



Materials Update

Issue 2 Spring 2009

School of Materials
The University of Manchester



Professor George Thompson,
Deputy Head of School and Head of the
Corrosion and Protection Centre

Welcome to the Second Issue of Materials Update, the Newsletter from the School of Materials to our network of staff, alumni, students and industrial partners around the World.

Materials Update has been well-received, with much valuable feedback including the wish that the Introduction should focus on different research areas across the School. In this manner, colleagues in the School can be highlighted as well as giving the reader a flavour of the research activities in particular centres.

As Head of the Corrosion and Protection Centre within the School of Materials, I have been asked to pen a few words about our ongoing research. The strategic research maintains its focus on delivering practical solutions, for instance in the energy and transport sectors, with significant cross-School collaboration. The Light Alloys Towards Environmentally Sustainable Transport (LATEST) Portfolio Partnership

is a further cross School initiative; to date, we have held two LATEST Outreach events; the most recent event, which followed on from the Industrial Steering Committee Meeting, was opened by Mark White from Jaguar Land Rover who discussed 'The Sustainability Challenge Facing the Automotive Industry'. Presentations were also made by the postgraduate and published researchers on their technical programmes within LATEST. You can find out more about LATEST at www.manchester.ac.uk/lightalloys

It is also pleasing to record that Professor Scantlebury's research achievements were recognised at the Eurocorr Meeting in Edinburgh that was organised by a committee led by Professor Stuart Lyon.

Do not forget to log on to Your Manchester Online and join the new Materials Network – where you can catch up with friends, link up with local alumni groups in your part of the world, and keep up to date with University reunion events and news. See inside the newsletter for more details.

All the best!

George Thompson

Professor George Thompson

Deputy Head of School and
Head of the Corrosion and Protection Centre



Go Online and Catch Up with Old Friends

The Materials Network has been launched on Your Manchester Online (YMO), the interactive alumni website where you can catch up with friends, link up with local alumni groups in your part of the world, and keep up to date with University reunion events and news!

The Materials Network will allow you to link up with other graduates of the School, post news and discussion topics, and keep up to date with what's going on at the School! We would like you to be more involved too – if you have any news which you'd like posted to the site, or if you would like to have a say in how the network communicates with alumni, then email Fiona at fiona.fraser@manchester.ac.uk

If you haven't already logged onto YMO, you can do so very easily at www.manchester.ac.uk/yourmanchester

Long Lost Thesis Sparks Manchester Memories

Dr Adrian Roberts, alumnus of the University and leading figure in the nuclear engineering industry, has been reunited with a long lost PhD thesis he completed 40 years ago – thanks to the efforts of staff at The University of Manchester

After gaining a first-class honours degree in Metallurgy, Dr Adrian Roberts finished his doctorate in August 1968 before leaving to work at the Argonne National Lab, near Chicago.

During his successful career, Dr Roberts held several senior roles at Battelle, including interim laboratory director at the Pacific Northwest National Laboratory in Richland Washington.

Dr Roberts and Battelle continue to have close links with the University and when staff met Dr Roberts and found out he had misplaced his thesis, they set about tracking one down in the University's archives.

Dr Roberts, who now lives in Portland, Oregon in the United States, said:

"Receiving a copy of my thesis brought back heaps of memories. I recall building complex machines at the back of the Metallurgy Department in a special vibration free basement. The building where the department was

based is now the cafe for the Manchester Museum on Oxford Road.

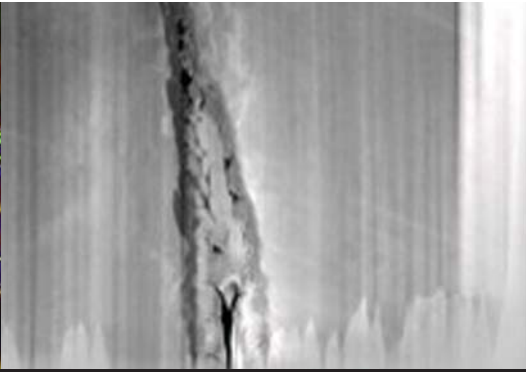
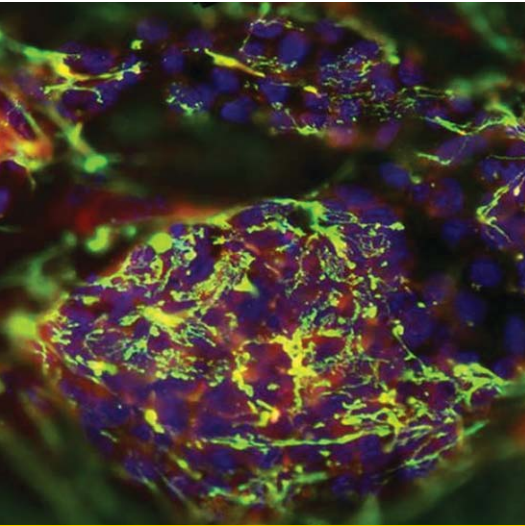
"I recall breaking off for coffee each day at around 10am and reviewing the racing form guide so we could lay our half crown bets on the horses before lunch. There was a betting shop just across the street which was very popular with the students at Manchester.

"The university was small back then with around 5,000 to 6,000 students, so we had small classes and plenty of space in the gym and in the Union. I remember rag weeks as being quite wild with lots of beer and curry and also a 'Bogle' walk from Manchester to Lancaster totalling 50 miles."

If you have memories from your time in Manchester – why not share them with us? Email Fiona at fiona.fraser@manchester.ac.uk and we'll add them to the Manchester Memories section of Your Manchester Online, and maybe use them in the next newsletter!



A new leather bound copy was presented to Dr Roberts during a recent visit to The University by Professor John Perkins, Vice President and Dean of The Faculty of Engineering and Physical Sciences (EPS). L-R: Dr Adrian Roberts; Professor John Perkins



Oxide penetration along slip bands at the tip of a stress corrosion crack in cold-worked 304 stainless steel tested in PWR water (collaboration with Serco).

Sugar Study is Sweetener for Stem Cell Science

Scientists in the School are striving to discover how the body's natural sugars can be used to create stem cell treatments for heart disease and nerve damage – thanks to a £370,000 funding boost.

Dr Catherine Merry, who is leading the research, has been awarded a prestigious New Investigator Research Grant by the Medical Research Council (MRC) to investigate how different cells make different sugar types and to test out theories on how sugars can influence cell behaviour. She explains:

“At present, the way in which cells make these sugars is not well understood. From the little we do know, we believe isolated fragments of these sugars could be used to instruct cells to behave in particular ways.

“We also think we might be able to force cells to make one particular type of sugar and not another, thereby influencing the way in which that cell grows and interacts with other cells.

“This work is important in helping us understand how the sugars made by the cells change during this process.

“We also believe our research might suggest how sugars can be used to help embryonic stem cells grow in the lab – or how they can be instructed to become cell types which could be of use in human therapies to treat problems with nerve, heart muscle or blood cells.

“Although the prospect of creating cells from embryonic stem cells for use in humans is still a considerable time away, research such as ours helps move towards this goal.”

Research within the MPC

The Materials Performance Centre is a research centre aimed at undertaking leading-edge research and skills development to support the nuclear process and plant industries.

The MPC is supported through the EPSRC, industrial research partnerships with the UK National Nuclear Laboratory, NDA, EDF, British Energy and Serco TAS, as well as the wider UK nuclear industry. The MPC draws on academic expertise in corrosion, structural integrity, nuclear graphite, zirconium alloys and materials modelling.

Research programmes are pioneering new approaches for the design and performance of a wide range of materials in nuclear applications, including nuclear waste management, plant life extension and new nuclear build. Improvements in welded joint performance are being addressed through the use of neutron diffraction measurements of residual stress levels, compositional variations and advanced modelling techniques. Better understanding of structural integrity safety margins is being achieved through research into the impact of residual stresses on the fracture behaviour of brittle and ductile materials. Improving the stress corrosion cracking resistance of materials is being addressed through minor alloying additions within research programmes that use high resolution electron microscopy to provide new insights into the mechanisms cracking in PWR water environments (see figure). The use of proton irradiation is providing the ability to study the corrosion properties of fuel cladding materials within the laboratory. Finally, advanced mechanistic models are being developed to enable the prediction of materials performance in nuclear applications.

Top-up or Learn New Skills with MMM

If you work full-time in industry and would like to gain a postgraduate qualification; or if you already have a qualification and you'd like to top-up your skills – then you may be interested to know that four of the School's science and technology MSc courses have been made available in online distance-learning format – allowing you to study at a time that suits you, wherever you are in the world!

Advanced Engineering Materials, Corrosion Control Engineering, Polymer Materials Science and Engineering, and Textile Technology are all now available in online distance-learning format under the Manchester Materials Masters (MMM) programme. You can choose to take individual units, or build units up to gain a postgraduate qualification.

For more information on online distance-learning and MMM, go to www.manchester.ac.uk/mmm

DIAMOND

Decommissioning
Immobilisation and
Management of Nuclear
Waste Disposal

June saw the start-up event for the Decommissioning Immobilisation and Management of Nuclear Waste Disposal (DIAMOND) consortium, a collaboration between six leading UK Universities (Imperial College, Leeds, Loughborough, Manchester, Sheffield and UCL) which aims to foster research to address the problems facing the UK in the area of nuclear waste disposal, not least among these being the shortage of qualified scientists working in the field.

The DIAMOND consortium has been granted £4.25M from the EPSRC to support 35 individual research projects, with Manchester hosting five PhD projects and one postdoctoral researcher. The themes to be addressed range from understanding and mitigating risks to the environment, decommissioning nuclear plants, dealing with historic and legacy wastes, and developing high performance materials for future use in waste disposal.

From the early stages, a particular emphasis on encouraging links between groups already working on problems of interest to the nuclear industry and groups with complementary skills to widen the nuclear community in the UK was set. The collaboration aims to help to train the next generation of scientists with the skills needed to oversee an effective program of nuclear waste management and disposal. Through participation in the consortium, it is hoped that new avenues for collaboration will be identified, and additional novel research projects facilitated.

For more information on DIAMOND, contact Dr Nick Stevens
nicholas.stevens@manchester.ac.uk

Textile Design & Technology

Textiles & Paper have been successful in securing funding for a Pathfinder project focused on delivering an MSc in Technical Textiles.

The associated funding will enable an upgrading of the CAD provision in Technical Textiles and in particular the improved facilities in the design and engineering of 3D structures. The new computer and CAD provision will complement the existing CAD suite and establish the largest Textile-based CAD cluster in Europe. Prasad Potluri and Chris Carr coordinated the bid and were pleased that this investment allowed Manchester to yet again lead in developing the interface between Textile Design and Technology.

In addition Textiles Research within the School of Materials has teamed up with Manchester based licensed textile company Character World to produce an innovative range of 3D Spider-Man bed linen. The new product range uses an innovative digital processing and printing technique, which incorporates both 2D and 3D imagery. This means that when viewing normally a striking Spider-Man image can be seen, but when 3D glasses are worn, the third dimension instantly becomes apparent. Head of School, Professor Robert Young commented "creating this dynamic imagery on textiles has yet again demonstrated the diversity and wider commercial impact of the School's activities".

3D grain mapping by Diffraction Contrast Tomography

Manchester's EPSRC funding supported the development with ESRF and INSA Lyon, of the new technique of Diffraction Contrast Tomography to measure three-dimensional grain shapes and crystal orientation, non-destructively.

Here we've grown an intergranular stress corrosion crack in stainless steel, observing it in-situ by three-dimensional high-resolution tomography [REF Science paper].

Our 3D measurements describe the resistant and susceptible grain boundaries in terms of their crystal plane and help us design better microstructures. We're using the same methods to look at fatigue cracks in Magnesium, and intergranular thermal strains in alumina. **For more info, contact james.marrow@manchester.ac.uk**

Hall of Fame

Armourers and Brasiers' Fellowship for Manchester

Dr Xiaofeng Zhao, a postdoctoral research associate in the School, supervised by Professor Ping Xiao, has been awarded the annual Armourers and Brasiers' Fellowship, based upon his research achievements over the past year. The Worshipful Company of Armourers and Brasiers seeks to carry forward its ancient traditions of metalworking and technological education by concentrating its charitable support in the fields of metallurgy and materials science.

Royal Society of Chemistry award

Professor George Thompson of the School of Materials, Corrosion and Protection Centre, has been awarded the Royal Society of Chemistry Award for Corrosion Science. It has been awarded for his significant contributions to corrosion science which, assisted by pioneering approaches, have provided detailed consideration of the relationship between materials structure, properties and performance, including corrosion control strategies through surface and near-surface modification. Professor Thompson received his award at the RSC awards presentation evening in Birmingham in November 2008.

British Heart Foundation supports research in School

Riaz Akhtar has been awarded the British Heart Foundation Advanced Training Fellowship to work on joint projects between the School of Materials and the Cardiology Unit of the School of Medicine. The BHF Advanced Training Fellowships are awarded to provide younger researchers moving into a different field of science, with an opportunity to re-train and gain additional expertise in an established research institution in the UK.

Design success at the Trafford Centre

Design Management for Fashion Retailing student, Chloe Waters, has scooped the first prize at the Trafford Centre Card Design Competition for 2008 and will see her design used on the Trafford Centre's own Visa credit card! In fact, the judges were so impressed that they have asked Chloe to work for them over her summer holiday on a packaging design project – this will be great experience for Chloe, working with the team from the design stages all the way through to production.



Lessons in Paper

Five members of the conservation team from the John Rylands University Library visited the School of Materials in October for a trip round the Paper Science research group's facilities. Although conservators are highly skilled in conservation, preservation and restoration of paper and books, they have little exposure to the techniques of paper manufacture. On the visit they were able to see hand and machine-made manufacturing techniques as well as the facilities for scientific testing with plenty of opportunities for questions.



What's On?

2009

22-26 March 2009

Corrosion 2009 – NACE Conference and Exhibition
jackie.hune@nace.org/www.nace.org

30 March - 3 April 2009

38th Annual Corrosion Engineering and Control Course
www.manchester.ac.uk/materials/shortcourses
shortcourses-materials@manchester.ac.uk

31 March - 1 April 2009

Carbon in Health, the Environment and Energy British Carbon Group Meeting
ian.kinloch@manchester.ac.uk

1-3 April 2009

Design and Connexity: the 8th International Conference of the European Academy of Design
pammi.sinha@manchester.ac.uk

6-7 April 2009

The Second World Conference on 3D Fabrics and Their Applications
www.texeng.co.uk/
xiaogang.chen@manchester.ac.uk

21-22 May 2009

The First World Conference on Software for the Textile and Clothing Industries
www.texeng.co.uk/
xiaogang.chen@manchester.ac.uk

6-10 September 2009

Eurocorr 2009: 'Corrosion from the Nanoscale to the Plant'
info@cefrecor.org/www.cefracor.org

13 - 18 September 2009

Advances in Pulp and Paper Research, Oxford 2009
14th Pulp and Paper Fundamental Research Symposium
www.frc14oxford2009.org.uk/
steve.ianson@manchester.ac.uk

14 – 18 September 2009

Advances in Corrosion Protection by Organic Coatings, 5th International Conference
david.scantlebury@manchester.ac.uk

2010

11-16 July 2010

Macro2010 - 43rd IUPAC World Polymer Congress
www.macro2010.org

We'd like to hear your



We'd like to include more news from our alumni and students around the world! If you've got some interesting news about your career or your studies, then please contact Fiona Fraser.

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Tel: +44 (0)161 306 4869

In addition, if you have any ideas or suggestions for future issues of Materials Update please get in touch!

www.manchester.ac.uk/materials