

# Research Newsletter

The School of Mechanical, Aerospace and Civil Engineering

Issue 1 - Spring 2011

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- New Optical Nanoscope
- Report to Parliament
- Major grants

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# Editorial



I have great pleasure in introducing this MACE Research Newsletter. It will be the first of many.

The School has developed considerably since its formation in 2004. Major areas of research of national and international importance have grown, notably in energy, manufacturing, environment and climate change. The longstanding industries of aerospace and infrastructure, vital to the North West, face new challenges driving research needs. Clearly Nuclear Engineering in the School and Faculty has developed rapidly with major funding for the Nuclear Advanced Manufacturing Centre and the Centre for the Nuclear Engineering Technology under the umbrella of the Dalton Institute. The

Tyndall Centre for Climate Change Research is no longer funded as a national Centre but the group in Manchester concentrating on energy and carbon emissions has gone from strength to strength with considerable funding and impact, linking with the Sustainable Consumption Institute. Research in Marine Energy has grown markedly with major involvement with the Energy Technology Institute. The Modelling and Simulation Centre has been launched with major funding from EDF and is expected to make major contributions in many areas. There are numerous small pockets of excellence which will also contribute to this Newsletter. Engineering is more important now than at any time in my career.

*Professor Peter Stansby, FEng  
Head of School*

## NEW RESEARCH CENTRES



### Centre for Modelling & Simulation

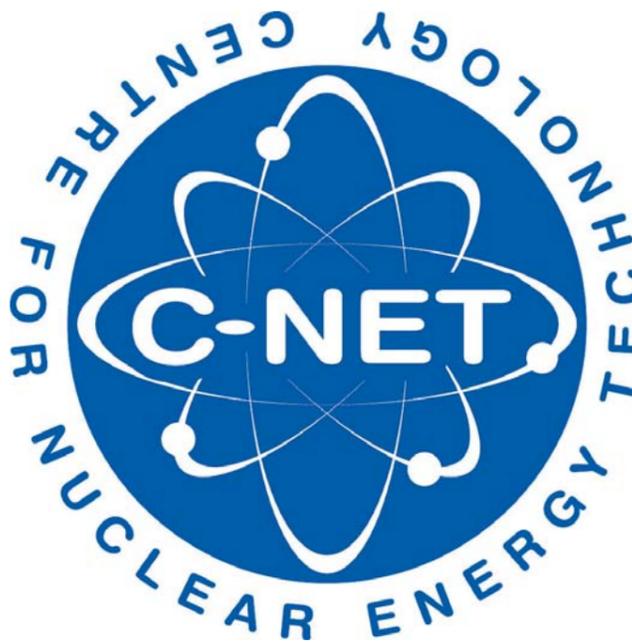
In January MACE launched the Centre for Modelling and Simulation with long-established partners Electricité de France (EDF). The Centre, led by Prof John Yates, will build on the EDF open source code to tackle problems from the entire range of the engineering sciences, from the microstructure of materials to the flow of ocean currents. Dr Daniele Colombo, formerly of EDF, will be working as a research fellow in the Centre.

The two-day launch event saw representatives from EDF, Rolls-Royce and Serco speak on industry's need for high quality modelling and simulation, with researchers from MACE illustrating the impact of modelling and simulation on their own work.

Commenting on the Centre, Pierre-Louis Violette, from EDF's research and development branch, said:

"For EDF, the joint creation of the Modelling and Simulation Centre represents a major partnership. It will benefit from over 10 years of cooperation between the University of Manchester and EDF R&D on simulation, and enhance worldwide development of energy research for the development of renewables as well as nuclear energy in the UK"

For further information please visit:  
<http://www.mace.manchester.ac.uk/research/centres/masc/>



### Centre for Nuclear Energy Technology

The official launch ceremony of the Centre for Nuclear Energy Technology (C-NET) hosted by Dame Sue Ion, OBE, FEng took place at the end of January. Jointly funded by the North West Development Agency (NWDA) and the University of Manchester, C-NET has been established to help provide the R&D support and skills training needed for the next generation of nuclear power plants, as well as for extending the lifespan of operating plants. Nuclear power is vital to the region's economy, providing 25,000 jobs and bringing in £3 billion a year. The Centre is led by Prof Tim Abram and works closely in partnership with a number of research centres across the University of Manchester.

If you would like to know anything further about the Centre for Nuclear Energy Technology please contact Dr John Roberts, the Centre's external business manager, on 0779 536 6669.

For further information please visit:  
<http://www.dalton.manchester.ac.uk/our-research/c-net/index.html>



**NUCLEAR AMRC**  
ADVANCED MANUFACTURING RESEARCH CENTRE

### Nuclear Advanced Manufacturing Research Centre

With the imminent launch of the Nuclear Advanced Manufacturing Research Centre (NAMRC), the University of Manchester further cements its status as Britain's leading nuclear research university.

Following bids from some of the UK's leading universities to develop the Centre, it was announced in December 2009 that the Nuclear AMRC would be led by the University of Sheffield and the University of Manchester, with Rolls-Royce as lead industrial partner. Other founding partners are Areva, Westinghouse, Sheffield Forgemasters and Tata Steel.

The Nuclear AMRC is primarily supported by a £15 million grant from the Department for Business, Innovation & Skills and £7 million from the Regional Development Agency Yorkshire Forward. The European Regional Development Fund (ERDF) is also supporting the development of the centre's permanent home on the Advanced Manufacturing Park (AMP), South Yorkshire.

BIS and the Northwest Development Agency (NWDA) are investing a further £8 million to expand the nuclear research laboratories at the University's Dalton Nuclear Institute.

For further information please visit:  
<http://namrc.co.uk/>

# SPOTLIGHT ON

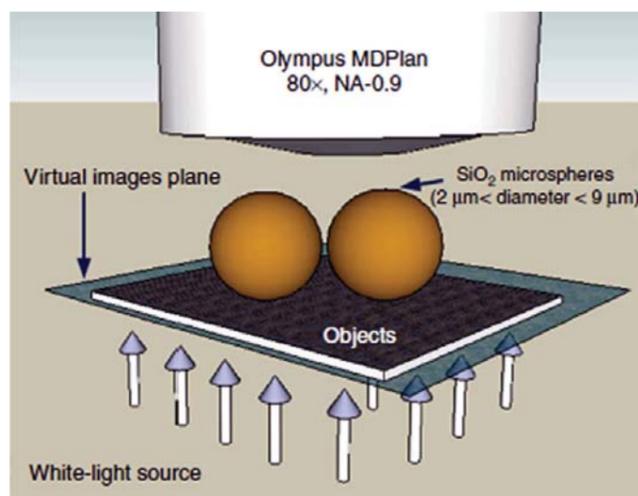
## New Optical Nanoscope

A research team, led by Prof Lin Li and Dr Zengbo Wang, has developed a microscope which will potentially allow virologists to see living viruses directly for the first time. Dubbed the 'microsphere nanoscope', the microscope can see objects 200 times smaller than a conventional optical microscope. However, Prof Lin Li is optimistic about developing that capability even further: "Theoretically, there is no limit on how small an object we will be able to see."

Viruses have always presented a problem for examination under a microscope, as electron microscopes can only give an image of the outside of a cell. Optical fluorescence microscopes can see inside the cells indirectly by dyeing them, but these dyes cannot penetrate viruses. The innocuously titled paper 'Optical virtual imaging at 50 nm lateral resolution with a white-light nanoscope' was published in the journal Nature Communications.

Further information:

<http://www.mace.manchester.ac.uk/aboutus/news/index.html#nano>



**Tyndall°Manchester**  
for Climate Change Research

## Reports to Parliament



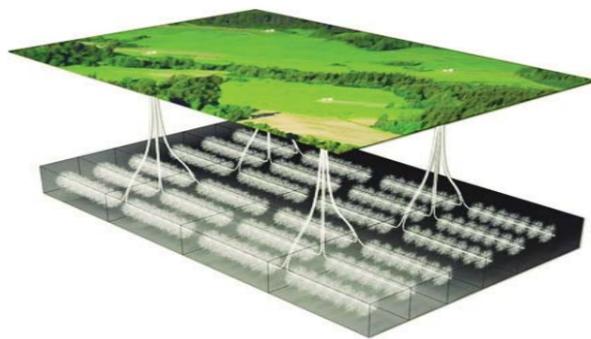
Academics at the Tyndall Centre have been making waves in the past few months. After a policy report was submitted to Parliament suggesting that Britain's shipping emissions could be six times higher than previously thought, publications as diverse as The Guardian and Lloyd's List covered the story.

This was shortly followed by a report on shale gas mining delivered this January. The report was commissioned by the Co-operative Group, an institutional investor, as shale gas deposits in Lancashire could provide the UK with a secure, relatively cheap source of gas, as well as providing significant investment in the area. The report

urged caution on health grounds, noting that several cases of groundwater contamination in mining projects in America had yet to receive proper investigation. Whilst shale gas is promoted as a transition route to a low carbon future, none of the available evidence indicates that this is likely to be the case. It will likely be used in addition to other fossil fuel reserves, potentially raising CO<sub>2</sub> in the atmosphere by 11ppmv.

The report led to the fourth Tyndall Centre input to Parliament in as many months, as Prof Kevin Anderson appeared before a Commons Select Committee investigating the potential for shale gas mining in the UK. Further information:

<http://www.mace.manchester.ac.uk/aboutus/news/index.html#shale>



method for pottery dating" is due to start in July of this year.

## Dating Ceramics

Public interest in Dr Moira Wilson's discovery of rehydroxylation (RHX) dating shows no signs of abating, as she was invited to speak at the University of Oxford earlier this academic year.

RHX is a method for dating clay ceramics that works by taking all the moisture out of a piece of ceramic and looking at the new weight. As ceramic contains no moisture upon leaving the kiln, and accrues it only steadily over time, the difference between the two weights can be used to calculate the age of any clay ceramics under 2000 years old.

Dr Wilson's newly awarded NERC grant "Rehydroxylation [RHX]: Towards a universal



## Major Grants

The past few months have seen a number of high-value grants awarded.

### UK's electricity system

Prof Kevin Anderson and his team have received £1.1 million from the EPSRC to develop approaches and tools to investigate the UK's electricity system and how its resilience can be improved to tackle the forthcoming strains it will be put under.

### Oil-free turbomachinery

Dr Philip Bonello also receives a grant from the EPSRC, to the tune of £320,000, to research oil-free turbomachinery for aircraft engines.

### RHX dating

The NERC awarded Dr Moira Wilson £320,000 to refine RHX dating discovered by Dr Wilson and her team in 2009.

### Turbulence modelling

Finally, our Head of School Prof Peter Stansby has been granted £240,000 by EDF for turbulence modelling in the near-field of an axial flow tidal turbine as part of the second phase of the ReDAPT (Reliable Data Acquisition Platform for Tidal) project.

## International collaboration

### Laser-welding of graphene

Of additional interest may be a £6000 grant from the Royal Academy of Engineering to aid collaboration with Tsinghua University on research into the laser-welding of graphene. The discovery of graphene by Andre Geim and Konstantin Novoselov, two University of Manchester academics, led to them winning the Nobel Prize for Physics in 2010 and an explosion of speculation ensued as to how the potential of the material – thin, transparent, strong and highly conductive – can be harnessed.

Watch The Royal Society video

<http://www.datingceramic.manchester.ac.uk/>

# Appointments

## New Staff joined the School



Dr John Francis joined us in January 2011 as a Senior Lecturer in Welding Technology, where he is involved in the Nuclear Advanced Manufacturing Research Centre (NAMRC) project. His research interests include welding and cladding technologies and stress relationships in welds.



Dr Paul Gilbert joined the University of Manchester in 2009 as a Research Associate on the EPSRC SuperGen Bioenergy Consortium but he has recently been appointed as a Lecturer in the Management of Projects Expert Group. His research interests include shipping emissions and carbon management.



Dr Andrey Jivkov joined the University of Manchester in 2010 as core staff in the newly created Research Centre for Radwaste and Decommissioning. His research is in the fields of deformation and fracture of solids.



Dr Carly McLachlan is a Lecturer in Climate Change, Sustainability and Project Management in the Management of Projects Expert Group. Her chief research interests centre on the relationship between the layman, climate change and climate change science. Her research is further focussed on how organizations and the public engage with energy, climate change and sustainability issues.



Dr Lei Ren is a new Lecturer with special interest in the mechanics of human movement.



Dr Joao Quariguasi joins us as a Lecturer, with special interests in sustainable supply chains, reverse logistics and remanufacturing.



Dr Katharine Smith is a Lecturer whose chief research interest is in the application of electro spray technologies in satellites.



Dr Ahmad Syed joins us as a Lecturer with special interest in geo-engineering.



Prof John Yates joined the School in August 2010 as Professor of Computational Mechanics and Director of the Centre for Modelling and Simulation. His research interests include structural integrity and modelling & simulation.



Dr Laure Pellet has come to work on MaSC from EDF Grenoble on a four year appointment.



Prof Thierry Maitre has come from EDF Grenoble on a four year appointment to work with the Centre for Modelling and Simulation MaSC.

His research focuses on Marine Darrieus Turbines that can be settled in marine or river current to generate renewable electricity.



# The bigger picture

## Consultancy work



Paul Nedwell, the only UK Fellow of the International Ferrocement Society, recently organised a three day course on the practicalities of building with ferrocement for visitors from the Civil Engineering Consultancy "Expedition" and their Greek partners.

A new cultural centre for the Stavros Niarchos Foundation is being built in the Kalithea region

of Athens and architect Renzo Piano has designed a ferrocement solar collector to sit on top of the structure. Prototypes are being built and tested in Athens during the first half of this year with the final structure expected in 2013.

All consultancy enquiries can be sent to Barbara Smith: [b.smith@manchester.ac.uk](mailto:b.smith@manchester.ac.uk)

## Research workshop

Academic Writing Workshop for Management of Projects (MoP) PhD Researchers in the School of Mechanical, Aerospace and Civil Engineering (MACE) – 1, 2 and 9 June 2011 This series is funded mainly by the University's Faculty of Engineering and Physical Sciences (EPS) Strategic Fund. The purpose is to help earlystage PhD researchers understand how academic papers are appraised and reviewed to increase their chances of getting their work published.

### 1st June

Prof Christine Räisänen (Chalmers University) will explore how the literature can be critically appraised, and discuss how critical appraisal of the published research can provide greater clarity on research methods and academic writing.

### 2nd June

The second workshop is jointly sponsored by the Association of Researchers in Construction Management (ARCOM). Participants will undertake a mock-review of an actual article submitted for publication in a peer-reviewed academic journal.

### 9th June

Prof Rodney Turner (Editor of the International Journal of Project Management) will consider current and future trends in the field of project management.

For more details about the workshop, please email [paul.chan@manchester.ac.uk](mailto:paul.chan@manchester.ac.uk)

## Keynote speeches



Prof Yong Wang recently gave keynote presentations at two conferences in China. At the first, the 5th International Conference on Performance Based Fire and Fire Protection Engineering, his presentation was entitled "Meeting the Changing Demands of Structural Fire Engineering".

The second, the 11th International Symposium of Structural Engineering, saw him deliver "Punching shear resistance of shearhead connection between flat slab and tubular column".

For more details please email [yong.wang@manchester.ac.uk](mailto:yong.wang@manchester.ac.uk)

## Awards

### 2011 Prize from ISE

A poster by 2<sup>nd</sup> year PhD student Ashkan Shahbazian under the supervision of Prof YC Wang, entitled: "Fire Resistance Design Methods for Thin-Walled Steel Structural Panels for Wall Construction" won the First Prize in a poster competition at the YOUNG RESEARCHERS' CONFERENCE 2011 organized by the Institution of Structural Engineers.

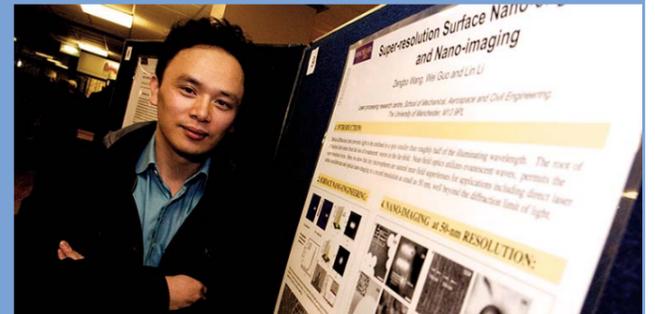
<http://www.mace.manchester.ac.uk/aboutus/news/index.html#ISE2011>



### 2011 Prize from the Royal Academy of Engineering

A poster by Dr Zengbo Wang, Dr Wei Guo and Prof Lin Li, titled: "Super-resolution Surface Nano-Engineering and Nano-Imaging" has won the 1st prize in a competition among around 40 posters. The poster was presented by Dr Zengbo Wang in Sheffield in a RAEng regional lecture "Nature and Nano – It's all going on at Engineering Surfaces".

<http://www.mace.manchester.ac.uk/aboutus/news/index.html#nature-nano>



### EFNMS Award for MSc thesis in Maintenance

Akilu Yunusa-Kaltungo who took an MSc in Maintenance Engineering & Asset Management received the EFNMS Excellence Award 2010 for Best Master Thesis in Maintenance from UK for his dissertation project 'Development of a Condition Monitoring System for Ashaka Cement Coal Workshop'. He studied for an MSc in The Maintenance Engineering & Asset Management supervised by Dr Jyoti Sinha.

<http://www.mace.manchester.ac.uk/aboutus/news/index.html#efnms>

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