

Join the IPSI Group!

Ion & Plasma Surface Interactions Group

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* Students may apply for £300

Welcome to the Ion and Plasma Surface Interactions (IPSI) Group Newsletter

A message from the Chair:

The last year has seen some changes within the IPSI group committee, with Ashley Knowles and Chris Jeynes stepping down due to other commitments. Both were active and enthusiastic members of the committee and their contribution will be missed. We did, however welcome Sabrina Blackwell (TWI, Cambridge) and Brian Jones (University of Sussex) onto the committee, and both have made an excellent contribution, with Sabrina active in organising the PSTF event and Brian once more taking on the role of newsletter editor – many thanks to you both. Thanks also go to Erik Wagenaars for taking on the role of acting secretary in place of Adam Brierley, whose work over the last year has been much appreciated.

On behalf of the committee I would like to say it has been our pleasure in supporting a number of events throughout the UK, both financially and in active participation. We have also been able to award prizes and a student conference bursary. Details follow in this newsletter; thanks to all concerned! This year, we have announced new IPSI group prizes for contributions to the newsletter and also for the production of an outstanding PhD thesis. More details are to be found in the newsletter.

As always, it is our hope that we can continue to support a range of activities via participation, organisation, informing the wider community and via financial support. The committee is here to serve the group, so I would ask members to send any suggestions of how we can support the ion and plasma surface interactions community to us for consideration.



Glen West
(IPSI Chair)

IPSI News & Events

Plasmas, Surfaces & Thin Films

17th June 2015, Loughborough University, Loughborough, UK

Held at Loughborough University and organised by Roger Smith and Sabrina Blackwell of the Ion and Plasma Surface Interactions Group with support by the Vacuum, Thin Films and Surfaces and Materials and Characterisation Groups of the Institute of Physics

This meeting took the place of the Group's annual June meeting in London, "Plasma, Surfaces and Thin Films", moving to Loughborough, due to the unavailability of a suitable venue in London.

It was organised by Roger Smith and Sabrina Blackwell of the Ion and Plasma Surface Interactions Group with support by the Vacuum, Thin Films and Surfaces and Materials and Characterisation Groups of the Institute of Physics. It was held at Loughborough University on Wednesday 17th June 2015 and was free to attend.

The programme consisted of ten oral and sixteen poster presentations. The posters were submitted from all supporting groups and there were three prizes, which were judged during the lunch interval and presented at the tea break in the afternoon.

The Groups would like to thank the independent judges for their contribution to the meeting and the difficult choices that they had to make. To be totally impartial, they cannot be named !!!

The meeting started with an excellent overview of the status of JET by Dr Guy Matthews from the Culham Centre for Fusion Energy, and then followed many interesting papers presented by the 'early-career scientists'. The event was well supported during the day with over 50 delegates attending, which produced some lively discussions during the lunchtime poster session.

Judging by the numbers attending and the favourable comments received, the event was a real success and may well be repeated next year.

The three prize winners were :



IPSI prize £100: D. Shaw, York University

Poster title: Surface modification of polymer films using an atmospheric plasma jet.



Vacuum prize £100: Sagar Agrawal, Institute for Plasma Research, Gujarat, India

Poster title: ZnO:Al Thin Film Deposition by Magnetron Co-Sputtering



Materials and Characterisation prize £50: Andrew McInnes, Loughborough University

Poster title: Fabrication and photoelectrochemical studies of Bi₂Ti₂O₇ polychlore thin films by aerosol assisted chemical vapour deposition.

The day's programme :

ORAL PROGRAMME

10-20 Coffee/Tea and Arrival

10-40 Guy Matthews, Head of the JET Plasma Operations and Boundary Unit
"Fusion and Plasma-Surface interactions"

11-20 Yevhen Zayachuk, Oxford University "Interaction of high ion flux density deuterium plasmas with tungsten"

11-40 Xiaou Yi, Oxford University "Collision cascades and microstructural evolution in heavy-ion irradiated tungsten: a coordinated study of electron microscopy and multiscale modelling"

12-00 T.J. Petty, Liverpool University "The dependence of tungsten fuzz growth on He ion fluence in the range 10²⁴-10²⁸ m⁻²"

12-20 Ion and Plasma Surface Interactions Group AGM. Poster session and

14-00 Dave Bosworth Cambridge University, "DC Magnetron Sputtering of Ultra Thin NBN and MOSI superconductors for single photon detectors"

14-20 Fabiana Lisco, Loughborough University "Surface Activation using an atmospheric plasma process for thin film photovoltaic device fabrication"

14-40 Tom Morton, Sheffield University "Structure and wear mechanism of novel CrAlBYCN/AlSiCN PVD coating deposited using a combined UBM and HIPIMS process in a reactive gas mix."

15-00 Tea break and announcement of poster prize winners

15-30 Andy West, York University "The Role of Reactive Oxygen Species in Fast Plasma Ashing Using an Atmospheric Pressure Plasma Jet"

15-50 Lanxi Zhang, Loughborough University "Characterisation of an Atmospheric-Pressure Air DBD Discharge"

16-10 A. Nominé, Open University "High-speed video imaging of Plasma Electrolytic Oxidation discharges"

POSTER PROGRAMME

N. Somont, Huddersfield, Radiation hardness of MAX phases Ti_3AlC_2 and Cr_2AlC

Subhashi Jayathilake, Loughborough, Towards the fabrication of novel and low cost transparent conducting oxides for electronic and optoelectronic applications

Mukul Bhatnagar, FCIPT, Institute of Plasma Research, Gujarat, India Atomistic modelling of interaction between Silver and a dielectric surface.

Andrew McInnes, Loughborough, Fabrication and Photoelectrochemical studies of $Bi_2Ti_2O_7$ Pyrochlore Thin Films by Aerosol Assisted Chemical Vapour Deposition

Preeti Puntambekar, Loughborough, Cold Atmospheric-Pressure Plasma Treatment for Promotion of Cell Adhesion onto PDMS substrates

Paul Brack, Loughborough, Aerosol-Assisted CVD of Bismuth Vanadate Thin Films and their Photoelectrochemical Properties

Adam Lloyd, Loughborough, Development of a reactive force field potential for modelling the growth of Ag on ZnO.

D. Shaw, York University, Surface modification of polymer films using an atmospheric plasma jet.

Paulo Seri, Bologna Italy, The effect of plasma surface modification on biodegradation rate and biocompatibility of a poly(butylene succinate)-based copolymer

Anna W. Oniszcuk, Sheffield, Target Poisoning in Mixed Ar, N₂ and CH₄ Atmosphere, in Processes Using Different Target Materials for HIPIMS/DC and DC Cathode Modes.

Michael Gona, Loughborough High rate deposition of AZO thin films by pulsed DC magnetron sputtering

Hayley Brown, Surrey University, Nanostructure Gas Barrier Film for Plastic Electronics Deposited by Remote Plasma Sputtering

Christos Potamialis, Loughborough, Sputtered MoOxNy as a back contact buffer for CdTe solar cells

Sagar Agrawal, FCIPT, Institute of Plasma Research, Gujarat, India ZnO:Al Thin Film Deposition by Magnetron Co-Sputtering

Mark Wooton, Loughborough, Radiation Damage in Advanced Materials for Next Generation Nuclear Power Plants

Aidan Wilkinson Loughborough, Conductivity properties of highly disordered nanoscale thin films

Sibel Yilmaz, Loughborough, Optimisation of Cadmium Chloride Process for CdTe Solar Cells

Quantum, Molecular, Atomic & Plasma Physics (QUAMP) 2015

1st to 4th September 2015, University of Sussex, UK

Hosted by The University of Sussex, Organised by the Quantum Optics, Quantum Information and Quantum Control Group, Co-sponsored by the European Physics Society and sponsored by the Ion & Plasma Surface Interactions Group

The International Conference on Quantum, Atomic, Molecular and Plasma Physics, was held in Brighton from 1st to 4th of September 2015. The meeting attracted over 50 delegates with topics covering Quantum technology, Quantum information, Metrology, Ultra-cold matter, Atomic and molecular interactions, Ultra-fast phenomena, Quantum optics and Plasma physics.



QUAMP 2015

IPSI Group Outreach Activities

Please submit contributions to Dr Brian Jones b.jones@surrey.ac.uk

Plasma & Light Public Outreach Event 31st March 2015, The Open University, UK

As part of the Institute of Physics Plasma Physics Group annual conference hosted by the OU in this International Year of Light, an 'Outreach Event' was held in the afternoon and evening on 'The Nature of Light'.

The event began with an exhibition on the concourse, outside the lecture theatre, featuring light-related elements of the SEPnet roadshow, the Rosetta/Philae showcase and a plasma-lighting exhibit from a local lamp manufacturing business (Cervasion) - visitors were also offered 'light refreshments'.

In the afternoon there were two 'specialist' talks on Optical communication components fabricated by plasma processes by Dr Andy Carter from Oclaro, Caswell, followed by Probing plasmas with lasers by Dr Grant Ritchie from the University of Oxford.

After a break, there then followed four presentations. Jonathon Porritt, environmentalist, gave his perspective in a specially commissioned short video clip. John Stocks from Ceravision spoke about the non-visual effects of light including effects on vitamin D uptake and circadian rhythms. Dr Lucia Marchetti, one of the Open University Astronomy team, who is also leading the UK university involvement in the International Year of Light, spoke on the IYL initiative and on Cosmic sources of light from the sun, through interstellar dust to distant galaxies. Her presentation included a preview of the OU IYL cartoon, celebrating several anniversaries of light-science. Finally Dr Calum Maccormick, lecturer in Physics at the OU, gave a fascinating glimpse of how light can slow atoms to within a fraction of absolute zero and then how such atoms can slow light to a snail's pace.

Although the ticketing system used indicated an audience of 40 to 50, about 90 to 100 people actually attended.

Forthcoming Meetings

Thirteenth COSIRES 2016 **19th to 24th June 2016, Loughborough University,** **Loughborough, Leicestershire, UK**

The biennial international COSIRES (Computer simulation of radiation effects in solids) meeting will take place at Loughborough University from 19-24 June 2016.

The web site for the meeting is <http://www.cosires2016.co.uk/>

The 2016 Computer Simulation of Radiation Effects in Solids (COSIRES) is the 13th edition of this conference. This conference is a major international forum to present and discuss the recent achievements in the advanced computer modelling of surface and bulk phenomena stimulated by all forms of irradiation. Fundamental understanding of these phenomena is often not accessible by experiments, since they occur on very small time and length scales. This year the meeting is organised by Roger Smith of the IPSI group but is also sponsored by the Computational Physics Group, the Plasma Physics group and the theory of condensed matter group, CCP5 and the IAEA. The meeting will also be run in conjunction with the workshop MoD-PMI (Models and Data for Plasma-Material Interaction). As part of the conference an outing has been arranged to Newton's birthplace which is about 25 miles from Loughborough.

Registration will open in the new year.

This year the invited speakers are:

Kazuto Arakawa, Shimane, Japan
Eva Zarkadoula, ORNL, USA
Herbert Urbassek, Kaiserslautern, Germany
Daniel R. Mason, Culham, UK
Nikita Medvedev, DESY, Hamburg, Germany
Luis Sandoval, Los Alamos, USA
Weiqing Ren, NUS, Singapore
Yonggang Li, Chinese Academy of Sciences, Hefei

Further information can be obtained from the conference chair Roger Smith (R.Smith@lboro.ac.uk) tel 01509 223192

Bridging-Time Scale Techniques and their Applications in Atomistic Computational Science

12th to 15th September 2016, Max planck Institute for the Physics of Complex Systems, Dresden, Germany

Scientists involved in simulation of the interaction of particles with surfaces often use the SRIM code to evaluate quantities as implantation depths or sputter yields. If more accurate calculations are required then Molecular Dynamics is often the methodology of choice and this has become a standard tool with the widespread availability of codes such as DLPOLY or LAMMPS. These codes can be used successfully with empirical potentials to model the interaction of the atoms in the system with each other. These potentials are becoming more realistic also through parameterisation based on ab initio calculations. With the advent of high performance computing, systems containing millions of atoms can now be studied successfully.

There is one drawback to the MD technique. Accessible time scales of microseconds at best can be achieved so that dose effects are difficult to model. Extending simulation times to experimental levels is an area of current reserach and although there have been recent breakthroughs much more needs to be done. As a result funding has been obtained to run a workshop at the Max Planck Institute for Complex Sytesm in Dresden in September 2016

Focus Workshop: 12 - 15 September 2016

Scientific Coordinators: Matthias Posselt, Roger Smith, Blas Uberuaga

Please contact Roger Smith as above for further details.

For a full listing of events organised by the IPSI Group Committee please visit:
<http://www.iop.org/activity/groups/subject/ipsi/calendar/index.html>

IPSI Student Funding Report

Attending your first international conference as a PhD student is pretty nerve-racking. Finally putting faces to names from the papers you have read, mingling with prospective collaborators or employers, and of course presenting your own work in front of a huge number of people. The 22nd International Symposium on Plasma Chemistry in Antwerp, Belgium, this summer was attended by over 550 researchers, students, and industry specialists from around the world.

My oral presentation was just 1 of 168 talks that were given over the five days, and even with the ample preparation and practice before, it is safe to say I was a little nervous. My presentation went without a hitch, though of course it was at a slightly accelerated rate to what I had practiced due to my nerves. I managed to answer the questions fielded to me, and to my surprise stirred up quite the interest in the subsequent coffee breaks. All in all I was proud with my effort, but of course I wasn't only there to present my work, but also to learn what others had been up to as well.

This year saw a focus on plasma diagnostics, thin film manufacture, plasma catalysis, and plasma medicine, amongst many other topics. In particular I was interested in the work done by various groups to separate the role of UV light and the reactive species, both produced by the plasma. This question of if the combination of the two helps or inhibits has been unanswered for many processes, not just catalysis and biomedicine.

I have come away from the 22nd ISPC with a much broader picture of the work done throughout the world, and the vast range of problems plasma can be applied to. The conversations I have had will hopefully lead to some fruitful collaborations both in the UK and abroad, and of course more people know of some of the work I have been doing these past 3 years so far during my PhD. The benefit to students in attending conferences like these is great, and without the Institute of Physics (IoP) Research Student Conference Fund (RSCF), it would not have been possible. The student bursary is open to any PhD students who are members of the IoP and are members of a relevant group. The Ion & Plasma Surface Interactions Group (IPSI) awarded me the full £300 available to help attend and present my work on atmospheric pressure plasma processing.

I wholeheartedly recommend any students who want to attend a major conference in the UK or abroad not organised by the IoP consider full or part of the grant available through the RSCF.

Andy West
University of York, UK (IPSI member)

IPSI Student Funding Info

The Institute of Physics provides financial support to research students to attend international meetings and major national meetings.* The Institute of Physics (IOP) handles the application process but it is the relevant IOP group that makes the decision on whether to award the bursary and its value.

Am I eligible?

Research Student Conference Fund (RSCF) bursaries are available to PhD students who are a member of the Institute and of an appropriate Institute group. For example, if an applicant is a member of the Women in Physics Group only then they could only seek support to attend a conference related to women in physics and not to low temperature physics. To be eligible for that meeting, the applicant would also need to be a member of the Low Temperature Group.

What is the bursary worth?

Students may apply for up to £300 during the course of their PhD. Students may apply more than once, for example they may request the full amount or decide to request a smaller amount and then apply for funding again for another conference at a later stage. Groups have limited funds to award bursaries and so students may not receive the full amount they have requested. If the full amount is not awarded students may apply again to receive further support for a different conference until they reach £300 overall. Note that grants will normally cover only part of the expenses incurred in attending a conference and are intended to supplement grants from other sources.

How can I apply?

Application details and application form:

http://www.iop.org/about/grants/research_student/file_38809.doc

RSCF applications are considered on a quarterly basis and should reach the Institute by: 1 March, 1 June, 1 September or 1 December; a decision will be made within eight weeks of the closing date. Your application must reach us by the deadline which is at least three months before the conference you wish to attend. We strongly recommend that you submit your application early.

All recipients are asked to produce a report on return from their conference before receiving payment.

For further information please contact: supportandgrants@iop.org

* Please note that bursaries are not available for meetings organised by the Institute of Physics including those organised by IOP Groups.

The Committee

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The British Vacuum Council

The IPSI Group welcomes ideas from members for topics for future events, including conferences, meetings and workshops. Please contact the Chairman or Secretary. This newsletter is also available on the web and in larger print sizes. The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated. The Institute of Physics, 76 Portland Place, W1B 1NT, UK. Tel: 020 7470 4800 Fax: 020 7470 4848