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Ion & Plasma Surface Interactions Group

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Welcome to the 2018 Ion and Plasma Surface Interactions (IPSI) Group Newsletter

Welcome to the 2018 Ion & Plasma Surface Interactions group newsletter. One of the stranger aspects of editing an annual publication is that somehow the editor gets to the end of the year and realises that in the midst of all the mayhem and chaos of the preceding months, once again they haven't actually got round to putting it all together. Fortunately plenty of others are less disorganised than I am, and this year we have a range of articles on subjects from the origins of the group to meeting reports. Hopefully it has been worth the wait!

There was a change of venue for this year's Plasmas Surfaces and Thin Films Early Careers meeting, which was hosted by the University of Huddersfield. The change in location also coincided with a slight change in focus, with more emphasis on tribology at this year's meeting. As ever it was a great success, with a fascinating range of talks and posters. Congratulations to Emily McNulty and Frank Dangan, winners of this year's poster prize! There were also two prizes provided by Huddersfield for the presentations, which were won by Samuel Capp and Sam McMaster. Thanks to Vladimir Vishnyakov, John Colligon and Kieran Cheetham for organising and running the event. The meeting will run again next summer, but this time we will be at the IoP's new headquarters in London. Further details including announcements of dates etc. will be posted on the IPSI group webpage (<http://ipsi.iop.org>).

The IPSI group Outstanding PhD Thesis Award was introduced in 2016, and is presented annually. This year's prize was awarded to Anna Oniszczyk for her thesis entitled "Microstructure and Cutting Performance of V-C Based Coatings Deposited by HIPIMS/UBM". Her work investigated a possible solution to the build-up edge problem, something which is particularly seen with high-speed cutting tools when used on various types of softer metal alloy. By developing an effective surface coating for these types of tool, Anna identified a means for reducing this problem. Her thesis also involved thorough analysis of the film deposition environment, including the effects of different ions and ion balances in the sputter plasma and investigation into possible target poisoning. Controlled use of intentional target poisoning enabled the deposition of a graded film with the desired properties, and which showed improved performance compared with the uncoated tools.

Continuing on the theme of prizes, last year's Newsletter Prize was awarded to Joshua Ellingford for his excellent article on working for a small research and development firm over the summer break and its impact on his studies.

If you would like to apply for the IPSI group Outstanding Thesis Award, please email a two-page abstract to the Secretary, Dr. Erik Wagenaars (erik.wagenaars@york.ac.uk)

by the 4th of November 2019. The abstract must be on a completed and examined PhD thesis (examination in the period Nov 2018 – Oct 2019), explaining the outstanding nature of the work, and include IOP membership number and full contact details of both the student and their supervisor. The winner receives a certificate and £250, and the winning entry is included in the newsletter and on the group website.

Finally if you would like to contribute to the next edition of this newsletter, please email your submission to me at P.J.M.Isherwood@lboro.ac.uk by the 30th of September 2019. Submissions can be on anything from experiences of working in areas of physics relevant to the group through to technical articles and conference reports. There is a prize for the best article, which is announced in the following issue.

Patrick Isherwood, 16th January 2019

IPSI Group news

Alan Webb

Next year sees the return of “Plasmas, Surfaces and Thin Films” at the Institute’s new HQ in London.

The meeting moved away from London with a new identity as “The Young Researchers’ Meeting”, and, so as not to be forgotten, the meeting will incorporate both themes. The IPSI ‘flagship’ meeting is also the venue where the Group awards the Poster Prize, so this will continue at this meeting, with the award being made by our Group Chair on the same day.

June 2019 is the time of year that you will want to see the new IoP facility and be able to take part in one of the longest running one day events on the IoP calendar.

Further details will be available soon.

Don’t miss it!!!

The origins of the Ion and Plasma Surface Interactions Group (IPSI)

John Colligon, Alan Webb and Roger Webb

In the late 1960's the fields of ion-surface interactions and ion implantation were developing quickly and, particularly in the electronics industry, the use of ion beams to dope silicon wafers to precise levels of dopant became a viable commercial process. Ion implanters were marketed, among others, by Dan Fysik in Denmark. Geoff Dearnaley at Harwell Atomic Energy Establishment used an ion implanter to study the change in properties of materials bombarded by ions and found a significant improvement in wear-resistance of steel when bombarded using Nitrogen ions. Mike Thompson used the implanter for studies of sputtering of materials and development of surface topography. By using a rotating cylinder substrate and radioactive gold targets he was also able to estimate the energy distribution of sputtered atoms from the deposited atom distribution around the cylinder surface [1]. Whilst at RAE Farnborough John also used radioactive gold to determine the lowest energy for sputtering of gold by Argon ions [2]. This damage threshold was of interest in terms of minimising damage to satellites.

In other areas the advantages of surface coating were being studied using a technique originally described in a patent by Berghaus in 1938 [3], now known as Ion Plating and being developed in the 1960's by Dennis Teer in the UK and Don Mattox in the USA [4, 5].

George Carter at Salford realised that industry would need specialist training in the ion-surface field and set up an informal Atomic Collisions in Solids group. We met at venues of our members and had research meetings with papers on latest developments. Out of this the idea of a MSc level course was developed and run by staff from the Universities of Sussex, Surrey and Salford with students spending some time at each site.

In 1969 Mike Thompson (now Sir Michael Thompson) took over the chair of the ACIS group and John was its Secretary and we decided the interest in this activity fitted quite well into the IOP group structure so we prepared a case which led to the "Atomic Collisions in Solids Group" becoming an IOP Group in 1970.

However, in the next 20 years plasma-based coating methods, such as magnetron sputtering and then unbalanced magnetron sputtering became the norm for surface coating whereas, as the name suggests, atomic collisions in solids covered ion implantation into materials together with defect and compositional analysis. The ion energy ranges became more diverse and, in particular, energies were lower in the field of surfaces and special coatings which had become more important. This led to low energy bombardment, low energy ion beams and other methods of interacting and modifying surfaces including plasma-surface interactions.

In 1989, Derek Palmer became the chair of ACIS and Roger took over the secretarial duties from Mike Walls. Subsequently Lyndsay Earwaker took over the chair and Alan Webb took over as secretary from Roger. By 1990 there was such interest in lower energy surface interactions that the conference series Low Energy Ion Beams was initiated. This emerged as a separate event from the plasma-surface interaction conference series, resulting in the ACIS membership considering that the group remit should be broadened and that such a change might also result in increased membership.

It was thus in 1990 that the idea of a name change emerged with the ACIS members considering that the group remit should be broadened and that such a change might also result in serving the members better and, possibly, increased membership of the group.

A proposal for the Group name change involved a survey of the entire ACIS Group membership to determine (a) did we need to change the name and (b) what would be the most appropriate name.

The ACIS members at the 1992 AGM voted for a name change and authorised the committee to propose alternative names for the Group, to circulate these and to arrange a vote for all members to choose the favourite title.

This led to proposals for a new name, which resulted in a short list of three plus the option of retaining the name ACIS, to be sent out to the membership to vote. The list was:

1 Atomic Collisions in Solids 2 Ion Beam and Plasma Engineering 3 Ion and Plasma Surface Interactions 4 Plasma and Ion Surface Technology.

As three of these had the word 'Plasma' in the title, the proposed change led to discussions with the Plasma Physics Group, to ensure that there should be no significant overlap with their remit.

During these Group discussions, the legal / constitutional issues were also discussed with IoP HQ (mainly with the IOP Secretary, Clive Jones).

The entire membership were contacted to vote on the name change and the majority was for Ion and Plasma Surface Interactions. The following year, 1993, with the approval of IoP, the name change was agreed at the Group AGM.

The Committee therefore decided, after a long debate, to change the name of the group to its present Ion and Plasma Surface Interactions Group. The decision was difficult because there was a possibility that members interested in atomic collisions may not sign up for the new group. Fortunately this did not happen and Ion- and Plasma- surface interactions have become of great interest both commercially and scientifically in the areas of new materials for engineering and medical applications.

New coating methods, such as High Power Impact Magnetron Sputtering and other ion-

assist methods, allow formation of novel surface layers, such as MAX Phase materials [6] These coatings do withstand high temperature [7] and bring the challenges of Tribology into the realm of IPSI expertise. The surface topography of bearings can dictate how a lubricant can be entrained and reduce friction and wear. Reduction of friction is also important for implant prostheses of mobile joints such as artificial hips where correct entrapment of body fluid as the lubricant is important. The situation is likened to so-named “planing” where a car tyre tread on a wet road can trap water leading to water on water (zero) friction.

I mentioned in an earlier article that it is a strange oversight that the IPSI Group does not have a major link with Tribology which is the study of Corrosion, Friction and Wear of materials. Technology has moved on and, whereas coatings were required for components and tools operating at fairly moderate temperatures, the challenge now is to find methods to form new thin film coatings which are durable at temperatures up to 1000°C and above. As the late Professor Jost, well known in the Tribology field, pointed out some years ago over 50% of our energy in running machines is used in overcoming friction [8]. More gains in energy-saving can be obtained by operating engines at higher temperatures where, not only fuel efficiency increases, but also, a fuller combustion process is completed which minimises ejection of unused fuel in the exhaust gases. Other areas of concern are machines which require coolants which also offer environmental problems and could be avoided if improved materials with high temperature stability and low friction could be found. Wind farms at sea have the further challenge to provide corrosion-resistant materials for bearing components and the medical supplies industry must have anti-bacterial and non-poisonous materials for prostheses and other implanted devices.

As a member of the IET Tribology Steering Committee I am setting up the programme for day 2, of the 4th IET conference on New Challenges in Tribology to be held at IET Austin Court, Birmingham on 28-29 March 2019 (see details at the end of this article).

The present committee would like to hear from members with suggestions of other topics for IPSI meetings and other activities. We already run an annual meeting, usually in June, for PhD research students at which they present their work. We support the annual Photo-voltaic meeting at Loughborough University (next is 19th September 2018). There appears to be growth in interest of plasma-surface interactions in medical diagnostics and treatment. Should we be bidding to host some of the regular conferences, such as Ion beam Modification of Materials?

Please send any ideas or comments to J.Colligon@hud.ac.uk

For those interested, the New Challenges in Tribology conference dates are 27-28 March 2019 and the meeting is at IET Austin Court in Birmingham. Day 1 is of interest as it highlights industrial problems and new achievements in transport and machine operation. Day 2 has invited talks on materials and coatings. Both days offer oppor-

tunities to researchers in the IPSI area to meet engineers and discuss how their work could provide solutions to some of the problems. There will be a poster competition with a prize for research students. Preliminary details will soon be on the IET website: www.theiet.org/tribology-challenges. Registration will be required in January 2019.

References

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Summer School on nanoScience@Surfaces2

Andrew Thomas

The second biannual summer school on nanoScience@Surfaces, organised by members of the Thin Film and Surfaces Group Committee, was held at the Cavendish Laboratory in Cambridge from the 30th July - 2nd August 2018. Based on feedback from the previous meeting this workshop was delivered in a more pedagogical way with themed lectures/talks. Each day kicked off with an overview of a particular technique followed by some more specialised adaptations of the techniques. Prof. Rob Jones from the University of Nottingham started the meeting with the opening talk. Entitled, "Getting it off and getting it on", the talk focused on methods for preparing clean ordered surfaces and depositing molecules or layers upon them. The rest of the first day was dedicated to theoretical methods for surface structures and electronic structure, with talks by Drs. Steve Jenkins (Cambridge), Daniele Selli (Milano Bicocca) and George Darling (Liverpool). The evening entertainment was provided by Dr Karen Syres, with her Fermi quiz, in which the teams did spectacularly well.

The second day covered spectroscopy, with Prof. Wendy Flavell (Manchester) giving the overview talk, followed by Alex Walton (Manchester) and Georg Held (Reading) who described novel ambient pressure spectroscopy techniques using photoelectrons and X-ray absorption. The late afternoon speakers, Katie Moore (Manchester) and Andy Jardine (Cambridge) gave talks on very different ways of using ions for surface spectroscopy. The topic on Wednesday was scanning probe and electron microscopy techniques. Phil Moriarty (Nottingham) gave an entertaining overview of the scanning probe and also focused on the pitfalls of image interpretation. This was followed by talks from Geoff Thornton (UCL), Rachel Oliver (Cambridge) and Neil Curson (UCL) on imaging oxides, nitrides and semiconductors. Giovanni Costantini (Warwick) and Stefan Rauschenbach (Oxford) completed the imaging day theme with an overview of the deposition, assembly and imaging of large molecules on surfaces. The day was concluded with the summer school meal, hosted by Sidney Sussex College.

The subject of the final day of the summer school was surface spectroscopy and diffraction techniques. Prof. Phil Woodruff (Warwick) covered general area of surface structural determination techniques. Chris Nicklin (Diamond Light Source) and Rob Lindsay (Manchester) then discussed the use of synchrotron radiation and electron diffraction in structural determination.

The summer school also included a series of workshops. Andrew Thomas (Manchester) ran a workshop on X-ray photoelectron spectroscopy data analysis, and Joe Smerdon (UCLAN) ran a workshop on image analysis for scanning probe microscopy. On the final day Kieran Cheetham (Liverpool) and Karen Syres (UCLAN) oversaw a careers speed dating event, where a number of PhD graduates in surface, nanoscience

and thin film technology talked about their experiences in industry, and how their PhD studies had prepared them for this.



Presentation of the poster prize

Two poster prizes were awarded for research poster presentations by the students. First prize went to Henry Chandler from for his presentation “Molecular Maracas: Investigating the potential of LiC₆₀ as a multi-state molecular switch.” The runner up prize was awarded to Alexander Allen for his presentation “STM and AFM investigation of bi-isonicotinic acid assemblies on Au(111)”.

The organising committee is hoping that the summer school will run again in two years’ time. I would like to thank my fellow organisers Joe Smerdon, Holly Hedgeland, Kieran Cheetham, and Karen Syres. Special thanks go to Andy Jardine for all the local organisation and handling the registration process. I would also like to thank the following IOP Groups: Ion and Plasma Surface Interactions, Nanoscale Physics and Technology, Vacuum Group and Thin Films and Surfaces as well as the Royal Society of Chemistry Solid Surfaces Group and the Centre for Doctoral Training for Advanced Characterisation of Materials at UCL for their generous financial support.

Institute of Physics: Advances in Photovoltaics 2018

Liam Welch

Advances in Photovoltaics is an annual one day conference focussing on the current state of the art in photovoltaics and the challenges that must be overcome, pulling speakers from academia, industry and government. This year's event was held at Loughborough University but will return to London next year after the Institute of Physics moves to its new home near Kings Cross.

Bill Tumas, Associate Director of the National Renewable Energy Laboratory (NREL) in the United States, was the first speaker giving an overview of recent advances in photovoltaics and the remaining challenges. With the omnipresent NREL efficiency chart, Bill showed recent advances in multiple PV materials, but cautioned that just as the motor car didn't stop at horse-parity, photovoltaics shouldn't be content with reaching grid-parity, but must continue to improve... 'the job ain't done yet'. As Solar approaches grid-parity, the energy infrastructure must be modernised and expanded to handle the increasing electrical demand associated with vehicle electrification. In order to meet this rising demand, high throughput manufacturing of solar cells involving roll to roll processing of flexible thin films will be necessary, instead of the slow and high energy processing of crystalline silicon panels. Bill also spoke of the need for alternative uses of solar energy, such as photoelectrochemical splitting, which produces energy dense fuels from sunlight. Additionally, Bill spoke about the challenges of recycling modules, including the economic feasibility of recycling materials 25 years in the future.

Tim Silverman also of NREL, and a visiting academic at Loughborough University, gave a lively talk about module performance and reliability. The use of sub-bandgap mirrors and reflective back surfaces have been utilised by NREL to lower the operating temperature of ground mounted PV, leading to real-world efficiency gains. Tim provided an interesting look at the philosophy of failure testing, and how much uncertainty still remains in the methods used. He then covered the threat posed to panels by seemingly innocuous shadows, including renditions of photos of workers inadvertently casting damaging shadows in solar panel factories. Scanning electron microscopy and electroluminescence was used to identify the shunts caused by these shadows and the microfractures caused by mechanical forces on silicon panels. Will Hitchcock, founder and managing director of Above Surveying Ltd highlighted the problems occurring in many UK utility scale solar installations. Above Surveying use drones equipped with thermographic cameras to rapidly and thoroughly assess the health of PV assets in the field, providing site managers with a detailed assessment of faults and the modules affected. This analysis is both quicker and provides a more in-depth appraisal than ground based methods, showing managers when solar cells, junction boxes and wiring

(and even modules) require replacing. The technique can also appraise the effects of soiling and the effectiveness of cleaning. Above Surveying is a leader in its field addressing the important issues of operations and maintenance with automated aerial surveillance and state of the art computing and image analysis.

Colin Wolden of the Colorado School of Mines presented a 40 year history that took CdTe solar cells from a fledgling technology to almost 20GW of installed capacity. The talk finished with an insight into the next innovations that promise to contribute to the NREL champion efficiency chart.

Tom Fiducia of Loughborough University presented a detailed analysis using cathodoluminescence and SIMS to examine the latest CdTe technology that incorporates Se into an alloy at the front of the absorber. Interdiffusion occurs following the CdCl₂ activation treatment to provide grading of the Se. A 3-dimensional reconstruction was used to show the location of Cl and Se in the CdSeTe device to explain in detail the mechanisms leading to high conversion efficiency.

Patrick Isherwood gave an insightful look at alternative TCOs that could be used to relieve the industry's reliance on ITO, with a focus on the use of non-toxic Earth abundant materials and p-type TCOs, and the issues currently plaguing them, were also broached.



The 2018 one-day meeting on 'Advances in Photovoltaics' was held at Loughborough University, but will return to the Institute of Physics in 2019 at the new HQ at King's Cross.

Advances in Photovoltaics 2017

Kieran Cheetham

Editor's note: apologies to the author - I should have included this article in the previous issue, but sadly it only arrived on my desk post-publication. Organised by the Energy Group with assistance from the Ion and Plasma Surface Interactions (IPSI) Group, this meeting takes place annually. A report on the 2018 meeting is also included in this edition.

This one-day meeting provided a forum to help assess the current state of the art. It brought together distinguished invited speakers whose expertise covered a range of photovoltaic technologies.

Jim Sites (Colorado State University, USA) opened the session with an invited talk on the status of utility-scale CdTe, with First Solar leading the way with 17 GW of modules already installed globally, including an individual site with 550 MW in California. Jim then moved onto the various issues facing CdTe photovoltaics and what was being done to overcome them. All parts of the cell stack require optimisation and recent developments include alloying the CdTe itself with Se, the use of ZnMgO_x buffer layers for conduction band offset tuning and the additional of ultra-thin Te layers.

Ali Abbas (Loughborough University, UK) then gave a presentation on "Characterisation of thin film photovoltaics using transmission electron microscopy". He was looking at devices based on a NSG TEC™ 10/MGO/800 nm CdSeTe/graded CdTe/Cu₂Te/electrode stack and carried out elemental mapping. Carrier lifetimes of 22 ns were reported, higher than the usual 5 ns.

Adam Brunton (M-Solv Ltd, UK) outlined recent laser scribing technologies as part of M-Solv's one-step interconnect (OSI) process for photovoltaics. Conventional module production requires scribing of three tracks (P1, P2 and P3), which are usually done in air at room temperature, but the other processing steps require vacuum or elevated temperatures, meaning the process is inefficient. The OSI process however means that all scribing steps can be done at the end (A, B and P3) by laser from one side, meaning the deposition is uninterrupted. Track A is filled with inkjet-printed insulating material whilst track B is an inkjet-printed metal bridge. The process has been demonstrated for CdTe and Si, and is almost ready for production for CIGS. It is also thought to be feasible for perovskite cells, but not proven.

Edgardo Saucedo (IREC, Spain) discussed the work his group has been doing on kesterite-based solar cells, such as CZTS, primarily as part of the STARCELL European project. Kesterite cells make use of earth-abundant materials with the current record efficiency of 13.9% reported by DGIST, though not yet published. Challenges include secondary phase formation with a narrow compositional zone for single-phase materials and Cu and Zn exchange disorder, along with multi-valent Sn resulting in a

large VOC deficit. Edgardo also reported on their work looking at the substitution of Sn with Ge and their recent 11.8% cells.

Alex Ganose (University College London, UK) gave a short talk on earth-abundant and non-toxic V-VI-VII semiconductors for solar cells, namely bismuth chalcogenides. He focussed on BiSrl and BiSel, showing their band line-ups with common electrode materials.

Devendra Tiwari (University of Bristol, UK) outlined the development of solution-processed sustainable thin film solar cells. Solution-processed devices could potentially lead to cheaper devices. His group looks at a variety of PV absorber materials, including CZTS, BiFeO₃, CIS, etc. He presented some recent work done on Na and Sb dopants in CZTS to try to reduce the formation of secondary phases. Recent fully solution processed devices have been demonstrated with 4% efficiency for BiFeO₃ and 2% for Cu₂SnS₃.

Alan Delahoy (New Jersey Institute of Technology, USA) gave a presentation on his work with hollow cathode sputtering (HCS) for transparent conducting oxides and window layers. With HCS, a high argon flow is used and oxygen is injected outside of the cathode, avoiding the hysteresis effect caused by target poisoning. The pressure is also higher than magnetron sputtering and so the system only requires mechanical pumps, rather than more expensive turbo pumps. He reported on results in CdSeTe devices using ZnMgO_x layers and described the multiple functions of the CdS layer in devices. He finished his talk by showing results of doped CdO for use as an alternative TCO layer and claimed it could achieve similar sheet resistance of FTO with only a third of the thickness.

The final talk of the day was from David Bushnell (Oxford Photovoltaics Ltd, UK) on perovskites for thin film photovoltaics. He reported on recent work at Oxford PV on two terminal (2T) monolithic tandem Si/perovskite cells and the success they have had with passing IEC 61646 reliability testing. Tandems have an increased cost compared to single junction devices, but it was shown they could have a lower cost per watt. A lot of modelling work has also been done looking at the effect of changes in solar spectrum with tandem cells. Efficiencies of 22.7% were achieved with small cells and 22.6% with larger devices. 156x156 mm cells have also been produced at their demo line in Germany. It was suggested that perhaps in the future they might move to all perovskite cells.

Overall, the event was well attended, with over 60 delegates present - primarily academia, but with some representatives from industry.

University of York Postgraduate Conference

Steven Thomas

The physics postgraduate conference was held on Thursday 20th and Friday 21st September, and involved a plethora of activities including talks and posters for PhD students to enjoy. It is the one time in the social calendar that students from all the different physics research groups - condensed matter, nuclear, laser-plasma and biological physics - can get together and showcase their research, which is exactly what they did. Even some of the new postgraduates came along, many of whom hadn't been at the university for much more than a week, giving them inspiration for where they could be in a year's time.

A previous alumnus of the University of York, Dr Chris Kelley, opened the conference with an excellent presentation entitled "After a York PhD" in which he showcased some of the places he'd been and people he'd worked with since obtaining a PhD in physics. His presentation included a strong focus on the transferable skills and qualities that he obtained outside of specific subject and research knowledge. This was complimented nicely by a careers workshop provided on day two of the seminar from Andrew Hirst which covered some useful tips about the subtle changes in CVs and the application process for jobs in industry compared with those in academia.

The main bulk of the conference consisted of contributions from our Physics PhD students. The rest of day one was filled with ten-minute talks on the student's research area, with subjects from the world's largest and most powerful lasers to new modelling and imaging techniques of DNA in the human body. Day two kicked off with a more relaxed atmosphere during the poster session, where again students could showcase, explain, and discuss their research, with talks throughout the afternoon.

We were fortunate this year to have the event sponsored by various Institute of Physics (IoP) groups, and one private company. Our sponsors for the event were:

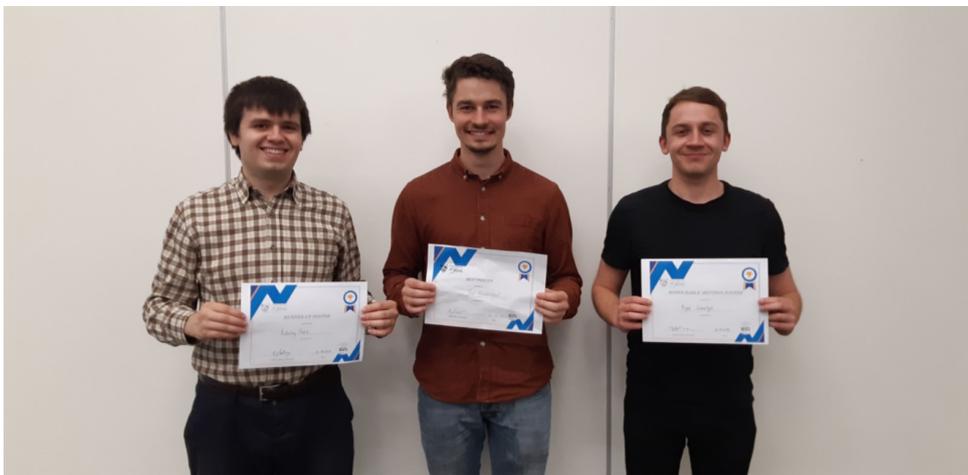
- Ion and Plasma Surface Interactions group - Nanoscale Physics and Technology group
- Nuclear Physics group - Plasma Physics group - Shock Wave and Extreme Conditions group - Unitive Design & Analysis Ltd (London)

Sponsorship enabled us to provide refreshments such as teas, coffees and biscuits throughout the conference, for which we are hugely grateful. We were also able to provide sponsored prizes for the best talks and posters. There were seven awards in total: three for posters and four for talks. The winners were:

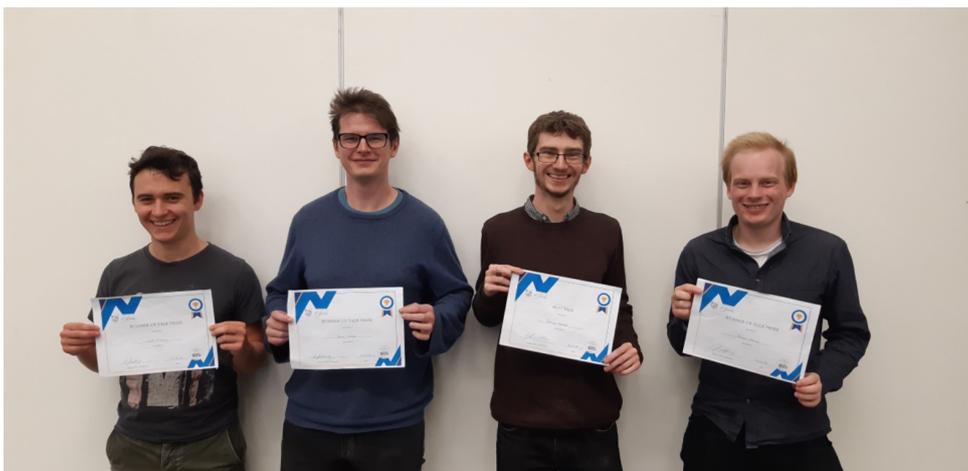
- Best poster prize – Joshua Boothroyd. Poster title: Potential method to measure atomic chlorine reactivity in ambient air
- Runner-up poster prize: Ashley Poole. Poster title: Temperature measurement in opaque shocked solids using x-ray diffraction

- Honourable mention poster prize: Ryan Llewellyn. Poster title: Isospin symmetry and nucleon collectivity in the neutron-deficient $A=80$ region
- Best presentation prize: George Watson. Title: Molecular dynamics of super coiled DNA mini circles
- Runner up presentation prizes:
Daniel Clarke – Magnetic hyperthermia in medical applications
Stuart Morris – Bremsstrahlung characteristics in focussing plasma mirror experiments
William Trickey – A shock ignition scheme using an x-ray driver for inertial confinement fusion

Congratulations to all the prize winners.



Poster prize winners.



Presentation prize winners.

A big thank you should be expressed to Nicola Farthing who worked tirelessly to organise the event. The physics postgraduate conference certainly wouldn't have come

IPSI Early Careers Researchers' Meeting, 14th June 2018

John Colligon

The 2018 conference was held at Huddersfield University and organised by the IoP IPSI group with support from the Tribology and Thin Films And Surfaces Groups. We are very grateful to all participating groups for this support which enabled the event to be free to attend. The programme of this event is given below:

“PLASMA SURFACE INTERACTIONS AND APPLICATIONS FOR COATINGS AND TRIBOLOGY”

14th June 2018; Bronte Lecture Theatres. Room BLG10, University of Huddersfield, HD1 3DH Sponsored by the IPSI, TFSG and Tribology Groups

Invited talks by established researchers

Session chair: Prof John Colligon

- 10.35 Rob Harrison, *University of Huddersfield*, A New in-situ Dual Ion Beam System for Investigation of Ion Implantation and Damage
- 11.05 Roger Webb, *University of Surrey*, The UK National Ion Beam Centre – what it is and what it can do for you
- 11.35 Tomasz Liskiewicz, *University of Leeds*, Functional DLC Coatings for Tribological Applications
- 12.05 P. Eh. Hovsepian, *National HIPIMS Technology Centre, Sheffield Hallam University*, Tribological Performance of Superlattice Structured Coatings Deposited by High Power Impulse Magnetron Sputtering
- 12.35 AGM of the Ion and Plasma Surface Interactions Group
- 12.45 *Lunch and poster session*

Young Researcher talks

Session chair: Samuel McMaster

- 14.00 Z. Thompson, *University of Leeds*, Effect of Humidity on the Lubricity and Lifetime of MoS₂ in Nitrogen Environments
- 14.15 Frank Danganan, *University of Leeds*, Influence of Substrate Surface Roughness on The Characteristics of MW-PECVD DLC Coating on 3D Printed Polymers
- 14.30 A. H. Gaddah, *Manchester Metropolitan University*, Titanium dioxide coated fly ash

- 14.45 Emily McNulty, *University of Leeds*, Characterisation of Silicon-oxide coatings
- 15.00 *Tea break*

Session chair: Samuel Capp

- 15.15 Samuel Capp, *Manchester Metropolitan University*, Photocatalytic Activity of coatings prepared By Magnetron Sputtering For Future use In Non-Thermal Plasma Reactors
- 15.30 Samuel McMaster, *University of Leeds*, Nanomechanical and Impact-Erosion Characterisation of DLC Coating Systems
- 15.45 *Poster prize winner announcement*
- 16.00 *Close*

Posters were assessed for the IPSI group Poster Prize whilst the oral presentations were assessed for a second prize courtesy of Huddersfield University. The overall standard of presentation was excellent and, after much deliberation, Samuel Capp and Sam McMaster were awarded prizes for their talks. The Poster Prize winners were Emily McNulty and Frank Dangan. Several students expressed their appreciation for this event and we hope that we can increase the number of delegates for the next conference at the new IoP London headquarters in June 2019!

The Committee

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