

Assistant Professor
Department of Applied Physics
Sardar Vallabhbhai National Institute of Technology Surat
Surat – 395007, India
Email: sp@phy.svnit.ac.in
Mobile: +91 9936461823



Dr. Shail Pandey

Research Interest

Plasma physics and application

- Pulsed microwave generated plasmas
- Nanoparticle synthesis in ambient plasma condition
- Atmospheric pressure plasma interaction with various surfaces
- Cold atmospheric pressure plasma for biomedical applications

Educational Qualification

- 2008 – 2015: **Ph.D. in Physics**, IIT Kanpur, Kanpur, UP (India). [CPI – 9.33/10]
[**Thesis title**: Pulse-modulated microwave plasmas: self-excited instability and plasma states]
[**Thesis supervisor**: Prof. Sudeep Bhattacharjee, Department of Physics, Indian Institute of Technology Kanpur, Kanpur, UP (India)]
- 2006 – 2007: **B.Ed**, Ranchi University, Ranchi (India)
[Percentage of marks – 71.1 (with Distinction)]
- 2004 – 2006: **M.Sc. Physics**, Ranchi University, Ranchi (India)
[Percentage of marks obtained – 69.0 (University rank – 2)]
- 2001 – 2004: **B.Sc. (Hons.) in Physics**, Ranchi University, Ranchi (India)
[Percentage of marks obtained – 74.0 (University rank – 4)]
- 1999 – 2001: **Higher Secondary** (12th Standard, AISSCE 2001), CBSE Board.
[Percentage of marks obtained : 71.6]
- 1999 : **Secondary** (10th Standard, AISSE 1999), CBSE Board.
[Percentage of marks obtained : 73.2]

Relevant Experience

- Jul 2015 - Mar 2016: **Adhoc Faculty**, Department of Physics, NIT Jamshedpur, Jamshedpur.
- Apr 2016 - Sept 2019: **DST INSPIRE Faculty**, Department of Physics, NIT Jamshedpur, Jamshedpur.

Ongoing research project

Physics and application of Plasma-surface interaction: Tuning effect of pulsed microwave electric field and electrostatic magnetic field

Academic Awards and Honors

- **PSSI Poster Award** by Plasma Science Society of India (PSSI) in the 28th National Symposium on Plasma Science and Technology "PLASMA 2013".
- **Buti Young Scientist Award** by Plasma Science Society of India (PSSI) in the 26th National Symposium on Plasma Science and Technology "PLASMA 2011".

- **DST International Travel grant** for attending an international conference, ESCAMPIG-XXI, held at Portugal in 2012.
- **National Eligibility Test (CSIR-NET)** in 2009.
- **Graduate Aptitude Test in Engineering (GATE)** in 2007.

Talks

- **Open seminar** on “*Pulse modulated wave induced plasma state and self-excited instability*”, Department of Physics, IIT Kanpur, 2014.
- **Oral presentation** on “*Observation of Electron Plasma Waves inside Large Amplitude Electromagnetic Pulses in a Temporally Growing Plasma*”, at 26th National Symposium on Plasma Science and Technology (PLASMA 2011), BIT, Patna, India.
- **State of the Art seminar** on “*Wave Interaction with Plasmas Confined in Multicusp Magnetic Fields*”, Department of Physics, IIT Kanpur, 2007.

Courses and Laboratories

- **Quantum Mechanics II and Electronics** (PG courses)
- **Established** M.Sc. Electronics laboratory in 2015-16 comprising of 7 experiments.
- **Lab-in-charge** of M.Sc. Electronics Lab during 2015-16, 2017-19
- **Laboratory instructor** of M.Sc. and B.Tech. Laboratories

Technical Skills

- Operation of Microwave based low pressure plasma source.
- Fabrication of 12-pole magnetic multicusp of permanent magnets for minimum-B field confinement of plasma.
- Operation and maintenance of vacuum systems, components and vacuum pumps in the pressure range $\sim 10^{-7}$ Torr - 760 Torr.
- Fabrication and implementation of vacuum compatible plasma diagnostic probes like Langmuir probe, electron and ion energy analyzer probe, disk probe and optical probe.
- Operation of high end equipments like Magnetron (2.45 GHz, 8 kW), Travelling-Wave-Tube Amplifier (TWTA, 6-18 GHz, 300 W), Box-car integrator, Nd-Yag laser (532 nm, 180 mJ/1064 nm, 320 mJ), Digital oscilloscope, Optical Spectrometer, Monochromator and PMT module
- Interfacing and data acquisition from different high-end equipment.
- **Software:** C, C++, MATLAB, Scilab, POISSON SUPERFISH code for magnetostatics, AUTOCAD, ORIGIN and LabView

Extracurricular Activities

- 2002 – 2003: **Honors Diploma in Web-Centric Computing** NIIT, Ranchi center, Jharkhand (India) [Performance : Excellent]
- 2009 – 2010: **Member of Horizon Lecture Committee**. The committee conducts a lecture series on Nobel prize given in various fields to various persons during current year.
- 2013: Participated in **Guinness World Record** for solving Rubik Cube by maximum number of participants, organized during Techkriti festival by Indian Institute of Technology Kanpur, India.

Publications in Refereed Journals

- 1) **Shail Pandey**, S. Bhattacharjee, and D. Sahu, "Observation of electron plasma waves inside large amplitude electromagnetic pulses in a temporally growing plasma", *Physics of Plasmas* **19**, 012118 (2012).
- 2) **Shail Pandey**, D. Sahu, and S. Bhattacharjee, "Transition from interpulse to afterglow plasmas driven by repetitive short-pulse microwaves in a multicusp magnetic field", *Physics of Plasmas (Letters)* **19**, 080703 (2012).
- 3) D. Sahu, **Shail Pandey**, J. Aneja, and S. Bhattacharjee, "Negative ion rich plasmas in continuous and pulsed wave modes in a minimum-B magnetic field", *Physics of Plasmas* **19**, 123517 (2012).
- 4) S. Bhattacharjee, I. Dey, K. R. Chowdhury, D. Sahu, **Shail Pandey** and S. Chatterjee "Trapping of electrons in troughs of self-generated electromagnetic standing wave", *Physics of Plasmas* **21**, 012111 (2014).
- 5) **Shail Pandey** and S. Bhattacharjee, "Observation of ion heating during stimulated Buneman instability in a temporally growing plasma", *Europhysics Letters* **108**, 15001 (2014).
- 6) **Shail Pandey**, D. N. Patel and S. Bhattacharjee, "Particle energy distributions and metastable atoms in transient low pressure interpulse microwave plasma", *Plasma Sources Science and Technology* **24**, 065004 (2015).
- 7) D. N. Patel, **Shail Pandey** and S. Bhattacharjee, "Size-controlled growth of nanoparticles and clusters during pulsed laser ablation into an ambient wave induced plasma", *Applied Surface Science* **462**, 373 (2018).

Publications in Refereed Conference Proceedings

- 1) **Shail Pandey** and H. Pandey, "Transient Evolution Of Electron Energy Distribution Function During Microwave Plasma Breakdown For Material Processing", *AIP Conference Proceedings* **2009**, 020043 (2018).
- 2) H. Pandey, M. Kumar, A. K. Srivastava and **Shail Pandey**, "Microstructural and transport characterization of Co₂MnSi thin films", *AIP Conference Proceedings* **2009**, 020029 (2018).

Conference Presentations

National

- 1) J. V. Mathew A. Chowdhury, **Shail Kumari**, S. Paul, and S. Bhattacharjee, "Study of ion energy distribution in a microwave plasma ion source for focused ion beams" (**Poster**), Proceedings 23rd National Symposium on Plasma Science and Technology (PLASMA 2008), BARC Mumbai, **India**, pp. 215, December 10 – 13, **2008**.
- 2) **Shail Kumari**, I. Dey, D. Sahu, S. Bhattacharjee, A. Sen, and H. Amemiya, "Damped electron plasma oscillations in a growing plasma upon interaction of high power short pulse microwaves with a gaseous medium" (**Poster**), Proceedings 24th National Symposium on Plasma Science and Technology (PLASMA 2009), NIT Hamirpur, **India**, pp. 53, December 8 – 11, **2009**.
- 3) **Shail Pandey**, I. Dey, D. Sahu and S. Bhattacharjee, "Experimental investigation of plasma oscillation

- due to interaction of high-power short-pulse microwaves with temporally growing self-produced plasma" **(Poster)**, Proceedings 25th National Symposium on Plasma Science and Technology (Plasma 2010), IASST Guwahati, **India**, pp. 50, December 8 – 11, **2010**.
- 4) **Shail Pandey** and S. Bhattacharjee, "Observation of Electron Plasma Waves inside Large Amplitude Electromagnetic Pulses in a Temporally Growing Plasma" **(Oral)** Proceedings 26th National Symposium on Plasma Science and Technology (PLASMA 2011), BIT Patna, **India**, pp. 29, December 20 – 23, **2011**.
 - 5) **Shail Pandey** and S. Bhattacharjee, "Electron energy distribution function in the Interpulse and Afterglow Plasma Regimes" **(Poster)**, Physics Workshop 2012, IIT Kanpur, **India**, March 31 – April 1, **2012**.
 - 6) **Shail Pandey** and S. Bhattacharjee, "Self-excitation And Energy Transfer Of Buneman Instability To Temporally Growing Plasma During A Short-pulse Microwave Discharge" **(Poster)**, Proceedings 28th National Symposium on Plasma Science and Technology (PLASMA 2013), KIIT Bhubaneswar, **India**, pp. 63, December 3 – 6, **2013**.
 - 7) S. Bhattacharjee and **Shail Pandey**, "Electron energy distribution in nonequilibrium transient pulsed microwave plasmas driven to different initial conditions" **(Poster)**, Proceedings 28th National Symposium on Plasma Science and Technology (PLASMA 2013), KIIT Bhubaneswar, **India**, pp. 64, December 3 – 6, **2013**.
 - 8) Kavita Rathore, Sudeep Bhattacharjee, Prabhat Munshi and **Shail Pandey**, "Optical tomographic and spectroscopic measurements for microwave induced compact plasma", **(Oral)**, National Symposium on emerging plasma techniques for materials processing and industrial applications (N-SEPMI), Pune, Maharashtra, **India**, pp. 32, February 13 - 15, **2014**.
 - 9) **Shail Pandey**, "Transient evolution and relaxation of particle energy distribution functions in pulsed microwave plasma breakdown" **(Poster)**, 32nd National Symposium on Plasma Science and Technology (PLASMA 2017), IPR Gandhinagar, **India**, November 7 - 10, **2017**.
 - 10) **Shail Pandey** and H. Pandey, "Transient Evolution Of Energy Distribution Function During Microwave Plasma Breakdown For Material Processing Applications" **(Poster)**, National Conference on Advanced Materials and Nanotechnology (AMN 2018), Jaypee Institute of Information Technology Noida, **India**, March 15-17, **2018**.
 - 11) A. R. Baitha, **Shail Pandey**, A. Nanda and S. Bhattacharjee " Diffusion And Particle Balance in a Plasma Confined by a Dipole Magnet" **(Poster)**, 33rd National Symposium on Plasma Science and Technology (PLASMA 2018), University of Delhi, New Delhi, **India**, December 4- 7, **2018**.
 - 12) **Shail Pandey**, "Microwave Plasmas Confined in a minimum-B Field: Frequency Dependence", International Conference on Photonics, Metamaterials and Plasmonics (PMP-2019), Jaypee Institute of Information Technology Noida, **India**, Feb 14-19, **2019**.
 - 13) A. Nanda , Sargam, A. R. Baitha, **Shail Pandey** and S. Bhattacharjee, "Diffusion Of Particles Confined in a Dipole Magnetic Field" **(Poster)**, International Conference on Photonics, Metamaterials and Plasmonics (PMP-2019), Jaypee Institute of Information Technology Noida, **India**, Feb 14-19, **2019**.

International

- 1) **Shail Pandey** and S. Bhattacharjee, "Transition from interpulse plasmas to afterglows in a pulsed microwave discharge" (Poster), Proceedings XXI Europhysics Conference on Atomic and Molecular

- Physics of Ionized Gases (ESCAMPIG 2012), Viana do Castelo, Portugal, pp. P3.9.6, July 10 – 14, 2012.
- 2) **Shail Pandey** and S. Bhattacharjee, “*Transfer of Energy from Self-excited Waves inside Large Amplitude Electromagnetic Pulses in a Temporally Growing Plasma*” (Poster), Proceedings XXXI edition of the International Conference on Phenomena in Ionized Gases (ICPIG 2013), Granada, Spain, pp. 4-053, July 14 – 19, 2013.
 - 3) **Shail Pandey**, S. Sarkar and S. Bhattacharjee, “*Electron energy distribution in microwave plasmas confined in a multicusp magnetic field: Frequency dependence*” (Poster), Proceedings XXXI edition of the International Conference on Phenomena in Ionized Gases (ICPIG 2013), Granada, Spain, pp 4-055, July 14 – 19, 2013 .
 - 4) **Shail Pandey** and S. Bhattacharjee, “*Energy Transfer from Self-excited Buneman Instability to a Temporally Growing Short-pulse Microwave Plasma*” (Poster), Proceedings 8th International Conference on Reactive Plasmas/31st Symposium on Plasma Processing (ICRP-8/SPP-31), Fukuoka, Japan, pp 25, Feb 2 – 7, 2014.
 - 5) **Shail Pandey** and Sudeep Bhattacharjee, “*Electron Energy Distribution in Microwave Plasmas in a minimum-B Field: Frequency Dependence*”, (Poster), E-MRS 2014 fall meeting, Warsaw, Poland, pp 227, September 15-19, 2014.