

Thin Films and Surfaces Group

Newsletter



Comments from the Chair

Chris to write something here Welcome to the first TFSG Newsletter of 2004 and let me wish you all, a somewhat belated, Happy New Year. We will continue to publish both summer and winter issues of the Newsletters to keep you updated with activities and developments within the TFSG and in the Institute of Physics.

Since our last newsletter, much has happened in the world of thin films and surface science, with perhaps the most important issue relating to the divisional structure within the IoP. As many of you will know the TFSG was for many years affiliated to both the Surface Science and Technology (SST) division and the Condensed Matter and Materials Physics (CMMP) division. At the last AGM it was resolved that in the light of developments within the field (including the establishing of a new Nanoscale Physics and Technology group) the TFSG's interests would best be served within the CMMP division. Since that time a much wider debate regarding the role of the divisional structure within IoP has followed (and continues), and I have detailed the reasoning behind this decision and the current situation in this issue.

Scientifically it has also been a busy period, with reports from the ECOSS-22 conference in Prague, and a Modelling in Solid State Chemistry workshop. We also look forward to this year's CMMP meeting to be held at The University of Warwick from 4th-7th April, where we are supporting 4 symposia (one jointly with the Nanoscale Physics and Technology group). We are also holding this years group AGM in Nottingham at the SSUK supported meeting on the *Structure of Solid Surfaces* on 24th March, and I hope as many of you as possible will be able to attend. There are several people stepping down from the committee this year and so we are looking for new blood! If you are at all interested in standing for election to the committee then please contact Wendy Brown or myself directly.

Finally all that remains is for me to thank the people who have again given of their time and effort to the TFSG activities, in particular Martin McCoustra (Nottingham) who has again done an excellent job to produce this issue of the Newsletter. We will aim to have this issue, and several back issues, available on the new group website Adrian Wander (Daresbury Laboratory) has designed and updated (<http://www.cse.clrc.ac.uk/cmgi/NETWORKS/TFSG/index.shtml>). Please do let us know if there is anything you would like to see included in the Newsletter.

I hope to meet you at a TFSG supported meeting in 2004.

Dr. Chris McConville
(Chair, TFSG)
Department of Physics, University of Warwick
(C.F.McConville@warwick.ac.uk)

Contents

Conferences

Support for Meetings and Conferences	3
Diary	
AGM	3
Structure of Solid Surfaces	3
CMMP 2004	3
Plasmas, Surfaces and Thin Films	5
Student Bursaries	6
Conference Reports	
22 rd European Conference on Surface Science	6
Modelling in Solid State Chemistry Workshop 2003	8

Articles

TFSG and the Surface Science and Technology Division	9
The IOP and Your Career	
On-line Careers' Discussion Forum	9
Career Break Support	9

Committee and Contact Details

10

Further details of the group and its activities, including an up to date diary of supported meetings and conferences, are to be found on our website at <http://www.cse.clrc.ac.uk/cm/NETWORKS/TFSG/index.shtml>.

Support for Meetings and Conferences

The committee is very happy to offer the support of the TFSG to any meeting or conference in the relevant areas of thin films and surface science organised by the UK scientific community. We would also welcome suggestions from group members for topical one-day meetings that the TFSG could organise alone or in collaboration with other IOP subject groups. If you are organising a meeting or conference and would like to find out if support is available or if you have an idea for a topic meeting, please contact Dr. Wendy Brown (TFSG Secretary).

Dr. Wendy Brown
(Secretary TFSG)
Department of Chemistry, UCL
(w.a.brown@ucl.ac.uk)

Diary

The following meetings will be of interest to group members and have been organised with the support of the TFSG.

Annual General Meeting (AGM) of the Thin Films and Surfaces Group

This will take place on Wednesday, March 24th 2004 at lunchtime during the one-day meeting *The Structure of Solid Surfaces* to be held at the University of Nottingham (see details below). Further details relating to the timing and location of the AGM will be sent out shortly but can also be obtained from Dr. Wendy Brown (TFSG Secretary). New TFSG committee members will be elected at the AGM. If you would like to serve on the committee and would like to nominate yourself, or someone else, for election to the committee, please contact the TFSG Secretary, Dr Wendy Brown (w.a.brown@ucl.ac.uk), with details of your **nomination by Friday 27th February at the latest.**

The Structure of Solid Surfaces

School of Chemistry, University of Nottingham
Wednesday 24th March 2004

The Solid Surfaces Group of the Royal Society of Chemistry will be holding a one-day meeting on the *Structure of Solid Surfaces* in the School of Chemistry of the University of Nottingham which the Thin Films and Surfaces Group will be supporting. So far, the following have agreed to speak at the meeting;

Dr. Georg Held
(Department of Chemistry, University of Cambridge)

Professor Rasmita Raval
(Department of Chemistry, University of Liverpool)

Professor Geoff Thornton
(Department of Chemistry, UCL)

Contributions are welcomed from members of the Solid Surfaces Group of the RSC and from members of the Thin Films and Surfaces Group. Details of the meeting can be obtained from Professor R. G. Jones (robert.g.jones@nottingham.ac.uk).

Condensed Matter and Materials Physics (CMMP) 2004

University of Warwick
4th – 7th April 2004

CMMP is the major national conference organised by the Condensed Matter and Materials Physics Division of the IoP. This coming year it will be held at the University of Warwick and will run from 4th-7th April. The TFSG, as an affiliated Group of this Division, will be sponsoring and co-sponsoring a total of four symposia at this meeting. The symposia, organisers and details of speakers, where available at this time are:

Theory of Surface Processes

(Professor S. Holloway and Dr. W. Hofer, University of Liverpool)

Invited Contributions
<i>News – Anderson Model for Chemicurrents: The Spin Phase Transition</i> D. Bird (University of Bath, UK)
<i>With ab initio to the Mesocale? Challenges and Prospects for the Modeling in Heterogeneous Catalysis</i> K. Reuter (Fritz-Haber-Institut, Germany)

Organic & Inorganic Thin Films: Surfaces and Multilayers

(Professor N. V. Richardson, University of St. Andrews
and Professor T. S. Jones, Imperial College)

Invited Contributions
<i>Growth Dynamics of Organic Semiconductors</i> F. Schreiber (University of Oxford, UK)
<i>Interface Formation of Organic Layers with Inorganic Semiconductors and Metals</i> D. Zahn (Technische Universität Chemnitz, Germany)

Self-Assembly on Surfaces

(Professor S. D. Evan, University of Leeds and Professor R. Raval, University of Liverpool)

Invited Contributions
<i>Writing with Molecules on Molecular Printboards</i> D. Reinhoudt (University of Twente, The Netherlands)
<i>S-layers as Basic Building Blocks for a Molecular Construction Kit</i> U. Sleytre (University of Vienna, Austria)
Submitted Contributions
<i>Hydrogen-bond Mediated Self-assembly of Nanoscale Templates on Silicon</i> P. Beton (University of Nottingham, UK)
<i>Self-assembled Monolayers and Their Impact on the Electrical and Morphological Properties of Indium Tin Oxide Electrodes</i> S. Khodabakhsh
<i>Functionalised Self-assembled Monolayers on Si/SiO₂</i> P. Mendes
<i>Phase Transitions of Thiol-Based Self-Assembled Monolayers</i> F. Schreiber (University of Oxford, UK)

Atomic Manipulation

(Dr. P. Moriarty, University of Nottingham and Dr. R. Smith, Loughborough University)
(Joint Session with the Nanoscale Physics and Technology Group)

Invited Contributions
<i>Ripening Processes in Supported and Pinned Nanoclusters</i> R. Bennett (University of Reading, UK)
<i>Scanning Tunnelling Microscopy and Quantum Computation</i> M. E. Hawley (Los Alamos National Laboratory, USA)
<i>Integral Atomic Layered Crystals Grown within Single Wall Carbon Nanotubes</i> A. I. Kirkland (University of Oxford, UK)
<i>Mode-Selective Cleavage of a Single-Bond with STM</i> J. I. Pascual (Institut de Ciència de Materials de Barcelona, Spain)
<i>Nanoindentation, Nanoviscoelasticity and Nanofriction</i> A. Richter (University of Applied Sciences, Germany)
<i>The Control and Manipulation of Surface Properties on the Nanoscale: From High-Density Data Storage to Nano-Patterning</i> S. Wilks (University of Wales Swansea, UK)

Members of the TFSG are encouraged to support these symposia, and CMMP in general. If you'd like further information on any of these symposia, please contact the organisers directly.

Plasmas, Surfaces and Thin Films

Institute of Physics, 76 Portland Place, London
Wednesday 9th June 2004

Ion & Plasma Surface Interactions Group of the Institute of Physics are organising a one day meeting entitled Plasmas, Surface and Thin Films at the Institute of Physics headquarters in London. The Vacuum Group and the Thin Films and Surfaces Group are co-sponsoring the meeting. Professor Michael Walls (michael.walls@applied-multilayers.com) is organising the meeting and further details may be obtained from him. The programme includes the following presentations

Understanding Reactive Sputtering Processes

Soren Berg
(Uppsala University)

Development And Applications Of Hitus Technology

Mike Thwaites
(PlasmaQuest)

High Rate Atmospheric Plasma Deposition Of Structurally Well-Defined Functional Coatings

Jas Pal Badyal
(Durham University)

Modeling Of Ion Erosion And Plasma Deposition

Roger Smith
(Loughborough University)

Roll To Roll Vacuum Processing - From Packaging To Displays.

Alf Smith
(General Bobst Group)

Further 10-minute contributions and a limited number of poster presentations are invited. A title should be sent before 2nd April 2004 to:

Maureen McKenzie
Department of Physics
Loughborough University
Leicestershire
LE11 3TU

Telephone: 01509 228409, Fax: 01509 223986, e-mail: m.mckenzie@lboro.ac.uk

Student Bursaries

We are happy to encourage postgraduate students to apply for bursaries to assist their attending major national and international conferences. To be eligible for a bursary, applicants must be a student member of the TFSG or the SSUK group of the RSC and be presenting a talk or a poster at the conference. In addition, bursary recipients will be expected to prepare a one-page report on the conference that they attended for the TFSG Newsletter. Student members of the group interested in applying for a bursary to attend a conference should contact Dr. Georg Held (Department of Chemistry, University of Cambridge) for further details. Application forms can be downloaded from the group website (<http://www.cse.clrc.ac.uk/cm/NETWORKS/TFSG/index.shtml>).

Dr. Georg Held
(Bursary Co-ordinator TFSG)
Department of Chemistry, University of Cambridge
(gh10009@cam.ac.uk)

Conference Reports

22nd European Conference on Surface Science (ECOSS 22)

(Prague, Czech Republic, 7th-12th September 2003)

The scope of surface science nowadays ranges from reactions of small adsorbates on single crystals to nanotribology. ECOSS 22 was the perfect environment to provide an insight on new scientific breakthroughs and advancements. This year the conference was held from September 7-12, in Prague, which is famed for its stunning backdrop of towering churches and centuries-old bridges and alleyways.

The conference was organised as 4 parallel sessions for oral presentations and 2 very full poster sessions over five days. In addition, the programme included 4 plenary lectures and 10 invited talks. The first plenary lecture given by Dr. F. Netzer was of particular interest, and focused on the growth of oxide nanostructures on various metal surfaces. The invited talk by Professor H. Ueba was also very informative and covered the theory behind single molecule manipulation with an STM tip, which is of particular interest to me since I am planning to investigate the molecular vibration of a molecule on an oxide surface.

The TFSG bursary not only allowed me to attend ECOSS 22, but also gave me the unique opportunity to present a talk entitled *Single Molecule Vibrational Spectroscopy of N₂ on Cu(110)* to

the wider surface science community. This work introduces interesting results on the vibrational properties of a nitrogen molecule adsorbed on Cu(110) by using a recently implemented method. By employing a STM tip, it is feasible to obtain a vibrational spectrum of a single molecule via an inelastic tunnelling process. This conference also provided a forum where leading researchers and students could meet and exchange ideas.

This year a panel discussion was newly added to the scientific programme, whose principal subject was *Sn and Pb on Si*. Reducing registration fees for the ECOSS 22 encouraged the participation of young scientists. The organising committee also allowed a half-day for social activities and organised the conference dinner in the Municipal House, which is Prague's most prominent *art nouveau* building.

Unfortunately, it was not possible to attend all the talks due to the variety of topics. But, the presentations I attended have helped me perceive future directions and innovations in the field of surface science. Overall this conference was successful and I personally gained by networking with experts and learning about different techniques in current and innovative research. The organising committee and, in particular, ICARIS, were very helpful for solving minor problems.

Finally, I would like to thank the TSFG for awarding this bursary to me, which allowed me to attend ECOSS 22.

Lydie Leung
(Postgraduate Student)
Department of Chemistry, University of Manchester

ECOSS is the premier gathering of surface science researchers from Europe and beyond, and is a forum for a wide range of fundamental surface science. This year's ECOSS was held in the city of Prague in the Czech Republic, (just around the corner from where Einstein lived). Attending ECOSS gave me an unparalleled opportunity to hear about the latest discoveries and innovations in the field and to meet and network with researchers from across Europe.

The scientific program comprised over six hundred contributions, with two hundred talks given over four parallel sessions, as well as two poster sessions. In a new departure for ECOSS, space in the program was also made available for a number of panel discussions on current topics. In particular the organisers made a special effort to encourage the participation of young scientists. Rather than presenting a small number of bursaries, a substantially reduced student registration fee was offered, allowing more than 130 students to attend and present work.

The breadth of the program was considerable and gave me the opportunity to learn about a wide range of subjects, including some highly specialized areas I would not otherwise be exposed to. In particular the session on nanotribology gave a fascinating glimpse into this emerging field; a particular highlight of this session was a very stimulating overview given by Joost Frenke (Leiden University). Other particular highlights were plenary lectures on surface plasmon photonics and imaging of insulating oxide surfaces. The opportunity to hear a number of talks on the subject of surface stress has also illuminated my own work considerably.

The generous support of the thin films and surfaces group not only allowed me to attend this conference, but also gave me the opportunity to present some of my recent work in the form of a poster, *Ni(110)c(2x2)-CN: Evidence for a Surface Reconstruction* describing a novel, adsorbate induced reconstruction of the surface. Attending ECOSS was a great opportunity for me as it not only allowed me to present my work to an international audience, but also to discuss it with a wide variety of researchers. I was very gratified to be placed in a shortlist of seven for the ECOSS prize.

The social program was no less all encompassing. The welcome party at the Staropramen brewery ensured we were all introduced to Prague's finest commodity, The culmination of the social program was the conference banquet, held in the splendid art nouveau metropolitan house in the center of Prague.

I should like to thank the TFSG for their bursary, which facilitated my attendance at a very stimulating and enjoyable conference.

Ben Daniels
(Postgraduate Student)
Department of Chemistry, University of Manchester

Modelling in Solid State Chemistry Workshop 2003

(Torino, Italy, 7th – 12th September 2003)

The MSSC2003 *Ab Initio* Modelling in Solid State Chemistry workshop conducted by the Theoretical Chemistry Group of the University of Torino was held from the 7-12th September 2003 in Torino, Italy. The school was an introduction to the use of the widely distributed CRYSTAL software, a program used for the study of crystalline and defective solids and surfaces. The latest version, CRYSTAL2003, was used as a reference for the teaching. The number of participants was restricted to 40 where I was fortunate enough to be accepted for a place.

The course was structured into morning lectures followed by afternoon practical sessions. The lectures addressed the fundamental concepts used in the *ab initio* code. Talks that I found particularly relative to my area of interest were by C. Pisani, *From Bulk to Surface: Relaxation and Reconstruction*, and R. Orlando, *Spin Densities and Related Quantities in Paramagnetic Defects*. The hands-on tutorial sessions consisted of example problems which we had to solve using the software. These sessions were well structured involving step-by-step instructions to problems which catered for both beginner and more advanced users of the programme. The introductory sessions were general enough to be relevant to all research areas in the field and the choice was given to take the available advanced tutorials. I chose to undertake the "Surfaces and Catalysis" and "Defects in crystalline materials" advanced tutorials. The demonstrating staff were extremely helpful and I was able to find more efficient ways of running the software as well as increasing my knowledge of the software capabilities, so that the sessions were directly applicable to my research.

Posters were put up at the beginning of the week for the poster session where I presented my poster on *Magnetic Carbon*. The posters were left on display until the end of the school which meant that the poster session was not restricted to a couple of hours but continued throughout the week during the tea and lunch breaks. There was therefore plenty of opportunity for interaction with both the hosts and participants of the school and we were able to exchange important ideas and information and partake in useful discussions.

The co-ordinated social activities were excellent and included a guided tour and sumptuous workshop dinner. The tour was based around the city centre and gave a fascinating insight into the history of Turin. For me, the highlights of this were the Royal Palace, the Mole Antonelliana Tower, and the Cathedral, which houses the Sindone, or holy shroud.

Overall the workshop was a very productive guide to *ab initio* techniques and how they are implemented in the CRYSTAL software as well as a valuable occasion to integrate with CRYSTAL experts and users from a wide range of research areas. I would like to express my thanks to the Thin Films and Surfaces group of the IOP for financial support towards this workshop.

J. Chan
(Postgraduate Student)
Department of Chemistry, Imperial College

The TFSG and Surface Science and Technology Division

At the last AGM of the Thin Films and Surfaces Group in April 2003, there was a tabled discussion relating to the divisional structure within the IoP. As many of you will already know, when the group structure was originally established, the main function of the divisions was to improve collaboration between groups, for example to organise conferences and workshops using the combined expertise and resources of several groups. For several years now the TFSG has been by far the largest group within the Surface Science and Technology (SST) Division, a relatively small division which also included the; Ion & Plasma-Surface Interactions, Polymer Physics, Tribology, and Vacuum groups. Following some discussion as to how exactly the divisional structure affected the workings of the TFSG, the feeling of the members who attended the AGM was that the group as a whole was more aligned with, and would be better served by, being fully within the Condensed Matter and Materials Physics (CMMP) Division. After a vote it was agreed that the Chair would request that this divisional change be made, and this was done in the latter half of 2003. It should also be noted that this decision was made in the light of information that the newly formed Nanoscale Physics and Technology group was also planned to align itself only with the CMMP division. While as Chair, I appreciate that this decision to withdraw from the SST division was made by the committee and a relatively small sub-set of the membership of the TFSG, I firmly believe that it was the right decision for the group.

Since that time, Professor John Colligan (IPSI Group and SST Division Chair) has taken up this matter and has been proposed that the SST division changes its name to become the Applied Physics and Technology Division. This new division may also fit several other groups and he is planning to raise the matter at the next Group Co-ordination Committee meeting in March 2004 to look at the divisional structure as a whole.

Dr. Chris McConville
(Chair, TFSG)

Department of Physics, University of Warwick
(C.F.McConville@warwick.ac.uk)

The IOP and Your Career

On-line Careers' Discussion Forum

The Institute's career website, <http://careers.iop.org> has been developed further to include an open access discussion area. Members are encouraged to post questions or comments and share their own wealth of experience by answering the questions of others. The Discussion Board will be a permanent part of the website and I hope you find it useful in the future.

Career Break Support

The IOP offers a number of services in support of members taking a break in their careers. In the first instance, members on a career break are entitled to a *Reduced Membership Subscription Rate*, which is currently just £10. All you need to do is email membership@iop.org, including your membership ID number in the text, to qualify for this rate.

The Institute's *Career Break Grants* help members to stay in touch with the wider physics community by providing contributions towards attendance and associated costs at conferences *etc.* Members can apply by going to <http://careers.iop.org/resources> or by emailing cbg@iop.org. Of course, members can attend all IOP conferences at a reduced *Career Break Rates for Conferences*.

Alex Byrne
Professional Development Officer

Committee and Contact Details

Chair	<p>Dr. Chris McConville Department of Physics University of Warwick, COVENTRY, CV4 7AL. (c.f.mcconville@warwick.ac.uk)</p>	
Honorary Secretary and Treasurer	<p>Dr. Wendy A. Brown Department of Chemistry University College London 20 Gordon Street, LONDON, WC1H 0AJ. (w.a.brown@ucl.ac.uk)</p>	
Ordinary Members	<p>Dr. Giles Aldrich-Smith Materials Centre, National Physical Laboratory, Queens Road TEDDINGTON, Middlesex, TW11 0LW. (giles.aldrich-smith@npl.co.uk)</p> <p>Dr. Zoe Barber Department of Materials Science University of Cambridge Pembroke Street CAMBRIDGE, CB2 3QZ. (zb10@cam.ac.uk)</p> <p>Dr. Janet O'Brien Pilkington Glass PLC, Prescott Road, St. HELENS, WA10 3TT. (janet.o'brien@pilkington.com)</p> <p>Professor Andrew Fisher Department of Physics and Astronomy, University College, Gower Street, LONDON, WC1E 6BT. (andrew.fisher@ucl.ac.uk)</p> <p>Dr. Georg Held, Surface Science Group Department of Chemistry Lensfield Road CAMBRIDGE, CB2 1EW. (gh10009@cam.ac.uk)</p>	<p>Professor Stephen Holloway Surface Science Research Centre, University of Liverpool, LIVERPOOL, L69 3BX (stephen@ssci.liv.ac.uk)</p> <p>Dr. Jessica Maclean, Quest, QinetiQ Ltd., Malvern Technology Centre, MALVERN, WR14 3PS. (jomaclean@QinetiQ.com)</p> <p>Dr. Philip Moriarty School of Physics and Astronomy, University of Nottingham, NOTTINGHAM, NG7 2RD. (philip.moriarty@nottingham.ac.uk)</p> <p>Professor Peter Weightman Department of Physics University of Liverpool LIVERPOOL, L69 3BX. (peterw@liv.ac.uk)</p> <p>Professor Neville Richardson School of Chemistry, University of St Andrews North Haugh St. ANDREWS, Fife, KY16 9ST. (nvr@st-andrews.ac.uk)</p>
Newsletter Editor	<p>Dr. Martin McCoustra School of Chemistry, University of Nottingham NOTTINGHAM, NG7 2RD (martin.mccoustra@nottingham.ac.uk)</p>	
Webmaster	<p>Dr. Adrian Wander CLRC Daresbury Laboratory Daresbury WARRINGTON, WA4 4AD (a.wander@dl.ac.uk)</p>	