The Newsletter of the International Low Temperature Plasma Community (ILTPC)

Issue 45
November 1, 2024

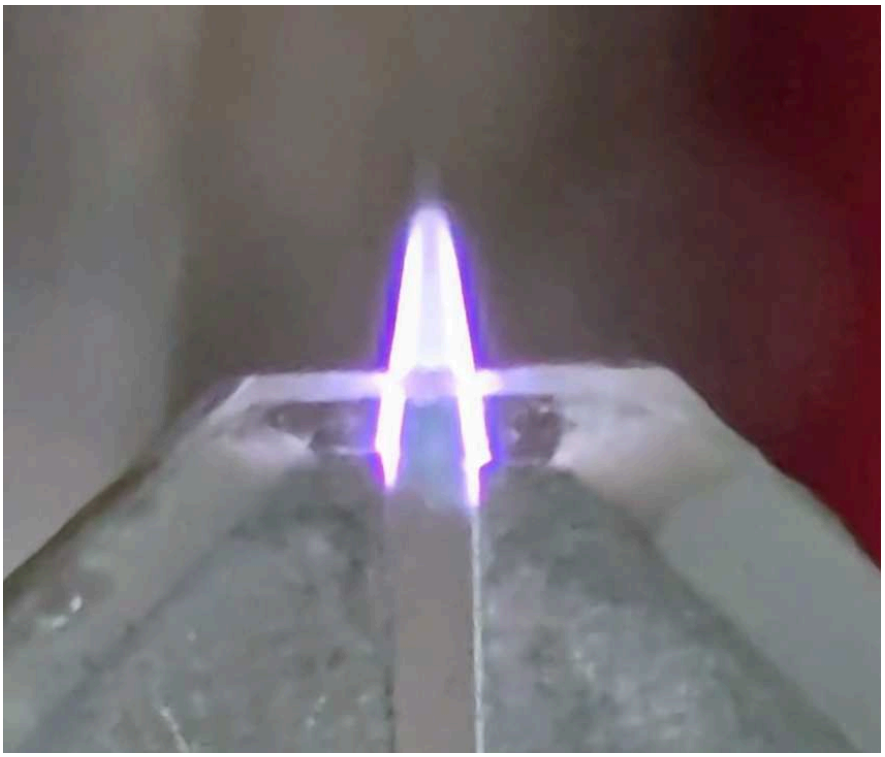
Call for Contributions

Please submit content for the next issue of the Newsletter. Please send your contributions to **editor@iltpcnewsletter.org** by November 29, 2024. Please send contributions as MS-Word files (***.docx**) if possible. In particular, please send Research Highlights and Breakthroughs using **this template**. You can also directly download the template in docx format **here**. (Please do **not** send files in doc format.)

The highlight consists of an image and up to 200 words of text; please also send your image as a separate file (the recommended image format is JPG or PNG; the minimum file width is 800 px). The topic can be anything you want - a recently published work, a new unpublished result, a proposed new area of research, company successes, anything LTP-related. Please see the Research Highlights and Breakthroughs for examples.

Images to Excite and Inspire

Please send your images (with a short description) to editor@iltpcnewsletter.org. The recommended image format is TIF, JPG, or PNG. The minimum file width is 800 px.



Discharge structure at the outlet of the COST jet. The jet is operated at 13.56 MHz with an argon flow rate of 500 sccm.. The picture is taken in the AEPT lab at Ruhr University Bochum. Please contact Dr. Ihor Korolov (korolov@aept.rub.de) for further information.

LTP Perspectives: Policy, Opportunities, Challenges

Please submit your notices for LTP Perspectives to editor@iltpcnewsletter.org.

On the value of long-term academic competence: the plasma example

Plasmas are everywhere. Plasmas range from quiet to hyper violent. Our atmosphere is at many heights a plasma, space contains low density and high density plasmas. Plasmas are used as reactive media with often a significant amount of control.

Although these plasmas look very different from the outside, understanding plasmas is possible due to a large body of common knowledge, which is the result of our eternal science chain of the events of “describe, understand, influence, and use” (in Dutch

“beschrijven, begrijpen, beïnvloeden, benutten”). This knowledge on plasmas has been built up in a period of over century, very often inspired by curiosity, often by observations, but also by recognition of possible applications.

In the absence of clear application demands, maintaining a high level of curiosity driven activity is not always easy. Academics groups continuing building up relevant knowledge deserve lots of credit. In the 80-ies and 90-ies of the last century when I was educated, fusion was an obvious driver for detailed studies of plasma generation, plasma heating, and detailed plasma dynamics. Fusion is one of those worldwide endeavors, or maybe more accurate a worldwide responsibility, that act and has acted as a driver for deepening plasma knowledge in many directions.

A more recent driver of “renewed” attention of plasmas is the world of EUV Lithography, using super intense sources of, ideally, narrow band 13.5 nm radiation. The courage and persistence of a single Dutch company, ASML, resulted in lithography machines with stupendous characteristics. ASML is active in a highly competitive semiconductor ecosystem, which on its turn is pushed forwards by expectations to follow Moore’s Law. 13.5 nm cannot easily be made in a simply “lasing” medium. One could consider complex high-energy electron beam driven FELs, but the most common route is to make use of a thermal source, driving tin-atoms to a temperature of up to 500.000 Kelvin, where one creates a violent highly charged plasma. This industrial endeavor became a motor for the revival of many academic activities on such laser produced plasmas. We can be grateful for academic groups that nurtured the underlying detailed knowledge in times with significant less attention for such plasmas.

In a lithography apparatus, the EUV radiation with its 92 eV photon energy, causes background gas to be weakly ionized everywhere where EUV travels, reflects, and interacts with detectors or resist. Knowledge on this plasma, its internal chemical reactivity with proton transfer reactions, its reactivity with walls and materials and its ability to transport matter in various forms through a vacuum system has renewed interest in many groups all over the world. Also here, the efficiency of research is helped enormously by groups that conserved a broad competence on not only on the basic knowledge of plasmas but more importantly on instrumentation, experimentation, and diagnostics to start new cycles of “describe, understand, influence, and use”.

The above paragraphs contain the core of my message. Although technological developments will accelerate under the pressure of economically relevant activities, the final effectiveness of such acceleration is deeply rooted in our ability as society to conserve competence, to reward innovative experiments and progress also and maybe explicitly in times that applications are less clear or only visible at some far away horizon. Hence, I want to make an explicit toast to progress in research fields where the application is not (yet) visible. Often, funding schemes do not make such toasts.

Wim J. van der Zande
Director of the Advanced Research Center for Nanolithography, Amsterdam
www.arcnl.nl; w.vdzande@arcnl.nl

Leaders of the LTP Community: Career Profiles

YEVGENY RAITSES – Leader and Supporter of LTP

Dr. Yevgeny Raitses, a managing principal research physicist at the U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL), is an expert in experimental physics. Dr. Raitses' research spans several areas of plasma physics, including plasma and ion sources, plasma diagnostics, and plasma nanotechnology.

Dr. Raitses is well known and respected in the plasma physics community as the world authority in magnetized plasma thrusters. Throughout his scientific career, he has lead cutting-edge research -- both experimental and theoretical -- on various plasma thrusters, especially on Hall-effect plasma thrusters. A pioneer in the field, he was the first who demonstrated experimentally that the plasma cooling by secondary electron emission from the thruster walls is much weaker than predicted by the classical fluid theories. This discovery pointed to the importance of electron kinetics in the thruster plasma and provided a new physical insight of the thruster wall erosion. Importantly, his pioneering work on Hall thrusters also provided a new tool known as segmented electrodes, which can achieve the strongest electric field in steady state ExB discharges, of kV/cm level, help to extend lifetime of the thruster, improve its efficiency and satellite compatibility.

Dr. Raitses also has a reputation of being one of the most creative scientists in plasma propulsion and a key innovator credited with inventing several widely used plasma thrusters and diagnostics, in particular cylindrical Hall thruster. His work on this thruster inspired R&D efforts on similar thrusters in the US, Germany, France, Japan, Korea and China, a sign of his tremendous impact on the field.

Dr. Raitses also conducted important research on the azimuthally rotating structures in ExB fields known as spokes, their associated anomalous electron cross-field transport and ion heating. Together with his graduate students, Dr. Raitses not only advanced fundamental understanding of spoke mechanisms associated with gradient drift instability, but also demonstrated ways to mitigate this usually unwanted phenomena utilizing either boundary-induced plasma short-circuit effect or a feedback control through segmented electrodes. His work in this area has applications to plasma thrusters and ExB plasma systems for so-called soft processing of ion-sensitive materials, such as 2D materials and diamond.

Dr. Raitses has also applied his expertise in plasma-wall interaction to new plasma regimes and technologies associated with nanoscale particles. He initiated nanosynthesis research at

PPPL and is the Head of its Laboratory for Plasma Nanosynthesis. Raitses led multi-institutional efforts on the multimillion dollar project: "Fundamental Studies of Synthesis of Nanomaterials. A joint challenge for plasma and materials sciences." The project team included 22 scientists and students. Dr. Raitses formulated scientific goals and research directions, putting together a very powerful group of plasma and materials science experts to accomplish these goals. He also created an inspiring atmosphere of scientific collaboration between members of the team. The project included experimental and modeling research that pointed to the formation mechanisms of carbon and boron nitride nanotubes in the arc plasmas and revealed the role of the plasma in synthesis. The success of this research and the importance of the results were recognized by the scientific community. This is evident from a large number of publications co-authored by Dr. Raitses in this area and their citations.

In addition to his impactful research findings, Dr. Raitses has demonstrated great leadership, successfully interacting with academia and industry, in the US and abroad. He is the founding director of the Princeton Collaborative Low Temperature Plasma Research Facility (PCRF), which has become a major enabling facility for the low-temperature plasma community. PCRF serves the needs of single investigators from academia, industry, and national laboratories who otherwise would not have access to such a broad array of diagnostics and modeling tools. Not only does PCRF provide access to tools, but it also supports users through its highly trained professional staff. The acceptance of PCRF by the low-temperature plasma community has been impressive. Since its inception in 2019, more than 200 proposals for runtime were submitted, of which 109 were accepted. The results of PCRF can be found in more than 60 peer-reviewed publications.

Dr. Raitses's success is in great part due to his remarkable ability to attract excellent students to participate in his research. He formulates and offers students exciting and challenging physics problems to study, and then effectively supervises them in a way that brings them to a high level of competency and creativity. Upon graduation, his students are highly demanded by leading Universities and National Laboratories.

His scientific contributions are well recognized by the scientific community. He is an associate fellow of the American Institute of Aeronautics and Astronauts and a fellow of American Physical Society. He is also a co-recipient -- together with Dr. Igor Kaganovich – of the Kaul Foundation Prize for Pioneering research on the development of plasma science and new devices relevant to applications ranging from rocket propulsion to microchip etching.

Prof. Michael Keidar
The George Washington University

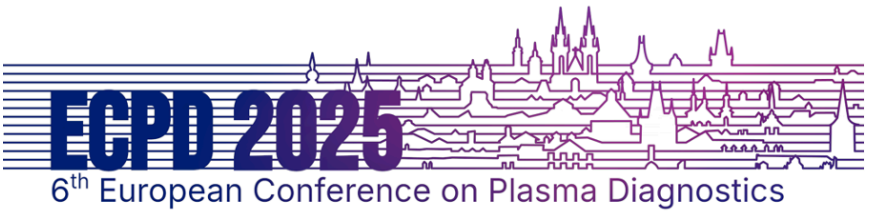
General Interest Announcements

Please submit your notices for General Interest Announcements to editor@iltpcnewsletter.org.

Meetings, Online Seminars, and Schools

Please submit your notices for Meetings and Online Seminars to editor@iltpcnewsletter.org.

6th European Conference on Plasma Diagnostics



6th European Conference on Plasma Diagnostics (ECPD), will be held from April 7 – April 10, 2025, in Prague, Czech Republic.

The ECPD is an event taking place every two years aiming at bringing together scientists and engineers working on plasma diagnostics for magnetic confinement fusion, inertial fusion, beam plasmas, low-temperature and industrial plasmas as well as basic and astrophysical plasmas.

The sixth edition of the Conference will be held at the DUO Hotel congress center and organised by the Institute of Plasma Physics of the Czech Academy of Sciences.

The event will feature the ECPD Prize Award Lecture for Outstanding Achievements in Plasma Diagnostics, Tutorial (45 min) and Invited (30 min) lectures from leading experts in the field, oral (20 min) presentations selected from the submitted contributions and poster presentations.

Important dates:
Abstract submission opening: mid November 2024
Abstract submission deadline: end of December 2024

Contact: ecpd2025@ipp.cas.cz
Source: http://www.ecpd2025.cz/

Session ‘Microfabrication Techniques with Lasers and Plasmas’ at the International Conference on Metallurgical Coatings and Thin Films (ICMCTF), San Diego, CA, USA, May 11-16, 2025

ICMCTF is the premier international conference in the field of thin film deposition, characterization, and advanced surface engineering, promoting a global exchange of ideas and information among scientists, technologists, and manufacturers. ICMCTF 2025 will have seven technical symposia covering synthesis processes, materials (four symposia), advanced characterization, modeling, and industrial applications, and three topical sessions focused on surface engineering for sustainable development.

The second edition of session ‘Microfabrication Techniques with Lasers and Plasmas’ will be held within the technical symposium ‘Plasma and Vapor Deposition Processes’. Strategies to synthesize nanostructured interfaces enabling few-atom catalysts, organic tissues, and optoelectronic devices, such as laser micro-texturing and plasma-assisted lithography, will be discussed in that session. You are welcome to contribute! The abstract submission system is open until November 15, 2024.

Symposium link: https://icmctf2025.avs.org/symposium-pp/

Session Chairs:
Dr. Carles Corbella
National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA
carles.corbellaroca@nist.gov
Dr. Valentina Dinca
National Institute for Laser, Plasma, and Radiation Physics, Magurele, Romania
valentina.dinca@inflpr.ro

4th Workshop on FAIR Data in Plasma Science (FDPS-IV)

We are happy to announce the 4th Workshop on FAIR Data in Plasma Science (FDPS-IV), which will take place on **12-13 May, 2025 at the Leibniz Institute for Plasma Science and Technology (INP) in Greifswald, Germany**. The event will also offer the option for virtual participation. The workshop is a continuation of annual events on research data management in the low-temperature plasma (LTP) community in the past years. It aims to inform about current developments and to strengthen community exchange on this topic.

The FDPS-IV workshop is intended to provide an overview over successful solutions for collaborative research data management with the goal to make data findable, accessible, interoperable and reusable (FAIR), finally supporting the broader use of data-driven research methods. This includes best practice in day-to-day research work as well as infrastructure tools for handling of research data. Successful examples from plasma research groups and collaborative research centers will be presented and we will discuss the further development

of data sharing and reporting standards for the LTP community.

The workshop will be held as a hybrid meeting and participation is free of charge. Please save the date and register by following the registration link on the workshop website: https://www.plasma-mds.org/ws-fair-data-plasma-science-4.html.

Attendance in person at INP is limited, so early registration is encouraged. The application form will be closed on 4th May, 2025.

The workshop organization is part of the activities of the working group Experimental Plasma Physics at the Kiel University (CAU), the INF project of the CRC 1316 at the Ruhr-University Bochum (RUB) and of the department Plasma Modelling and Data Science at Leibniz Institute for Plasma Science and Technology (INP).

Contact:
Dr. Markus Becker
Leibniz Institute for Plasma Science and Technology (INP), Greifswald, Germany
markus.becker@inp-greifswald.de

United States Low Temperature Plasma Summer School ISPC Summer School, ASPIRE Summer School University of Minnesota, June 14-16, 2025

Organizers:
Peter J. Bruggeman (University of Minnesota)
Satoshi Hamaguchi (Osaka University)
Gerrit Kroesen (TU Eindhoven)
Mark J. Kushner (University of Michigan)

The US LTP Summer School will be co-located with the International Symposium on Plasma Chemistry (ISPC) in collaboration with ASPIRE to provide opportunities for graduate students and early career researchers to be immersed in the fundamentals and applications of low-temperature plasmas and to learn from leading researchers in their field. There will be a special session on Plasma Materials Processing (PMP) for Microelectronics Fabrication.

Registration process:
Please send an expression of interest by filling in the questionnaire: https://forms.gle/UtQK3ojCTsdaAjw76.

Registration deadline:
April 1st, 2025 or until the maximum number of participants is reached.
More information: https://z.umn.edu/9wud
Contact: usltpss@umn.edu

ISPC
26TH INTERNATIONAL SYMPOSIUM ON PLASMA CHEMISTRY
Minneapolis, USA
June 15th – 20th 2025

https://www.ispc-conference.org/

Topics
Fundamentals of low-pressure plasma
Fundamentals of thermal plasma
Fundamentals of atmospheric non-equilibrium plasma
Diagnostics in plasma chemistry
Modelling in plasma processing
Plasma in and in contact with liquids
Plasma processing of nanomaterials and nanostructures
Plasma deposition of functional coatings
Plasma-based gas conversion
Plasma-assisted combustion and aerodynamics
Plasma medicine and agriculture
Plasmas for environmental applications

ABSTRACT SUBMISSION IS OPEN. DEADLINE: December 1ST, 2024

Chair:
P. Bruggeman
Co-Chairs:
U. Kortshagen, M. Simeni Simeni

Online Low-Temperature Plasma (OLTP) Seminar Series

The schedule for OLTP seminars and more information on the program, including links to past seminars, can be found at the OLTP website. The seminars are held on Tuesdays at 10:00 am EDT or EST via Zoom and are free to access.

Co-Chairs:
Dr. Ana Borras
CSIC, University of Seville, Spain
anaisabel.borras@icmse.csic.es
Dr. Mohan Sankaran
University of Illinois, Urbana-Champaign, USA
rmohan@illinois.edu

IOPS Online Seminars

The International Online Plasma Seminar (IOPS) is continuing to provide the international community with regular opportunities to hear from leading researchers in the field. The program of the IOPS (and links to past seminars) can be found at: http://www.apsgec.org/main/iops.php. Nominations for future speakers scheduled for November 2024 to April 2025 can be submitted through this page until September 13, 2024.

Chair:
Prof. Quan-Zhi Zhang
Dalian University of Technology, China
qzzhang@dlut.edu.cn

Community Initiatives and Special Issues

Please submit your notices for Community Initiatives and Special Issues to editor@iltpcnewsletter.org.

New Resources

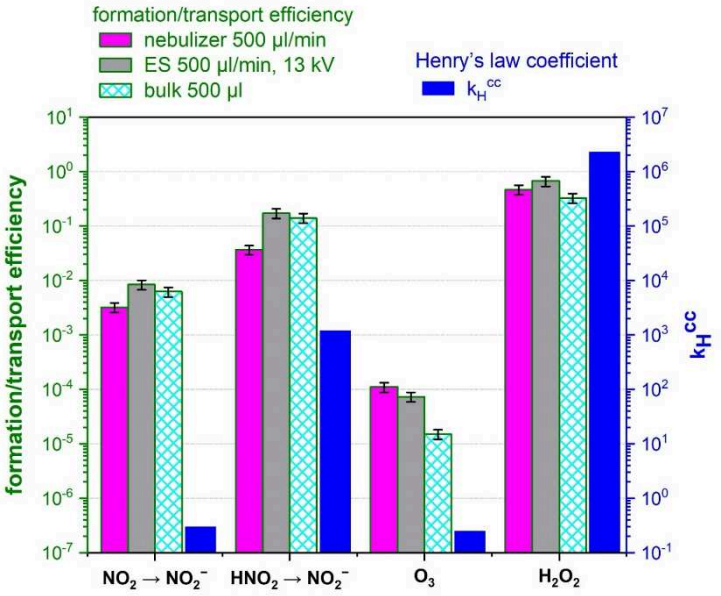
Please submit your notices for New Resources to editor@iltpcnewsletter.org.

Research Highlights and Breakthroughs

Please submit your notices for Research Highlight and Breakthroughs to editor@iltpcnewsletter.org.

Comparison of the Transport of Reactive Nitrogen Plasma Species into Water Bulk vs. Aerosolized Microdroplets

This work presents the experimental study of the transport of typical air plasma long-lived reactive nitrogen species (RNS: HNO_2, NO_2, and NO) into deionized water and compares them with the most typical reactive oxygen species (ROS: H_2O_2 and O_3). RONS are generated either by external sources or by a hybrid streamer-transient spark plasma discharge, in contact with bulk water or aerosol of charged electrospray (ES) or non-charged nebulized microdroplets with a large gas/plasma-water interface. It was found that NO's contribution to NO_2^- ion formation was negligible, NO_2 contributed to about 10%, while the dominant contributor to NO_2^- ion formation in water was gaseous HNO_2.
Figure: Comparison of the formation efficiency of NO_2^- from NO_2 and from HNO_2, and the transport efficiency of O_3 and H_2O_2 in the nebulized and electrosprayed (ES) microdroplets, and bulk water, shown with the dimensionless Henry's law coefficients (k_H^{cc}).



A higher transport efficiency of O_3, and a much higher formation efficiency of NO_2^- from gaseous NO_2 or HNO_2 than predicted by Henry's law was observed, compared to the transport efficiency of H_2O_2 that corresponds to the expected Henry's law solvation. The improvement of the transport/formation efficiencies by nebulized and ES microdroplets, where the surface area is significantly enhanced compared to the bulk water, is most evident for the solvation enhancement of the weakly soluble O_3. NO_2^- ion formation efficiency was strongly improved in ES microdroplets with respect to bulk water and even to nebulized microdroplets, which is likely due to the charge effect that enhanced the formation of aqueous NO_2^- ions. Comparisons of the molar amounts of O_3, H_2O_2, and NO_2^- formed in water by hybrid streamer-transient spark plasma discharge with those obtained with single RONS from the external sources enabled us to estimate approximate gaseous concentrations of HNO_2, NO_2, O_3, and H_2O_2 in the discharge. The highly soluble gaseous HNO_2 or H_2O_2, with a low gas concentration of < 10 ppm are sufficient to induce high aqueous NO_2^- or H_2O_2 amounts in water. This study contributes to a deeper understanding of the transport mechanism of gaseous plasma RONS into water that can optimize the design of plasma–liquid interaction systems to produce efficient and selected aqueous RONS in water.

Contact:
Mario Janda and Zdenko Machala
Comenius University Bratislava, Slovakia
mario.janda@fmph.uniba.sk, machala@fmph.uniba.sk

Source:
Plasma Chemistry and Plasma Process (2024) https://doi.org/10.1007/s11090-024-10511-6

Noteworthy Papers

This new section is intended to feature new noteworthy publications in the field of low-temperature plasma science that have appeared in **journals outside the standard reading repertoire of the ILTP community.**

Please submit your notices for Noteworthy Papers to editor@iltpcnewsletter.org.

Chronic oxidative stress adaptation in head and neck cancer cells generates slow-cyclers with decreased tumour growth in vivo

Berner, Miebach, Kordt, Seebauer, Schmidt, Lalk, Vollmar, Metelmann, Bekeschus, British Journal of Cancer, Volume 129, 869 (2023); https://doi.org/10.1038/s41416-023-02343-6

For the first time, we developed a laboratory plasma cancer treatment resistance model by repeatedly exposing head and neck cancer cell lines to plasma and selecting surviving cells for a re-growing culture over eight subsequent weeks. Plasma-desensitized tumor cells showed altered growth, inflammatory profiles, and gene and protein expression. Intriguingly, plasma-resistant tumor cells grew much slower in mice compared to their wildtype counterparts, which was also partially found in clinical observations. However, tumor cell injection into mice seemed to lead to re-established plasma sensitivity in vivo, showing equally diminished tumor growth in vivo compared to wildtype cells. Collectively, this study, for the first time, systemically addressed the issue of plasma treatment resistance in the cancer field. By finding initial clues as well as opening new questions, such as reshaping oxidative stress resistance in vivo, our report may help to explain or potentially even predict plasma treatment resistance in patients in the future.

Dual-comb spectroscopy of ammonia formation in non-thermal plasmas

Ibrahim Sadiek, Adam J. Fleisher, Jakob Hayden, Xinyi Huang, Andreas Hugi, Richard Engeln, Norbert Lang, and Jean-Pierre H. van Helden, Communications Chemistry volume 7, 110 (2024); https://doi.org/10.1038/s42004-024-01190-7

We use quantum cascade laser dual-comb spectroscopy (QCL-DCS) to investigate plasma-activated NH_3 generation, providing detailed insights into the rotational and vibrational states of the molecules. This technique quantifies state-specific densities, revealing distinct translational, rotational, and vibrational temperatures for NH_3, which highlight the non-thermal, reactive nature of the plasma environment. Our findings suggest energy transfer mechanisms that explain observed temperature and density trends in NH_3 produced in low-pressure N_2-H_2 plasmas.

Career Opportunities

Please submit your notices for Career Opportunities to editor@iltpcnewsletter.org.

Post-doctoral Researcher in Computational Plasma Science, Kiel University

The Theoretical Electrical Engineering Group at Kiel University, Kiel, Germany, together with the CAU Innovation GmbH invites applications for a post-doctoral researcher in modeling and simulation of EUV induced plasma chemistry. CAU Innovation GmbH is a 100% daughter company of Kiel University. The research project is focused on the development and application of transient Monte Carlo computer models for the analysis of electron and plasma chemical kinetics. The position includes interaction with external collaborators and sponsors of the research.

The applicant should have completed her*his PhD in electrical engineering, physics or a related discipline prior to starting the position, and should have a broad knowledge of low temperature plasma (LTP) physics and chemistry with experience in computational modeling.

Requirements:

- Expertise in the fundamental processes of plasma physics, plasma chemistry and plasma surface interactions
- Expertise in developing and maintaining computer models for LTPs using high level languages (including C/C++/Python)
- Excellent oral and written communication skills (English)
- Ability and desire to interact with research colleagues in academia and industry

The position is available immediately and is to be filled at the earliest convenience. The initial appointment period is 1 year with potential reappointment for 2 or 3 years subject to performance and availability of funds. The option for initial/part-time remote work may be considered. The regular weekly working time is 100 % of a fulltime position (38,7 hours). Depending on qualifications, the salary is based on the Collective Labour Agreement for public sector employees at the federal state level (group 13 TV-L).

Applicants should submit a cover letter describing their academic background and motivation, and a CV (including a list of publications with at least 2 references) as a single PDF file. Please also arrange for 2 contacts of reference that may be approached by the host.

We value diversity and therefore welcome all applications – regardless of gender, nationality, ethnic and social origin, religion/belief, disability, age, and sexual orientation and identity. We strive for a balanced gender ratio in all employee groups. Severely disabled applicants will be given preferential consideration if they are equally qualified.

Please send your application by **15-Nov-2024** exclusively by e-mail to jt@tf.uni-kiel.de in a single PDF file. Note that applications containing only a CV are considered incomplete and

unfortunately cannot be considered in the further process. Please refrain from submitting application photos.

Contact:
Prof. Jan Trieschmann
Kiel University, Germany
jt@tf.uni-kiel.de

Two Faculty Positions in Theoretical Plasma Physics
Department of Physics and Astronomy
West Virginia University

The Department of Physics and Astronomy at West Virginia University invites applications for up to two faculty appointments in plasma physics at all Professorial ranks. The preferred start date is August 16, 2025. Qualified candidates in any area of theoretical, computational, or observational plasma physics are encouraged to apply. The following research areas would complement existing strengths within the department: (1) space or solar plasma physics theory/ simulation or observation/data analysis; (2) high energy density physics theory/ simulation; and (3) low temperature plasma physics theory/simulation.

Responsibilities:
The applicant is expected to establish an externally funded, nationally competitive research program. Teaching responsibilities will normally include one lecture course per semester in core areas of the physics curriculum (1-1 teaching load) and one course per semester equivalent associated with advising undergraduate and graduate students in research. The candidate will also be expected to serve the community, university, and profession.

Professional Qualifications:
The Department welcomes applications from all qualified professionals in theoretical plasma physics. Minimum requirements are a Ph.D., or equivalent, in physics or a related field with a commitment and ability to lead an independent research program and to excel in teaching physics courses at the undergraduate and graduate levels. The successful candidate will present a record of research productivity as evidenced by journal publications, technical innovation, scientific collaborations, and the potential to develop an externally funded, nationally competitive, research program. For applicants at the associate professor level, a significant record of external funding is expected.

Application:
To apply, please visit https://careers.wvu.edu/career-opportunities (position 25371) and upload (1) a cover letter addressed to the Plasma Physics Search Committee, (2) a curriculum vitae including a complete list of publications and relevant teaching experience, (3) a research plan for the first five years including an estimate of research group size and equipment start-up costs, and (4) a statement of philosophy of instruction and any relevant supervisory experience. Please arrange for three letters of recommendation to be sent to plasmasearch@mail.wvu.edu. Review of applications will begin November 15, 2024, and will

continue until the position is filled. For additional information, please contact **Earl Scime** earl.scime@mail.wvu.edu.

Post-Doctoral Research Associate in Experimental Low-Temperature Plasma Science and Engineering at the University of Notre Dame

Applications are invited for a Post-Doctoral Research Associate position at the University of Notre Dame in Notre Dame, Indiana (United States) in the research group of Professor David B. Go starting as early as November 2024.

The position is nominally in the area of plasma-liquid interactions with support from a grant from the Army Research Office, but applicants may also propose their own line of complementary research if they are interested in pursuing a parallel research path. Applicants should have a Ph.D. (or anticipate receiving a Ph.D. by the time of the appointment) in an appropriate engineering or science discipline and experience in experimental plasma science (primarily at atmospheric pressure), including, but not exclusive to, developing plasma systems (with a preference for plasma-liquid systems), application of plasma devices, and/or plasma diagnostics. We are especially interested in candidates who will contribute to the diversity and excellence of the University's academic community.

Successful applicants will have a track record of research contributions and be effective at independent research, mentoring undergraduate and graduate researchers, and written and oral communication. Highly qualified candidates with multiple years of post-Ph.D. experience could also be considered for a research scientist position.

General inquiries and applications should be sent to **Prof. David Go** (dgo@nd.edu) with the subject line: "Application: Open Postdoc Position". Applications should include a cover letter that includes experience, career aspirations, and research interests, a CV, and contact information for at least two professional references all within a single PDF.

PhD student position on numerical modelling of low-temperature plasmas and their interactions with catalytic surfaces for environmental applications, at Instituto de Plasmas e Fusão Nuclear (IPFN), IST-UL, Lisboa, Portugal

The N-PRiME group of IPFN has an open PhD position under the framework of Horizon Europe project CANMILK (Carbon Neutral MILK). CANMILK aims to develop a new and innovative technology based on non-thermal plasma and catalysis to achieve greener milk

production. Its ambitious goal is to reduce greenhouse gas emissions in agriculture with a simple, efficient, and cost-effective equipment for methane abatement at the dairy and meat farms. Methane will be converted to CO_2, which is a much less harmful compound with 28 times lower global warming potential than methane.

The PhD student will work within a multidisciplinary team involving the N-PRiME group of IPFN and the experimental CATHPRO and theoretical MET groups of CQE (Centro de Química Estrutural) at IST-UL, as well as collaborating with the CANMILK consortium formed by 8 partners from 6 European countries. The focus of the PhD student will be on numerically simulating the interaction of reactive plasma species/products with different catalytic surfaces and on assessing the fundamental aspects of the synergies between plasmas and surfaces to promote methane oxidation. This work may involve the use and development of different numerical modelling techniques: Fluid, Monte Carlo, Molecular Dynamics and Density Functional Theory. The simulation results will be validated by comparisons with dedicated experimental measurements. The understanding of the radical species transfer from plasmas to catalysts will greatly improve the design of the CANMILK technology.

We are looking for candidates who have a MSc degree in physics, chemistry, engineering, applied mathematics, scientific computing or a similar discipline, preferably with experience in computational modelling. Those interested are welcome to come into contact to learn details about the position and instructions for how to apply, preferably before the end of November.

Contact:
Prof. Vasco Guerra
vguerra@tecnico.ulisboa.pt
Dr. Pedro Viegas
pedro.a.viegas@tecnico.ulisboa.pt

Experienced FORTRAN programmer with plasma modelling experience

Job Title: Computational Physicist
Job Type: Full time, Permanent
Location: Remote In-person meetings in London 2-4 times a month)
Salary: TBD

About us:
Quantemol is a leader in the plasma chemistry market for advanced software tools and consultancy services. Founded in 2004, we have established a global reputation for delivering cutting edge simulation software, comprehensive databases, and tailored consultancy services that empower researchers and industries to understand and optimise plasma processes.

Job Description:
We are seeking a highly skilled FORTRAN programmer with a strong background in plasma modelling to join our team. The successful candidate will play a crucial role in shaping the development of a new complex simulation code.

Responsibilities:
- Develop, maintain and optimise FORTRAN-based plasma codes
- Perform code validation and verification
- Work within a small team to ensure code modules successfully interface
- Document code development
- Analyse simulation outputs and provide insights
- Stay up-to-date with latest developments in low temperature plasma physics and computational modelling
- Construct plasma chemistry sets and perform plasma simulations
- Participate in customer meetings and presenting at international conferences

Requirements:
- Strong proficiency in FORTRAN programming (Modern FORTRAN preferred)
- Extensive experience in plasma physics and modelling (low temperature plasma physics a plus)
- In depth knowledge of relevant numerical methods and algorithms (FVM, FEM preferred)
- Experience in a Linux environment
- Ability to work independently and manage your own time effectively
- Strong communication skills
- PhD in plasma physics or closely related field

Desirable:
- Experience using Git (BitBucket, GitHub)
- Knowledge of parallelisation (OpenMP , MPI)
- Knowledge and experience with code refactoring and qualification
- Experience in writing kinetic plasma models (Boltzmann solver, Monte Carlo simulations, PIC) codes from scratch
- Experience in using CFD+, COMSOL, or commercial plasma software
- Experience working with meshes and unstructured meshes
- Knowledge of low-pressure plasma physics e.g. Semiconductor Plasma Processing (Etch, ALD, PECVD etc.)
- In-depth knowledge of rarefied gas flows
- Knowledge of plasma chemistry design

What We Offer:
- Competitive salary
- UK Visa sponsorship if necessary
- Opportunities for professional development
- Stimulating work environment with a focus on research and innovation
- The ability to make a large impact and help shape a small company

Quantemol is a scientific software and consultancy company with an international

customer base and a small friendly team of experts based in the UK. We are providing plasma modelling solutions to the semiconductor industry and others. Our products are complicated but the results of your work have a real impact. We are facilitating innovation which can change the world. Join us on this journey!
To apply please send your CV outlining your experience and qualifications to recruitment@quantemol.com.

Postdoctoral Position in Plasma Science and Engineering, University of Minnesota

This position is to participate in research focused on plasma enabled iron ore reduction. We are looking for a postdoctoral researcher with a recent Ph.D. degree in plasma science / engineering, chemical engineering, materials science or closely related field. Experience in high temperature reactor and/or plasma source design and diagnostics is preferred. The postdoctoral researcher should have excellent oral and written communication skills and the ability and desire to collaborate with a team of multidisciplinary researchers.
Applicants should send a brief cover letter (including interests and date applicant is available), CV, and reprints of 3 representative publications to **Prof. Peter Bruggeman** (pbruggem@umn.edu) and **Prof. Uwe Kortshagen** (korts001@umn.edu).

Applications Engineer Positions at Plasmatreat USA Locations: Hayward, CA and Elgin, Il

Plasmatreat USA (www.plasmatreat.com) has immediate openings for 2 scientists/ engineers to work in the area of plasma engineering. The Application Engineer will maintain a comprehensive understanding of company products, related applications, and technology implementation. Applicants should be self-motivated, be prepared to actively drive multiple projects toward timely completion and have a strong desire to contribute in a team environment.

Responsibilities:

- Conduct testing on a variety of materials: polymers, metals and ceramics, using plasma systems
- Perform materials characterization using surface analysis equipment
- Optimize processes based on customer specifications
- Collect, analyze, and present test data
- Participate and support other engineers and the Sales team on relevant development projects
- Maintain expert level understanding of product technology, product positioning and technical applications.

- The Applications Engineer is expected to understand, use, and run advanced PECVD tools, vacuum equipment, and metrology tools: optical microscopes, mechanical testers, etc.

Minimum Qualifications:

- Bachelor's degree in Engineering, Material Science, Physics, or Chemistry with 0 - 5 years of experience, preferably in materials engineering
- Experience with materials characterization equipment
- Strong project and lab management skills
- Good communication (written and verbal), teamwork, and organizational skills.
- Can Do attitude
- Hands-on experience

Desirable Qualifications:

- Experience in plasma processing of materials and plasma sources
- Familiarity with surface modification methods
- Familiar with robot programming
- Excellent communication and technical writing skills
- Willingness to travel to customer sites for support

Candidates are asked to send a resume and one letter of recommendation to:
Dr. Daphne Pappas, daphne.pappas@plasmatreat.com

Review of applications will begin immediately and continue until the positions are filled.

Collaborative Opportunities

Please submit your notices for Collaborative Opportunities to editor@iltpcnewsletter.org.

Disclaimer

The content of this Newsletter comes from the contributions of members of the ILTPC. The Newsletter editors are attempting to provide as inclusive a newsletter as possible by publishing contributions from all members of the ILTPC. However, the editors may limit contributions of individual research groups to any single issue. The editors do reserve the right to not publish contributions that they deem as not being appropriate. The Newsletter editors may do some light editing of the original submissions to maintain a consistent tone and style. The editors expect that submitting contributors have permission to share images. Inclusion of items in the Newsletter should not be interpreted as an endorsement by the editors nor as an advertisement for commercial purposes.

Editors:
Prof. Gerrit Kroesen
Eindhoven University of Technology, The Netherlands
g.m.w.kroesen@tue.nl
Prof. Thomas Mussenbrock
Ruhr University Bochum, Germany
mussenbrock@aept.rub.de