged in the jubilee year has several activities to create public awareness about the scientific and technological achievements of the nation as well as on emerging technologies and its prospects.



Prof Bora inaugurating the Science Day Exhibition. One of IPR exhibits 'Tesla Coil' was demonstrated by Ms. Priyavandana.



View of the exhibits from schools all over Gujarat State.



(L-R) Prof Bora distributing the prizes. The BSc. Physics students of the St. Xavier's College, Ahmedabad collaborated with IPR staff in putting up science exhibits.

Plasma Pyrolysis System Commissioned At IPR For In-House Waste Disposal

A 15 kg/hr Plasma Pyrolysis System, which was developed at FCIPT several years ago and operational at several places all over India, was commissioned at IPR on 1st Jan 2015 for in-house organic waste disposal. The Plasma Pyrolysis is a safe and environment friendly technique that destroys the waste by disintegration of organic waste in to lower hydrocarbons at high temperature. Temperatures higher than 5000°C in the plasma arc zone and ~ 700°C near the wall of the main reactor are maintained using a graphite electrode based plasma torch. The disintegration of organic waste in this process initially generate high calorific gases like Hydrogen, Methane, Ethylene, Carbon monoxide and when these are mixed with air and combusted in a secondary chamber temperature reaches to nearly 1050°C. The secondary chamber has been designed in such a way that the residence time of gas with in is 1 sec or more to ensure the complete combustion of gas molecules which come out from main the reactor. Product gases generated during the combustion process are quenched by alkaline water in the scrubber chamber. This eliminates chlorine, if present in the product gases, by converting it into NaCl and quenches the gas temperature from 700°C to 70°C. Finally, pollutant free gases are released to atmosphere by ID fan through chimney. Gas analysis measurements from primary chamber residue, scrubber water and chimney have been found much lower than the norms given by CPCB and US-EPA.



(L-R) Prof. Dhiraj Bora inaugurating the system, the team members and the Secondary Chamber flame in the device.

Silver Stars Of IPR



Mr. N.C. Patel joined IPR in 1991 andwas part of the general electronics group earlier and then a member of Aditya Data Acquisition and Control group. He is associated with Aditya vacuum and diagnostics group for different subsystems and also involved in various other experiments at IPR. He also takes care the technical management of the IPR seminar Hall.



itya Vacuum Group in 1991. He contributed towards the development of pulse and ECR Discharge cleaning and Gas puffing systems for the tokomak and later heat load and flux test facilities for the ITER first wall mock up and test systems for the prototype diverter division. Presently he is with SST-1 vacuum division working for density control, SMBI and FRPS systems

Mrs. Rachna Rajpal joined the Electronics division of IPR in 1990 and worked on front-end electronics for diagnostics, design and development of CAMAC Crate Controller and PXI Data Acquisition system. Presently she is heading the Electronics and Instrumentation division involved in the development of electronics for diagnostic systems and signal conditioning for Aditya and SST-1 Tokamak.

ITER-India Delivers SPIDER Beam Dump to ITER Organization (IO)

ITER-India has successfully delivered the SPIDER Beam Dump to ITER Organization (IO) for the Neutral Beam Test Facility (NBTF) marking an important milestone of its first in-kind delivery to ITER Organization under a procurement arrangement. The unit has been received at NBTF Site, Padova, Italy on 22nd December 2014 . The SPIDER Beam Dump was manufactured by M/s PVA Tepla AG, Germany under a contract with ITER-India. The manufacturing activities were monitored and assessed by ITER-India & IO according to the approved Manufacturing & Inspection Plan. The implementation of the ITER guality requirements has been assured by the ITER India & IO during execution of this project.



ITER India, PVA Tepla, Consorzio RFX & ITER Organization representatives at the acceptance Test of SPIDER Beam Dump at PVA Tepla AG, Germany

Several Tests for Factory Acceptance had been performed by PVA Tepla AG witnessed by the representatives of ITER India & IO. Also, being an end user, representatives from Consorzio RFX observed the performance of these tests at PVA Tepla's site in Germany. Upon unloading of the SPIDER Beam Dump at NBTF Site, package inspection was performed by ITER India, IO & Consorzio RFX representatives. With the verification of the Shock & tilt watch (i.e. accelerometer installed on the package at the manufacturer's site before transportation), it was concluded that the package did not receive any major shock or tilt during transportation and unloading operations.

At present, SPIDER Beam Dump has been stored in the Consorzio RFX's warehouse. This component is now awaiting its final integration with the SPIDER vessel and Site Acceptance Test.

New IPR Website Made Live

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Click here for old website

Institute for Plasma Research is an autonomous R & D organization under the authority of Department of Atomic Energy (DAE), Government of India situated near west banks of river Sabarmati in Gujarat, India. This institute is largely involved in theoretical and experimental studies in plasma science including basic plasma physics, magnetically confined hot plasmas and plasma technologies for industrial application. The institute owns two operational tokamaks (a machine for controlling thermonuclear fusion) - ADITYA and Steady State Tokamak (SST) - 1. FCIPT, ITER-India and CPP-IPR, located in Gandhinagar and Guwahati are three divisions under IPR.

A new and more dynamic website www.ipr.res.in has been made live with effect from 27th January 2015. This user-friendly website features structured information on all categories of activities and divisions of the institute.

A new addition to the site is "Events" tab where past, present and future activities would be listed in calendar format. The website also features a quick, photo-based "People Finder" where details of IPR staff are provided. IPR staff are welcome to give their feedback and comments so that the website can be improved upon to make it a better experience.

प्लाज़्मा अनुसंधान संस्थान में परमाणु ऊर्जा विभाग के 16वें अखिल भारतीय राजभाषा सम्मेल

परमाणु ऊर्जा विभाग का 16वाँ अखिल भारतीय राजभाषा सम्मेलन 29-30 जनवरी, 2015 को प्लाज़्मा अनुसंधान संस्थान, गांधीनगर में आयोजित किया गया। इस सम्मेलन के उद्घाटन सत्र में मंच पर पऊवि के सचिव माननीय डॉ.रतन कुमार सिन्हा, विशेष अतिथि के रूप में वरिष्ठ साहित्यकार एवं महाराष्ट्र राज्य साहित्य अकादमी के कार्याध्यक्ष डॉ. दामोदर खड़से, पऊवि की संयुक्त सचिव श्रीमती चित्रा रामचंद्रन, प्लाज्मा अनुसंधान संस्थान के निदेशक, प्रो.धीराज बोरा एवं संस्थान के डीन प्रो.रत्नेश्वर झा उपस्थित थे। निदेशक प्रो.धीराज बोरा ने सम्मेलन में पधारे सभी आगन्तुकों को संबोधित करते हुए आईपीआर में उनके आगमन पर प्रसन्नता प्रकट करते हुए संस्थान की वैज्ञानिक/तकनीकी गतिविधियों पर प्रकाश डाला। उन्होंने संस्थान में हिन्दी के प्रभावी प्रयोग हेतु हिन्दी अनुभाग एवं संस्थान के वैज्ञानिक/तकनीकी वर्ग द्वारा की जा रही हिन्दी गतिविधियों को भी उजागर किया। इसके पश्चात् पऊवि की संयुक्त सचिव श्रीमती चित्रा रामचंद्रन ने अपने उद्बोधन में पऊवि की विभिन्न इकाईयों/उपक्रमों सहायता प्राप्त संस्थानों में राजभाषा हिन्दी के अनुपालन हेतु किये गये नवीन कार्यो की सराहना की। पऊवि के सचिव श्री रतन कुमार सिन्हा ने सभी भाषाओं की महत्ता को प्रतिपादित करते हुए राष्ट्रभाषा को अपनाने की प्रेरणा देनेवाले सुंदर उदाहरणों को प्रस्तुत किया। सम्मेलन के विशिष्ट अतिथि डॉ. दामोदर खडसे ने अपने संबोधन में राजभाषा हिन्दी के विकास में निहित देश का विकास एवं प्रतिष्ठ को प्रतिपादित किया।

उद्घाटन सत्र में पऊवि के सचिव ने अपने कर कमलों से सम्मेलन की स्मारिका का विमोचन किया। संयुक्त सचिव श्रीमती चित्रा रामचंद्रन ने प्लाज़्मा अनुसंधान संस्थान की प्लाज़्मा शब्दावली का विमोचन किया। विमोचन के पश्चात् राजभाषा शील्ड/हिन्दी सेवी सम्मान/ उत्कृष्ट गृह पत्रिका पुरस्कार प्रदान किये गये। प्लाज़्मा अनुसंधान संस्थान को सहायता प्राप्त संस्थानों की कोटि में संयुक्त रूप से राजभाषा शील्ड पुरस्कार दिया गया। आईपीआर के डॉ.सूर्यकांत गुप्ता एवं सुश्री प्रतिभा गुप्ता को हिन्दी सेवी सम्मान से सम्मानित किया गया। सहायता प्राप्त संस्थानों की श्रेणी में प्लाज़्मा अनुसंधान संस्थान की हिन्दी गृह पत्रिका 'प्लाज़्मा ज्योति' को उत्कृष्ट गृह पत्रिका पुरस्कार प्रदान किया गया। उद्दृष्ट गृह पत्रिका पुरस्कार के लिए प्लाज़्मा ज्योति को लगातार तीसरे वर्ष यह पुरस्कार मिला है। इस दो दिवसीय सम्मेलन के दौरान वैज्ञानिक एवं राजभाषा हिन्दी से संबंधित आमंत्रित वार्ताएँ रखी गई। संस्थान के श्री प्रवीण कुमार आत्रेय, डॉ.तेजेन कुमार बसु एवं डॉ.सूर्यकांत गुप्ता ने वैज्ञानिक विषय पर अपने व्याख्यान प्रस्तुत किये।



(L-R) Mrs. Chitra Ramachandran (JS, DAE), Prof. D. Bora, Dr. Ratan Sinha (Chairman DAE) and Dr. Domadar Khadse (Chief Guest) addressing the gathering. The Chief Guest releasing the Hindi booklet of "Plasma Vocabulary"



(L-R) The IPR "Plasma Jyothi" received the best in-house Hindi magazine award for the 3rd time consecutively. Ms Prathibha Gupta and Dr. Suryakant Gupta received individual awards for their contributions to Hindi usage.

Past Events @ IPR

- Dr. Tanmoy Basu, Institute of Physics, Bhubaneswar, gave a talk on "Ion-beam induced nanostructuring of Si: Fundamentals and some applications" on 5th January 2015
- Mr. Shwetang N. Pandya, IPR, gave a talk on "Quantitative study of 3D radiation dynamics during resonant magnetic perturbation assisted detached plasmas in the Large Helical Device" on 8th January 2015
- Prof. A. Thyagaraja, Culham Centre for Fusion Energy and Bristol University, gave a talk on "The Art and Science of Computational Plasma Physics" on 12th January 2015 (Colloquium # 244)
- Dr. D. K. Srivastava, Distinguished Scientist & Director, Variable Energy Cyclotron Centre, Kolkata, gave a talk on "Discovery of Quark Gluon Plasma" on 13th January 2015 (Colloquium # 245)
- Prof. Roger Smith, Loughborough University, UK, gave a talk on "Models of surface modification through ion or plasma interactions" on 27th January 2015
- 16th All India DAE Hindi Sammelan, IPR, 29-30 January 2015

Upcoming Events

- National Conference on Advances of Plasma Science and Technology 2015 (APST 2015), 19-21 February 2015. http:// www.siet.ac.in/index.php/news/events/apst-2015
- SERC School on Modern Theories of Nuclear Structure, Department of Physics, Indian Institute of Technology Roorkee, 23 February – 5 March 2015 https://sites.google.com/site/nuclth/serc15
- 3rd Spectral Line Shapes in Plasmas Code Comparison Workshop (SLSP), Marseille, France, 2-6 March 2015. http:// plasma-gate.weizmann.ac.il/slsp3/
- Workshop-Sunspot Formation: Theory, Simulations and Observations, Nordita, Stockholm, Sweden, 9-13 March 2015. http://www.nordita.org/sunspots2015
- 2nd International Workshop on Plasma for Cancer Treatment (IWPCT2015), Nagoya, Japan, 16-17 March 2015. http:// www.iwpct2015.org/
- International Sherwood Fusion Theory Conference, New York. USA. 16-18 March 2015. http:// www.networkingworlds.com/sherwood2015/index.php
- Joint ICTP-IAEA Advanced School and Workshop on Modern Methods in Plasma Spectroscopy, Trieste, Italy, 16-27 March 2015. https://www-amdis.iaea.org/Workshops/ICTP2015/
- 7th International Symposium on Advanced Plasma Science and Its Applications for Nitrides and Nanomaterials and 8th International Conference on Plasma Nanotechnology and Science (ISPlasma2015/IC-PLANTS2015), Nagoya, Japan, 26 -31 March 2015. http://www.isplasma.jp/



Gujarat (India)

An image from the year 1988-89. Persons in the photo (L-R) are ;

- 1. M.V.V.S. Rao
- 2. J.P. Singh (late)
- 3. Shanker Joisa
- 4. Lalit Awasti
- 5. P. K. Atrey 6. C. V. S. Rao
- 7. S. K. Guha
- 8. Raniana Manchanda
- 9. V. N. Rai
- 10. Dhiraj Bora
- 11. S. K. Mattoo
- 12. R. Jha

Sri MVVS Rao, Sri K Guha and Shri V N Rai have hence moved on to other institutions.

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