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Welcome from the Treasurer

Dear members, this year has been extremely difficult for the whole world due to the COVID-19 pandemic. It has changed the way we live and has also made us aware that things can change unexpectedly. Our condolences to our fellow members and wider community who are reeling with loss and tragedy due to COVID-19.

This year, we had to cancel or reschedule our supported conferences. Our flagship biennial Interdisciplinary Surface Science Conference (ISSC) is going to be held as a virtual event on Apr. 19-21st, chaired by Prof Neil Curson, University College London. As always, we are expecting to have an outstanding array of invited speakers covering

a wide range of experimental and theoretical aspects of surfaces, interfaces and nanoscale physics and chemistry.

We are expecting to organise our first full virtual Annual General Meeting (AGM) in the second quarter of 2021, with new committee posts being elected. Any member of the TFSG is eligible to stand for a post. If you wish to take an active role in the TFSG, attending the AGM is a great place to start. Invitations and details on how to attend will be sent to all members by email.

In this edition, to support collaboration between diverse research fields connecting Thin Film and Surface Sciences, we have an article on *Diamond-II upgrade: proposal and planning*. It is going to impact a lot to this community due to the

planned “dark period” of about 18 months when the Diamond facility will not be operational. Further details are included in the Facilities section.



With Covid vaccination already started, we are looking forward to a bright start to the new year. Stay safe and best wishes for 2021.

Dr Santanu Ray
TFSG Treasurer
Surface Analysis
Laboratory, University
of Brighton

TSFG Student and Early Career Bursaries

The Institute of Physics (IoP) provides financial support to research students to attend international meetings and major national meetings.

Research Student Conference Fund (RSCF) bursaries* are available to PhD students who are a member of the Institute and of an appropriate Institute group. Students may apply for up to £300 during the course of their PhD and 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.

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. All recipients are asked to produce a report on return from their conference before receiving payment. For details and application form please look at http://www.iop.org/about/grants/travel-bursaries/page_69141.html.

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

FUTURE EVENTS

- **Mar 29-31:** [Faraday Joint Interest Group Conference](#)
- **Apr 19-22:** [Interdisciplinary Surface Science Conference](#) (ISSC-23)
- **Jun 9:** [Plasma Surfaces and Thin Films](#), London
- **Jun 21-23:** [Condensed Matter and Quantum Materials](#) (CMQM)
- **Jul 19-21:** [UK Colloids](#)
- **Aug 31-Sept 4:** [EPS Condensed Matter Division \(CMD\) conference](#)

2020 David Tabor medal and prize

Prof. Alexander Shluger, University College London, has won the 2020 David Tabor medal and prize for the development of new theoretical models of defects at the surfaces and interfaces of insulators and mechanisms of imaging and manipulation of surface atoms and molecules using atomic force microscopy (AFM). As one of his major contributions to surface science, he pioneered using computer modelling to understand mechanisms of high-resolution AFM imaging of insulating surfaces, and developed many of the currently accepted computational methods and theories. For further information, please have a look at the following link:

<https://www.iop.org/about/awards/2020-david-tabor-medal-and-prize>



Prof Alexander Shluger, Department of Physics and Astronomy, University College London

New TFSG webpage

It is a pleasure to announce that our new IOP webpage is now live! Please have a look at the following link for information about the group's activities, upcoming events, and more: <http://tfsg.iop.org/>

Woodruff Thesis Prize 2019 Winner

In November, the Thin Films and Surfaces Group committee were delighted to award the Woodruff Thesis Prize for 2019 to Dr Veronika Sunko from the University of St. Andrews for her PhD Thesis entitled "Angle resolved photoemission spectroscopy of delafossite metals". Her research involved angle resolved photoemission spectroscopy (ARPES) experiments on several delafossite oxide metals and theoretical work explaining the observations.

The delafossite metals are crystalline solids with exotic electronic properties. Veronika's measurements revealed unexpected electronic behaviour, which could not be explained in terms of standard pictures of electron behaviour in a periodic potential. Her theoretical work was then able to identify its origin as a Kondo-like coupling effect. Similarly, measurements and analysis of the surface states demonstrated large Rashba-like spin-splitting, which she showed arises as a consequence of the large energy scale of inversion symmetry breaking at the surface, that is in turn a consequence of the unusual structure of the transition metal oxide layer.

Although hers was nominally an experimental PhD, the committee was particularly impressed by the theoretical understanding that was also developed in order to interpret the results, which included collaborations with leading theoretical groups and on constructing intuitive interpretations. Her thesis work is associated with 15 journal publications, including first author publications in *Nature* and *Science Advances*, as well as other prestigious journals including *Proceedings of the National Academy of Sciences* and *npj Quantum Materials*.

More generally, the committee was very impressed by the exceptional standard of all the nominations this year, which shows the quality and diversity of our field. We very much hope it will be possible for Dr Sunko to speak at the next Interdisciplinary Surface Science Conference, in 2021.

Dr Andrew Jardine
TFSG Chair, University of Cambridge



Dr Veronika Sunko, University of St Andrews and Max-Planck-Institute for Chemical Physics of Solids

Call for Nominations for the Woodruff Thesis Prize 2020

Nominations for the Woodruff Thesis Prize 2020 are now open, with a closing date of 30th April 2021. The Woodruff prize is awarded annually for the best PhD thesis completed by a student member of the TFSG group in the stated year. The value of the prize is £250 and is established to encourage and recognise high quality research and scientific writing in the field of thin films and surfaces. Further information, is available online at the following IOP link:

<https://www.iop.org/physics-community/special-interest-groups/thin-films-surfaces-group/woodruff-thesis-prize>

Call for Contributions to the TFSG 2021 Summer Newsletter

The Thin Films and Surfaces Group are looking for news contributions towards their 2021 Summer Newsletter. Content could be related to TFSG and/or the UK surface science community in general. Contributions around any achievement or issues faced and overcome during the COVID-19 pandemic would also be welcome.

Please send up to half an A4 side, preferably including a relevant photograph, by May 2021, to our newsletter editor, Dr Theodoros Papadopoulos, at t.papadopoulos@chester.ac.uk. Previous newsletter issues can be found on the Group's IOP webpage: <http://tfsg.iop.org/>.

ICONN '21 Virtual Workshop

This virtual meeting builds on the ICONN series of conferences that are held regularly in Pakistan with significant UK participation. The topic is Nanoscience, ranging from fundamental physics and chemistry to applied biosciences and medicine. What makes our meeting different is that it is for students, by students. Most of the presenters will be postgraduate students, and the talks will be aimed at a general scientific audience, not just subject specialists.

The meeting will be held on Feb. 2-4th, 2021, using Zoom, with 3-4 parallel sessions each day. Participants are encouraged to sample multiple sessions! Each session will have a theme, such as Bio-Nanoscience or Machine Learning, and will be chaired and scheduled by the session organisers. We expect each session to have 8-10 ten-minute talks with plenty of discussion; one of the aims of the workshop is to build links between students with similar interests.

- **What can I do?** Volunteer to give a talk and/or help organize a session.
- **How can I do this?** Contact and give your research topic to w.schwarzacher@bristol.ac.uk
- **What's in it for me?** As a presenter or session chair, you will gain valuable experience that looks good on your CV. As a participant you will be entertained, learn more about a wide range of current research in nanoscience and make new international contacts.

Further information at: <https://events.iop.org/iconn-21-line-students-students>

Prof Walther Schwarzacher
Department of Physics
University of Bristol

Memorial for Prof. Pat Thiel and Prof. Ward Plummer

It is with great sadness that the Surface-Science community was informed of the passing away of [Prof. Pat Thiel](#) of Iowa State University, and [Prof. Ward Plummer](#), of Louisiana State University, both with many collaborators in the UK community. They will greatly be missed by family, friends and colleagues!

Facilities relevant to TFSG

Diamond-II upgrade: proposal and planning

Diamond Light Source is planning a major machine upgrade called Diamond-II. There will be a “dark period” of about 18 months when the facility is not operational. There are several flagship beamline projects being proposed as part of the Diamond-II upgrade. These are proposals for new beamlines, rebuilt beamlines or major upgrades of existing instruments. These projects are currently being developed with Diamond's user communities and by reaching out to new users and fields. Further details on the Diamond-II proposal and flagship beamline projects are available on the Diamond website: <https://www.diamond.ac.uk/Home/About/Vision/Diamond-II.html>

The Centre for Photonics Expertise new coating development facility

The [Centre for Photonics Expertise](#) (CPE), a pan-Wales team from four Welsh universities draws on leading academic capabilities offering light-based technological solutions to businesses across Wales at no cash cost to the company. It aims to support and accelerate business growth by encouraging engagement between academia and industry to support the development of new processes, products or systems to market. CPE has just opened its new thin film coating development facility in St. Asaph, Wales, and the facility is available predominantly to businesses in West Wales and the Valleys to develop the next generation of thin film and other coating-based products. The key capital equipment includes:

- The SyruPro 1350 coating machine. The SyruPro is the industrial standard coating plant for high precision optics, allowing for both process development and straight to production research and development. The 1350cm wide chamber has two multi socket electron beams guns, thermal sources, plasma Ion assisted deposition for increase film density, and both quartz crystal microbalance and optical monitoring for precise thickness control. It also has high uniformity planetary substrate holders, as well as the option of high capacity calotte.
- An Agilent Cary 7000 spectrophotometer. The Cary 7000 capable of measuring diffuse scattering, reflection or transmission through independent sample rotation (360 deg.) and detector positioning (10-350 deg.) at 0.02-degree intervals. It is capable of measuring wavelengths

from the UV to the far infrared (175 to 3300 nm).

- An environmental chamber for the environmental testing of thin films, coatings and products, capable of temperatures from -70°C to +150°C, as well as relative humidity of 0 to 98%.

For information regarding collaboration or access to the equipment, please contact Carole Eccles at Carole.Eccles@glyndwr.ac.uk



Part of the CPE facility at St. Asaph, Wales.

Researcher Profile

I have had an interest in the interaction of molecules with metal oxide surfaces since my PhD studies, specifically with regards to the interaction of materials with the biological environment. The biomolecule-surface interaction is a key component of any interaction of a biological system with a metal, since in most cases the metal will be oxidized and before any cells start to colonise the surface water and small biomolecules are likely to be deposited on the surface. Understanding these interactions may offer an insight into how to engineer surfaces to improve healing rates. The arrival of near-ambient pressure photoelectron spectroscopy and sum-frequency spectroscopy instruments in Manchester is allowing us now to probe ‘wet’ interfaces, much more relevant to biomedical devices.

My interest in the area of metal/metal-oxide biomolecule interactions and biomaterials surfaces has led to a long-standing collaboration with colleagues in the School of Dentistry at the University of Man-

chester looking at the surface chemistry of dental implants and nickel-titanium (NiTi) alloys used in arch-wires (braces),

More recently my group has begun a collaboration with clinicians, in trying to understand and control the corrosion on NiTi alloy oesophageal stents used for cancer patients. These stents are used to help patients maintain a normal life in cancers where constriction of the oesophagus may occur. NiTi is a superelastic alloy and can respond well to the peristaltic wave. However, the success of modern chemotherapy treatments means that patients are living longer, and corrosion of the stents is occurring, leading to invasive surgery to remove the parts. The aim is to produce a new standard test for the viability of NiTi wires used in the stents, and to allow surgeons to choose stents based on these standards.

Finally, in these strange times we can't ignore the Covid-19 pandemic and the role that surface science can play. At the beginning of the pandemic a paper was published showing Covid-19 survival rates on a number of surfaces and this work is still one of the main ones in considering materials to use to prevent fomite transmission (i.e. transmission from an object). However, many viruses are able to remain active on surfaces, and we are now working with virologists and materials scientists to try to understand how viruses are deactivated on surfaces as well as to model the effectiveness of detergents on different surfaces, in order that we may be able to design coatings or materials which will rapidly deactivate viral particles.

Dr Andrew Thomas
*Department of Materials Science, Photon Science
Institute, University of Manchester and Sir Henry
Royce Institute*



*Dr Andrew Thomas, Department of Materials
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