

Field-emission scanning electron micrograph of a catalyst film comprised of platinum nanoparticles supported on carbon particles, where platinum clustering is evident (left). Representative SECM contour map of a catalyst film, where the differing colours relate to varying rates of hydrogen oxidation (right)

Reactivity mapping of fuel cell catalyst films

Scanning electrochemical microscopy (SECM) mapping of the electrochemical activity of catalyst films enables new insights into catalyst performance.

In the area of fuel cell research, PEM (polymer electrolyte membrane) fuel cells show great promise, especially for automotive applications. These cells are electrochemical engines that consume hydrogen and oxygen to generate electricity and emit water as the waste product. At the heart of the PEM fuel cell lies two catalyst layers - commonly platinum nanoparticles supported on carbon, which enable the oxidation of hydrogen (at the anode) and the reduction of oxygen (at the cathode). At present, better understanding is needed of the interaction between the platinum particles, and how each particle contributes towards the total activity of the film. Additionally, research into alternative catalysts

would benefit from a rapid screening test, prior to fuel cell application. NPL has been testing techniques to aid in both of these research areas.

Scanning electrochemical microscopy (SECM) is a relatively new technique that offers a direct electrochemical method of assessing a potential catalyst's performance. SECM is an electrochemical scanning probe technique that spatially maps the electrochemical activity of catalyst films. Using the hydrogen oxidation/proton reduction reaction, NPL has been able to highlight the considerable electrochemical non-uniformity of the films caused by platinum nanoparticle agglomerates - i.e. where platinum nanoparticles

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cluster together. Combined with transmission electron microscopy and field emission scanning electron microscopy, this has proved to be a powerful tool for catalyst characterisation and discrimination.

At present the resolution of SECM is in the order of a few microns, but work is currently underway at NPL to extend this to nanometre resolution, which will give researchers access to previously inaccessible phenomena.

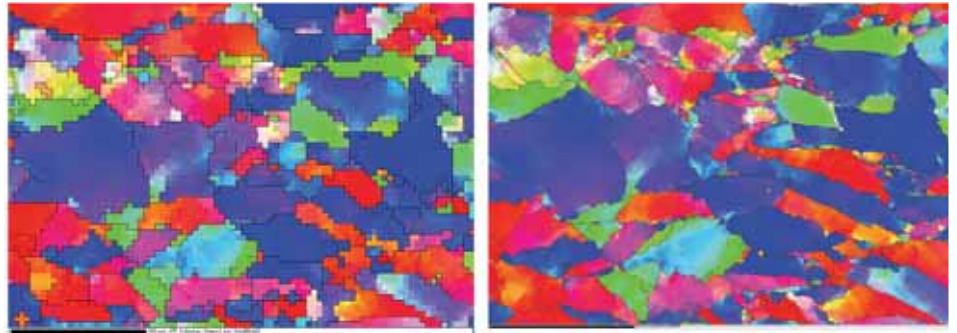
For further information, please contact Patrick Nicholson on 020 8943 6179 or e-mail patrick.nicholson@npl.co.uk.

Mapping microstructure

The state of internal microstructure is a key parameter that determines material properties. In hot metal working there is a requirement to obtain a required microstructure, first time, whatever the forming process - aided by appropriate models. If expensive processes of trial and error are avoided, costs and materials expenditures can be reduced.

Repeatable and reproducible hot compression tests are needed which can provide validated data for modelling, for process deformation strategies and for correlation with microstructural evolution studies. The required data are generally obtained from one or more of the three most commonly used types of hot deformation test: axisymmetric compression, plane strain compression and torsion. Currently, software modelling packages can be used to simulate metal working processes such as the manufacture of aeroengine discs and turbine components, and are vital for work scheduling, such as defining rolling mill pass sequences, to avoid endangering mill components. Their use can result in shorter times to market, increased yields and reduced costs, and deliver ideally tailored properties through microstructural control with guaranteed property levels. Advanced models are available, but there is uncertainty over microstructure state parameters and little or no data on the heterogeneity of the microstructure.

A greater understanding is needed of the development of microstructure in



Effect of scanning step size on resolution of microstructural details from a hot compressed sample of 316 stainless steel (coarse – left; fine – right): Colours represent different orientations - used to discriminate between different crystal grains and to evaluate strain

processing, and how this is controlled by deformation parameters.

NPL has collaborated with the Universities of Wales (Swansea) and Sheffield over the past few years to develop a good practice guide for characterising heterogeneity in structure in hot-deformed test pieces, with particular focus given to orientation measurements made via Electron Back Scatter Diffraction (EBSD). The guide (which will be available later this year) is based on detailed measurements of heterogeneity in structure of four

representative engineering alloys; a Ni-Base alloy (Waspaloy), a stainless steel (316), an aluminium alloy (AA5052) and a titanium alloy (Ti6Al4V). The project has recently borne fruit, having contributed to the annual Royal Microscopical Society meeting on EBSD at the University of Sheffield in early April, and the University of Sheffield's IMPPETUS seminar in early May.

For further information, please contact Bryan Roebuck on 020 8943 6298 or e-mail bryan.roebuck@npl.co.uk

Failure prevention in safety-critical applications

NPL's Lifetime Management of Materials service helps UK industry identify the origins of failures, improving safety and minimising downtime.

In-depth failure analysis after a fracture incident is critical to ensuring best practice in failure avoidance, once normal operations have been resumed. It is especially challenging when a corrosive environment is present leading to a synergistic combination of stress and corrosion. When a crane cable failed at little more than half the "safe" working load, yet had just been inspected, there was immediate concern about the origin of the failure and the viability of the inspection process. The crane cable consisted of more than 200 steel strands wound in six bundles around a hemp former. Close examination of the failure revealed that the strands had been weakened by a combination of wear and corrosion (i.e. tribo-corrosion). The

cross-sectional area of the strands in the outer layers had been reduced by 80%, and stress-concentrating corrosion pits had formed due to the aggressive atmosphere in which the rope was used. However, over most of its length the cable was in good condition. Evaluation of the crane operation revealed that the location of failure was associated with the steel pulley wheels; the repeated movement in this one region had led to the deterioration. NPL's recommendations for targeted inspection, rather than random assessment, should lead to early identification of problems and avoid a potentially dangerous failure.

Failure of water-filled fire extinguishers is another major concern, and when



Failed wire rope



Strand damaged by wear and corrosion

a large number of failures occurred for one organisation it was important to establish an explanation and prevent recurrence. The failures were identified as due to stress corrosion cracking of the brass adaptors into which the CO2 propellant cartridges were tightened. The initial prognosis was that the cracks were associated with high residual stresses in the adaptors. However, laboratory tests in mercurous nitrate solution (which causes brass to crack in the presence of sufficiently high residual stresses) produced no cracking in adaptors tested without applied stress. In contrast, when the adaptors were stressed by tightening the propellant cartridges into them, exposure to mercurous nitrate solution produced cracking similar to that which had occurred in service.

NPL recognised that the solution was not simply stress relief, and recommended that the inside of the threads be sealed in the adaptors to prevent the ingress of water.



Brass adaptor in water-filled fire extinguisher. Cracks were formed in service



Brass adaptor in water-filled fire extinguisher. Cracks are forming in laboratory test in mercurous nitrate solution

These are but two examples of a range of failure analyses undertaken by the Lifetime Management of Materials (LMM) service. Such analyses form part of a wider scope of activity for LMM, which includes advice and consultancy on thermal management for sustainability and metrological aspects of electronic, piezoelectric, magnetic, nano- and bio-materials.

For further information on LMM please visit www.npl.co.uk/lmm, or e-mail lmm@npl.co.uk

For further technical information, please contact Paul McIntyre on 020 8943 8684 or e-mail paul.mcintyre@npl.co.uk

Mtec show a great success

Mtec is the only UK tradeshow dedicated wholly to sensors, measurement and instrumentation. In February 2008, NPL exhibited at Mtec, alongside over 400 companies, with over 6,000 visitors in attendance. In addition to NPL's stand, visitors were invited to seminars on the training available from NPL and the services NPL can provide to industry.

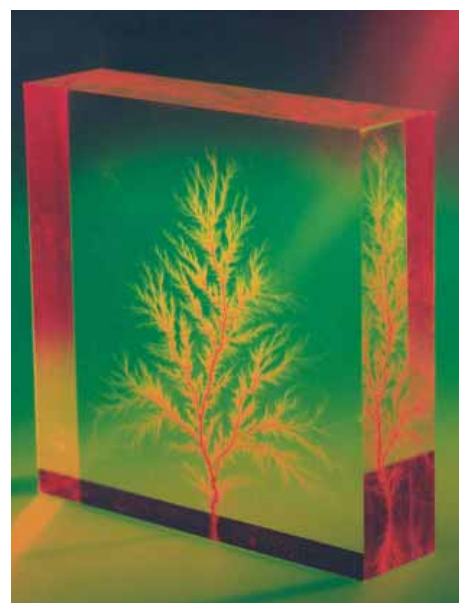
The services seminar covered:

- The breadth of NPL's involvement in the everyday life of people; healthcare, engineering, food, transport, environment, energy, pharmaceuticals, and defence
- The groundbreaking research that is carried out, as well as the applied research and underpinning of standards and procedures
- The availability of support from NPL through various programmes and specifically Mfl (Measurement for Innovators, a programme that provides easy access to funds to research and develop new products and services) and case studies to demonstrate the benefit of NPL's knowledge and abilities to businesses of all sizes (from small start-ups to large organisations)

Another benefit of visiting the NPL stand was the chance to win an NPL electron tree.

Visitors who subscribed to Engineering Precisely and submitted a correct answer to a multiple-choice question ("What does EMAN stand for?") were entered into a draw to win an electron tree. NPL is pleased to announce that the winner of the Mtec prize was Adrian Brand, Senior Engineer at Xention Limited. Look out for more chances to win these coveted objects at NPL stands at future shows.

"What does EMAN stand for?" – the Engineering Measurement Awareness Network, which aims to facilitate information flow to enable solutions for engineering measurement problems and to allow members to influence the direction of the Engineering Measurement Programme at NPL. For more details please visit <http://www.npl.co.uk/eman>



An NPL electron tree, created by using the NPL linear accelerator to bombard an acrylic block with a high-energy electron beam. A huge electric field builds up and electrical stress overcomes acrylic's insulating strength - the discharge paths create the visible fractures in the acrylic block

For more details on the training available from NPL, please visit <http://www.npl.co.uk/training>

For more details on NPL's services, please visit <http://www.npl.co.uk/server.php?show=nav.137>

UK torque intercomparison increases confidence in torque measurements

Nine laboratories have participated in the UK's first torque intercomparison, traceable to a national standard. The 10-month project was recently concluded with the publication of a report summarising the outcomes from the work



The report, 'UK torque intercomparison – 2007', by Robinson, A. can be downloaded or ordered from the NPL publications page <http://www.npl.co.uk/publications>

The comparison was a joint NPL/UKAS initiative with NPL acting as the pilot laboratory. In addition to

UKAS accredited torque laboratories, the comparison was open to other UK based torque laboratories that possessed suitable torque facilities. This work was made possible through the recent development of the UK national torque standard. Transducers (used to measure torque) from each of these laboratories were calibrated against NPL's national standard torque calibration machine.

Following a specified protocol, two measurement ranges were covered: 20 N·m to 100 N·m, and 200 N·m to 1 kN·m (N·m = newton metre, the torque generated by a force of one newton acting at a perpendicular distance of one metre from the axis of rotation). In the analysis, adjustments for temperature correction were made and the drift of the transducers over the 10-month period was shown to be negligible. Uncertainties for all measurements were calculated and the results were presented graphically.

Work is already underway at the laboratories that identified areas for improvement through the exercise, whilst for other laboratories the uncertainties have been reduced,

having achieved good agreement. Norbar Torque Tools described the project as, "a very worthwhile exercise and something that's undoubtedly worth repeating in the future".

"The exercise has given us and our customers additional confidence in the results we supply," Crane Electronics.

This work will have an important fan out – the nine laboratories involved are responsible for around 10,000 torque calibrations annually.

The project was a success both organisationally and in providing, in most cases, a first opportunity for the laboratories to compare to a national standard. The project was found to be an efficient and cost effective way for NPL to disseminate the unit of torque to a broad range of beneficiaries.

For further information, please contact Andy Robinson on 020 8943 6194 or e-mail andy.robinson@npl.co.uk

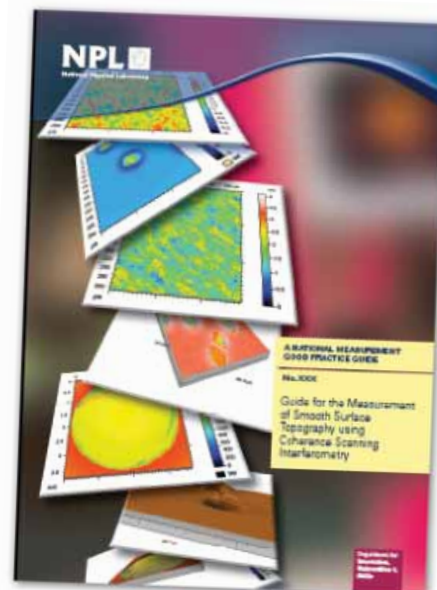
Good practice guide for the measurement of smooth surface topography

The 'Guide for the measurement of smooth surface topography using coherence scanning interferometry' (Good Practice Guide No. 108) is now available from NPL. This document gives guidance on the measurement of the topography of semiconductors, epitaxial wafers and optical thin film coatings, and can be applied to many flat, smooth surface topography measurements.

This good practice guide has been written to assist users in the effective measurement and analysis of smooth surfaces using coherence scanning interferometry (CSI), commonly referred to as 'vertical scanning white light interferometry'. Funded by DIUS's Applied Research Programme – Micro

and Nanotechnology Manufacturing Initiative, Project SOLADIM, NPL coordinated the production of this guide with advice and suggestions from project members and advisors from academia and industry.

Coherence scanning interferometry is a surface topography measurement



'Guide for the measurement of smooth surface topography using coherence scanning interferometry' (Good Practice Guide No. 108) can be obtained from www.npl.co.uk/guides

technique, and is useful for producing high-resolution geometric measurements of a wide range of surfaces. Epitaxial wafers (semiconductors often used in the creation of integrated circuits) and optical thin film coatings (used in antireflective coatings on glasses and to create optical filters and mirrors for high precision applications) are measured using this technique; these are components that need high precision topographical measurement

to ensure that their surfaces possess the required properties.

NPL produces good practice guides to help users make better measurements and obtain reproducible data. Over 100 of these guides are available, covering a wide range of measurement areas. This guide is available for download from the publications database on the NPL website, or paper copies can be ordered.

To download or to order a paper copy of the 'Guide for the measurement of smooth surface topography using coherence scanning interferometry' (Measurement Good Practice Guide No. 108), please visit <http://www.npl.co.uk/guides>

For technical information please contact the lead author Richard Leach on 020 8943 6303 or e-mail richard.leach@npl.co.uk

NPL pilots study into weighing of magnetic mass standards

NPL recently piloted a comparison study of the effect of magnetic and magnetically susceptible weights on mass calibration results. It is well known that a weight with high magnetic susceptibility (the measure of the extent a material is magnetised by, in response to an applied magnetic field) and/or permanent magnetisation can alter the reading displayed by a mass balance, leading to a potential for error in the weight's calibration.



OIML (the International Organization of Legal Metrology) recommendation R111 gives guidance on testing weights of various classes and recommends methods for assessing the magnetic properties of mass standards. An NPL-led study aimed to assess the magnitude of such effects for weights of various degrees of magnetic susceptibility and permanent magnetisation, and on a wide range of commercial mass comparators, and therefore determine the necessity for making the magnetic tests outlined in R111.

The travelling standards for this comparison comprised a set of four 1 kilogram mass standards with well characterised magnetic properties. The magnetic susceptibilities of the weights covered the range 0.003 to 9.6 (magnetic susceptibility does not have units) and the permanent magnetisation was between 1 micro-tesla and 278 micro-tesla.

The study included participants from UKAS accredited calibration laboratories, local trading standards offices, manufacturers and testing laboratories, with NPL providing reference values for the weights and analysing the measurement data. The participants used a wide range of balances to calibrate the travelling standards from mechanical balances to automatic electronic mass comparators.

While there was a wide spread of results from the participants, the majority of results agreed within the uncertainties quoted by the individual laboratories. Some useful conclusions were drawn about the relative sensitivities of various commercial balances to magnetic weights. The results indicated that routine measurement of the magnetic properties of weights is not necessary for mass calibrations. Instead the assessment of a balance's ability to

weigh magnetic weights provides a practical alternative that would only need to be done once for each balance.

A Special Interest meeting of the Engineering Measurement Awareness Network (EMAN) was held to discuss the results of the comparison and general issues regarding the magnetic properties of mass standards. To access presentations from the meeting, please visit <http://www.npl.co.uk/server.php?show=ConWebDoc.2576>.

The full details of the study can be found in NPL Report ENG 6 (ISSN: 1754-2987) UK comparison of magnetic stainless steel weights by searching the NPL Publications Database at http://publications.npl.co.uk/npl_web/search.htm

For further information, please contact Stuart Davidson on 020 8943 6224 or e-mail stuart.davidson@npl.co.uk

Big bang theory – measuring the temperature of explosions

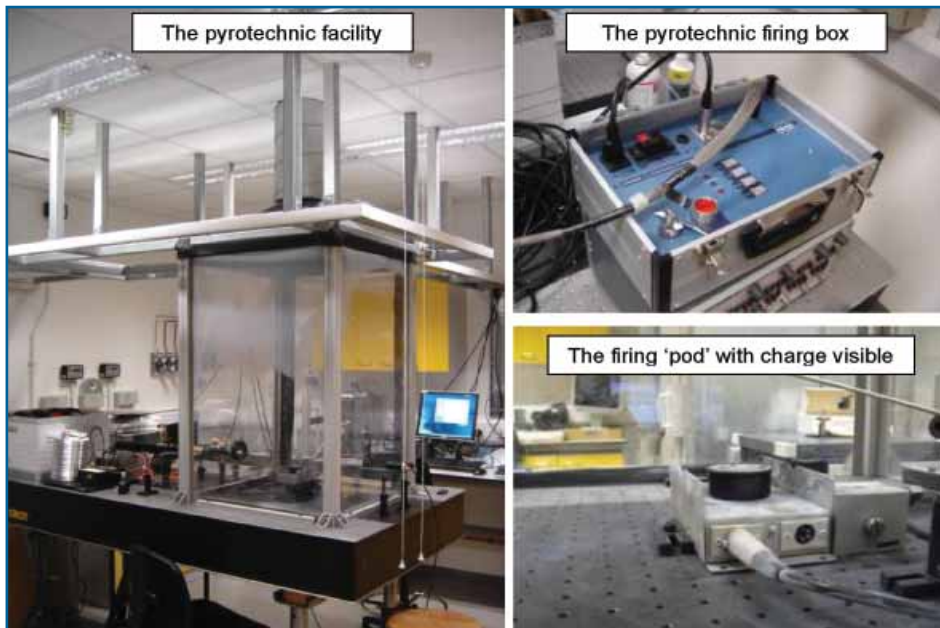
To understand the physical and chemical processes that occur during the detonation and expansion phases of explosive events, NPL was contracted to develop a high-speed thermometer that would not only survive the harsh conditions found inside an explosion fireball, but also measure its temperature.

The interaction of an explosion with its environment can be modelled using computational fluid dynamics codes and suitable equations of state. Temperature is an essential parameter in such calculations. Making measurements on real explosions in appropriate field trials can validate these models and improve their accuracy, but it is extremely difficult to

measure the temperature under such harsh conditions. NPL was asked to address this issue by developing an explosion thermometer.

Developing a thermometer probe to measure the temperature inside an explosive fireball is a very difficult task, because of the hostile environment and the complex physics and chemistry of

the explosion process. The explosion generates a shock wave, significant amounts of heat, and particulate matter such as soot, all of which can degrade or damage the thermometer probe. To meet this challenge, three activities were carried out: an initial survey of the measurement problem, a set of laboratory based experiments, and finally a portable robust explosion thermometer was designed and produced for the customer.



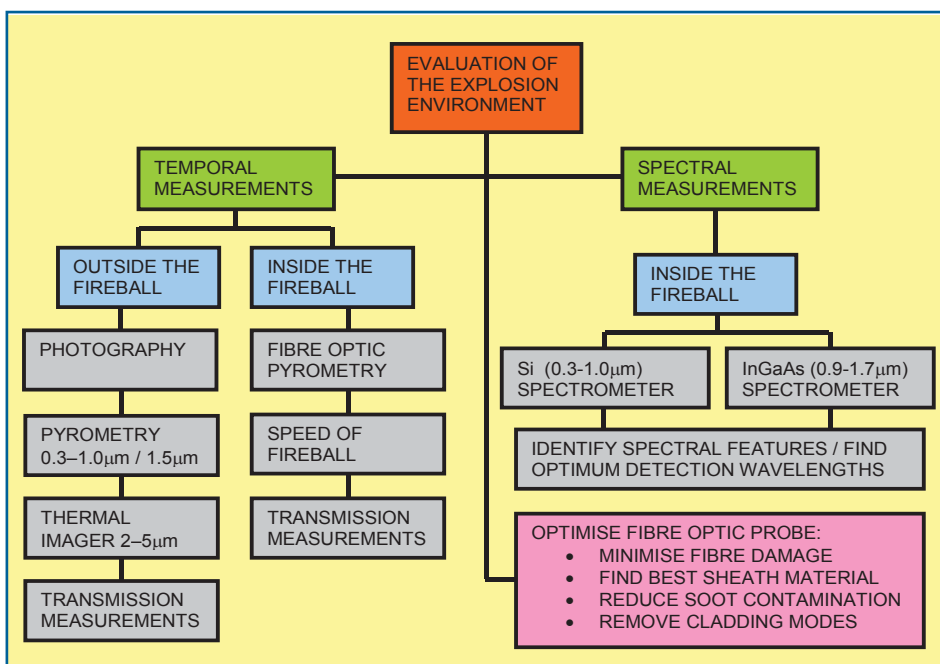
The laboratory based pyrotechnics facility, showing the tough, 6 mm thick acrylic enclosure, the firing box and the firing 'pod' with a small charge installed ready for firing

Initial survey

An initial survey was conducted to gain a better understanding of the measurement problem and advise on potential approaches, with the conclusion that a form of radiation thermometry would be the best solution. Radiation thermometry detects the passive thermal radiation emitted from the fireball, and the temperature is inferred from Planck's relationship. However, in an explosion this is complicated by the fact that the fireball has internal temperature gradients and is semi-transparent at certain wavelengths, making the interpretation of the thermal radiation signals difficult.

Laboratory based experiments

To develop and evaluate the radiation thermometer, and gain a better understanding of the explosion environment, a small laboratory based pyrotechnics facility (shown top left) was constructed at NPL. Using this facility, a number of different optical thermometry measurement techniques were investigated; these are summarised in the bottom left images.



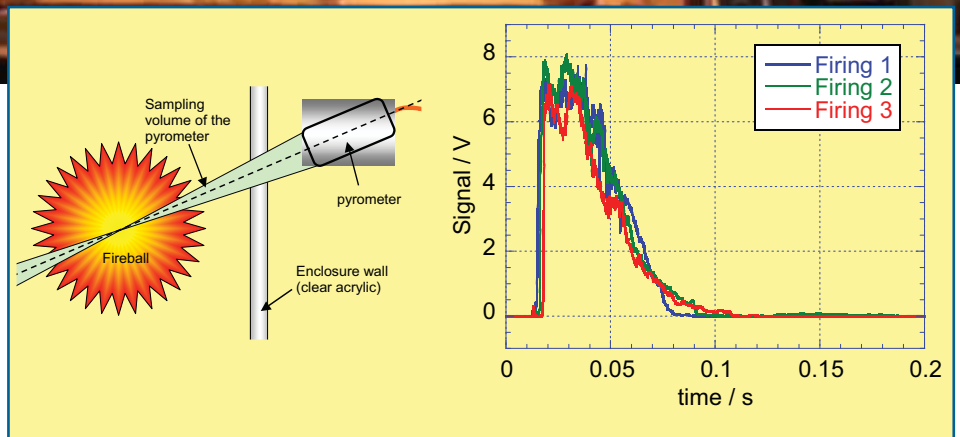
The explosion environment was evaluated using a variety of different measurement techniques aimed at quantifying key parameters to optimise the thermometry system

The top right image on the opposite page shows a radiation pyrometer observing the detonation of a small pyrotechnic charge inside the NPL facility – the energetic nature of the explosion can be seen, as can the generation of large amounts of particulate matter (including soot). The graph in the image below it shows pyrometer signals for three consecutive pyrotechnic firings, indicating both the transient nature (≈ 0.1 s) and reproducibility of the explosion.

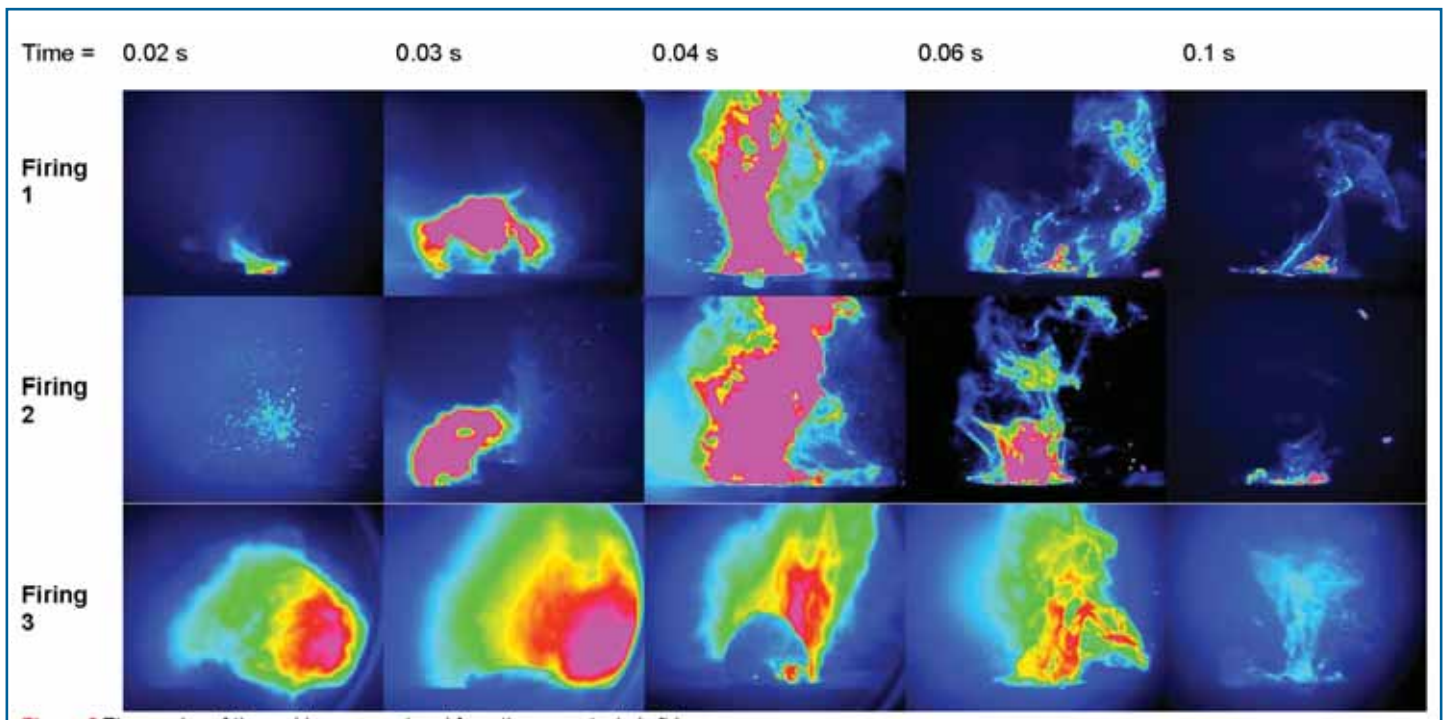


The detonation of a small pyrotechnic charge in the NPL facility. A radiation pyrometer on the left side of the image observes the event

The bottom image shows a time series of the thermal radiation emitted by the three pyrotechnic explosions, as captured by a high-speed thermal imaging camera (at 200 frames per second). The hot region of the fireball and the generation of smoke can be seen. Measurements of this nature aid in the understanding of the real explosion environment.



The signals measured by a radiation pyrometer for three consecutive pyrotechnic firings. The transient nature (≈ 0.1 s) of the explosion events is evident



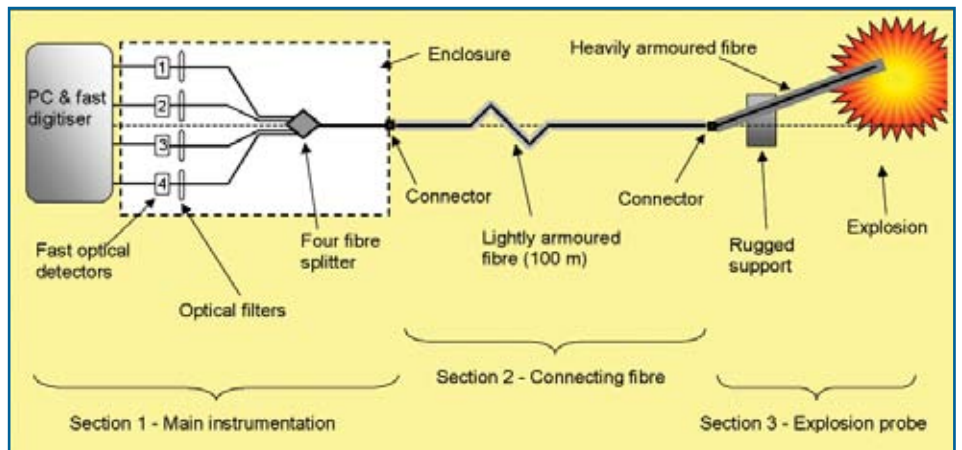
Time series of thermal images captured from three pyrotechnic firings. The hot region of the fireball and the generation of smoke can be seen

Portable robust explosion thermometer

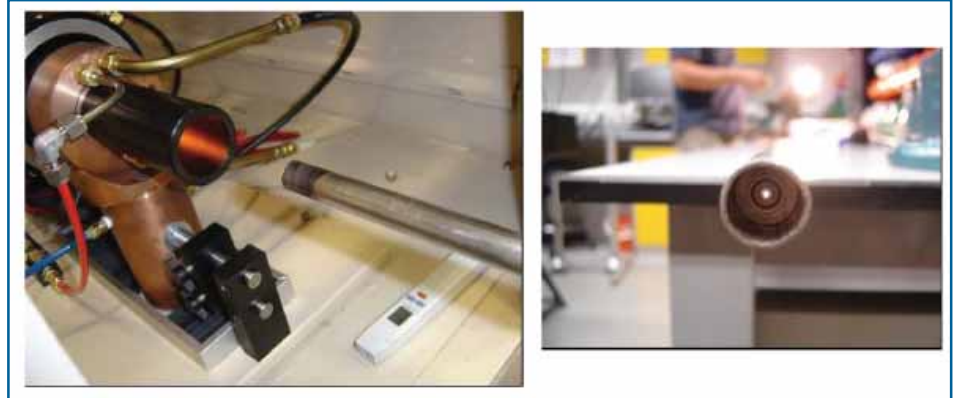
Based on the outcomes from the laboratory-based experiments, a rugged fibre optic based radiation thermometer probe was developed and delivered to the customer. The instrument (shown schematically, right) detects thermal radiation at four different wavelengths, collecting more information about the thermal physics of the fireball than could be obtained from any one wavelength alone. In the vicinity of the explosion, the optical fibre probe, contained in a rigid steel conduit for protection, collects thermal radiation, which is transmitted over a suitable safe distance to the main instrumentation, via a secondary lightly armoured fibre.

In order to measure the temperature of the explosion, the instrument was first calibrated up to 3000 K (2727 °C) with the NPL Thermogauge blackbody facility – the probe was quickly inserted and then withdrawn from the blackbody, and the detector signals at four wavelengths were measured during this period.

The calibration of the explosion thermometer made it possible to convert the measured thermal radiation signals into temperatures. Displayed below is typical data collected during a single explosion. Because the instrument analyses the thermal radiation at four discrete wavelengths, additional information



Schematic of the fibre optic explosion thermometer



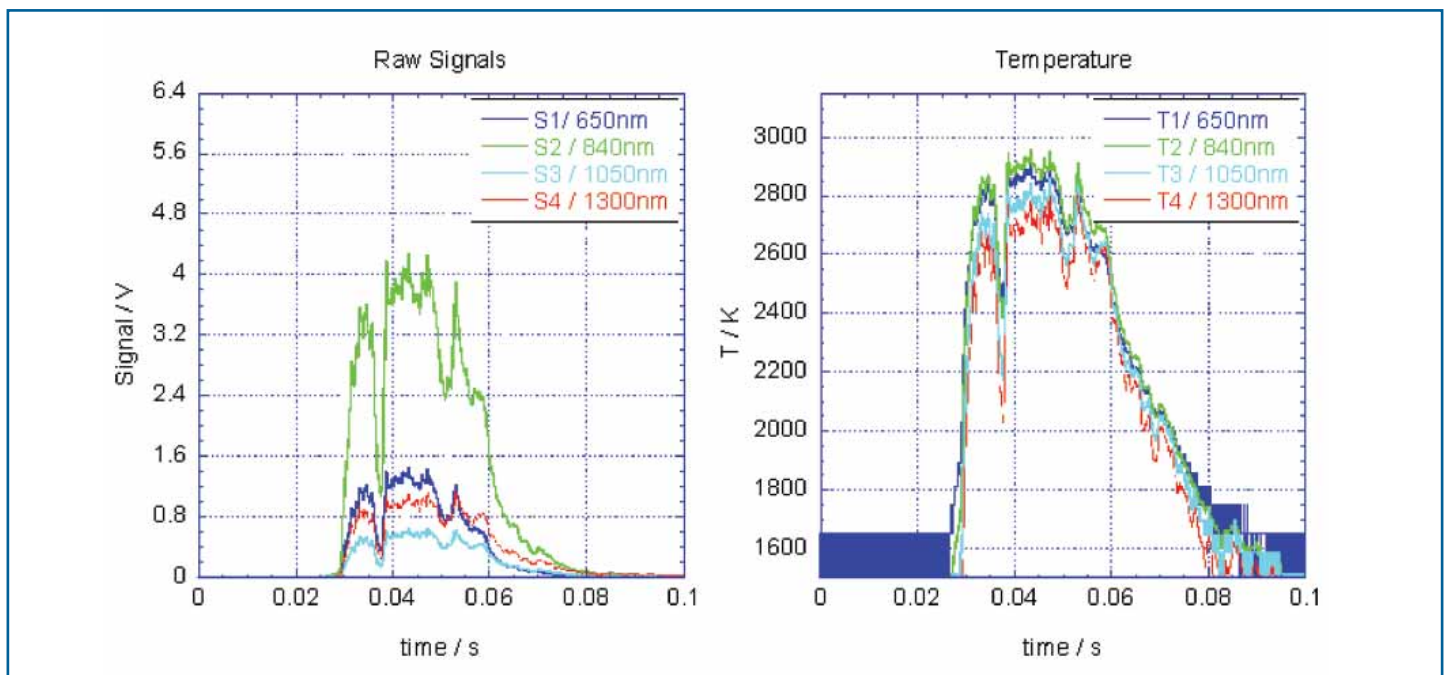
Calibration of the explosion thermometer against a high temperature blackbody (left) and the probe tip showing light exiting the optical fibre during probe assembly (right)

on the effective emissivity of the explosion fireball can be gained. Temperatures of 3000 K and above were regularly measured.

“We delivered a working prototype thermometer to our customer at the end of last year, performed some simple field trials and hope

to measure the temperature of full-scale explosions in the near future.” NPL lead scientist, Gavin Sutton.

For further information, please contact Gavin Sutton on 020 8943 6712 or e-mail gavin.sutton@npl.co.uk



Data collected by the NPL explosion thermometer for a typical pyrotechnic firing. The image on the left shows the raw data and the image on the right shows corresponding colour temperature

Coordinate metrology on the micro-scale

NPL has a new addition to its family of coordinate measuring machines (CMMs): the Zeiss F25. The F25 extends NPL's coordinate measurement capability down to the micro-scale.

The F25 is just one instrument in the suite of state-of-the-art measurement systems provided in support of the CEMMNT (Centre of Excellence in Metrology for Micro and Nano Technologies) partnership. NPL is currently carrying out research into reducing the size of the probing sphere to allow measurement of even smaller structures



F25 contact probe measuring an 8mm diameter verification sphere

NPL has recently taken delivery of a Zeiss F25 Micro-CMM. System commissioning and operator training are complete and the CMM is now available for customer measurements. The F25 has been developed to facilitate the measurement of miniature components and is capable of accurate, 3D measurements of complex, precision-engineered components within a working volume of 100 mm x 100 mm x 100 mm.

The F25 is equipped with both a touch and an optical probe located on the same probe head. The design of the touch probe is based upon a silicon chip membrane and integrated piezo-resistive elements, and the integrated probe stylus is fitted with a precision ball tip. This measurement

system, combined with ultra-precise machine kinematics, enables the F25 to achieve a measuring uncertainty of 250 nm at a resolution of 7.5 nm. This novel touch sensor technology also allows the probe to operate with very low probing forces, of the order of 0.5 mN. The touch probing system is designed for probe styli with ball tip diameters of 125 μm to 700 μm and with stylus lengths of up to 4 mm.

The F25 optical probing system comprises a ViScan camera sensor combined with a high quality objective lens. The optical sensor can provide 2D measurements with a measurement uncertainty of 400 μm and allows the measurement of pliable and delicate components.

The F25 comes equipped with measurement software to allow the operator to perform a wide range of measurement tasks on standard geometric forms or freeform surfaces using a variety of measurement strategies. Applications include diesel injection nozzles, complex moulding tools, highly aspheric or freeform optics, and high aspect ratio microstructures.

For further information, please contact Alan Wilson on 020 8943 8526 or e-mail alan.wilson@npl.co.uk

For the CEMMNT enquiry point, please contact Steve Mason on 07738 894313 or e-mail steve.mason@npl.co.uk

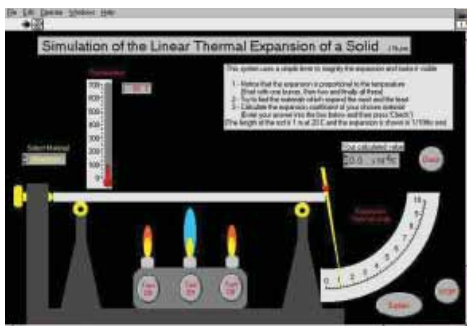
Over 200 interactive physics experiments on CD

Practical experiments in physics classes take time and money to set up, and require teachers to be constantly vigilant that pupils do not break expensive equipment. The Virtual Physical Laboratory is a piece of software designed to give students greater access to interactive experiments, without a greater cost.

The Virtual Physical Laboratory (VPLab) software is a set of over 200 interactive experiment simulations, which cover the majority of subjects that make up the Physics GCSE, AS and A2 syllabuses. This user-friendly package has proved to be very popular with teachers and pupils, who are able to use these experiments swiftly and cheaply, without the time and cost of equipment set up. Pupils can investigate these experiments according to their abilities, and at their own pace, without the fear of breaking something.

"I was astounded at how useful it was. Awarded 5-star = Excellent"
Bernard Taylor, Physics Education Magazine

The topics covered include temperature, stress/strain relationships, forces, sound and waves, amongst many others. The



VPLab simulation of linear thermal expansion. Heat the metal rod with the aid of the Bunsen burners, note the rise in temperature and the expansion on the dial gauge. Calculate the linear expansion coefficient for all the materials – the program will check the answer

package is very straightforward, and can be used as a demonstrator by teachers or individually by pupils. Written by John Nunn (NPL), schools and colleges in the UK and Republic of Ireland can obtain VPLab free of charge when teachers attend a

demonstration, thanks to sponsorship from NPL and IOP (Institute of Physics). NPL and IOP are able to attend teachers' events to provide these demonstrations.

VPLab may be installed on the computer server in the school of the recipient, to allow multi-user access, but it should be noted that VPLab is not 'freeware' and must not be passed on to third parties.

To find out dates and other information about these demonstrations please e-mail the IOP organiser Gary Williams at gary.williams@iop.org

If you are outside of the UK and Republic of Ireland, you can purchase the software from <http://www.vplab.co.uk/>

First European conference on TERFS

Europe's first conference dedicated exclusively to Tip Enhanced Raman Fluorescence Spectroscopy (TERFS) was held at NPL on 24 and 25 January 2008. This event was jointly organised by Debdulal Roy from NPL and the MNT Measurement Club.

The event attracted leading scientists and instrument manufacturers from all over the world to explore and discuss scientific and technical progress in the field.

The event was a great success with over one hundred delegates and nine exhibitors from ten countries in attendance. The high calibre of the exhibitors and delegates ensured there were plenty of opportunities to share knowledge and discuss the potential and the challenges presented by TERFS research. The event ended with a lively and engaging group discussion on the frontier issues in TERFS.



TERFS was first reported 7 years ago. The TERFS technique is the result of the coupling of a scanning tunnelling microscope (STM) (or an atomic force microscope - AFM) with Raman spectroscopy, combining the sensitivity provided by a huge near-field enhancement with the advantages of Raman spectroscopy and scanning probe microscopy. Due to the huge near-field enhancement, TERFS has the potential for single molecule spectroscopy.

NPL is at the forefront of understanding this technique, with an aim of enabling the development of a range of nanotechnologies, and is actively

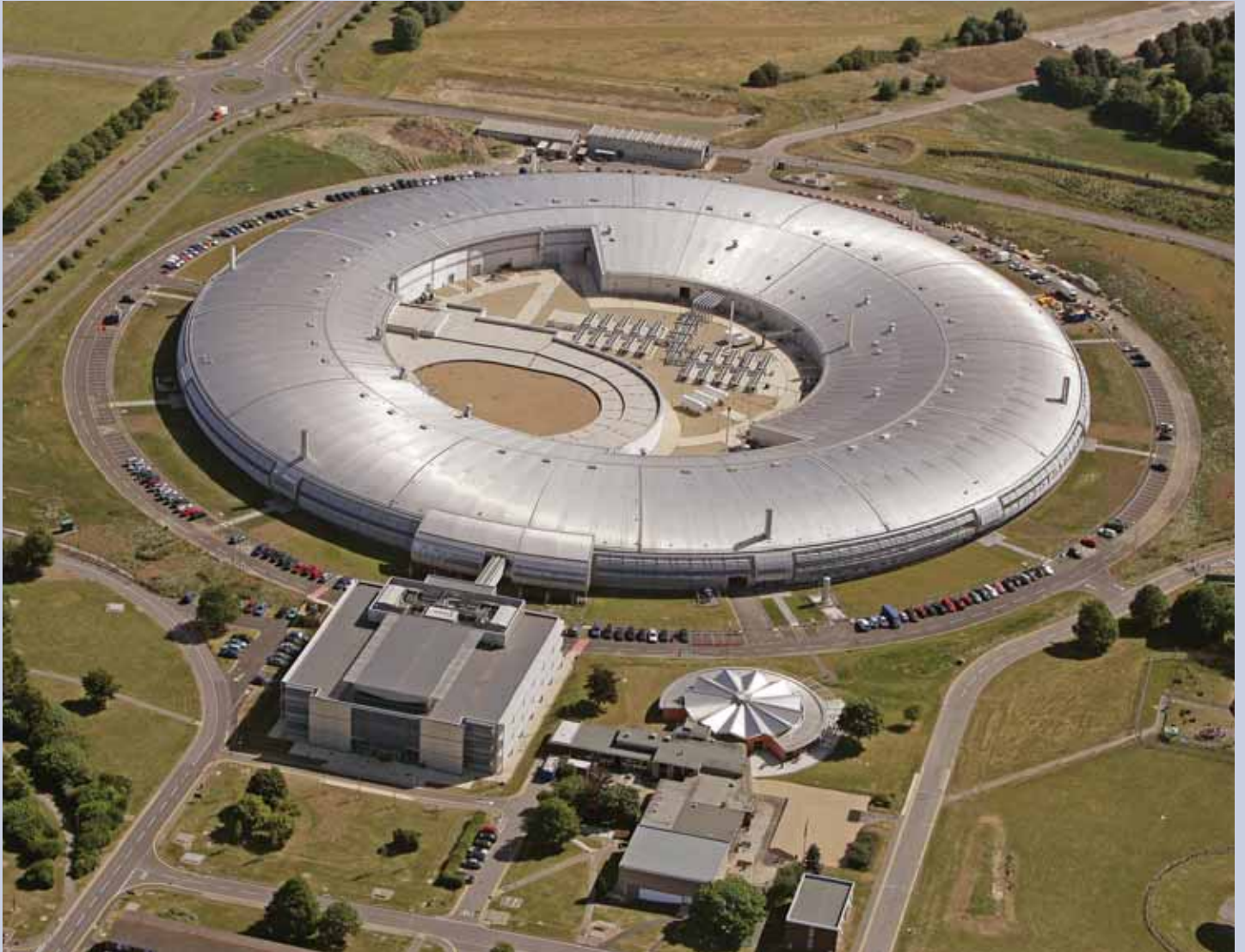
working to develop new international standards for the TERFS technique. This will enable TERFS to become a major tool in the development of a wide range of new products based on nanotechnologies.

For more information on TERFS, please contact Debdulal Roy on 020 8943 6545 debdulal.roy@npl.co.uk

For more information on the MNT Measurement Club, and the benefits of becoming a member, please visit www.npl.co.uk/mnt

Opportunity to meet the buyers for large science facilities

A 'Meet the Buyer' event will be held on 16 September 2008, at Royal Horticultural Halls, London. Bringing together representatives from academia, industry, and UK and Europe-based large science facilities, this event is an important opportunity for industry to showcase their products and services.



Aerial shot of Diamond, a large science facility. The silver building houses the 'synchrotron' machine, which produces pinpoint ultra-violet and X-ray beams of exceptional brightness – used as a series of 'super microscopes'. Image provided by Diamond Light Source Ltd

This combined conference and exhibition will be attended by visiting delegations of procurement and research teams responsible for over £5bn of spending on goods and services. Buyers, engineers and researchers from operational and planned large science facilities will be present to discuss their current and future requirements.

Maintaining large science facilities is a priority for the UK government - to keep UK researchers competitive and at the forefront of their research by giving them access to these facilities. Large science facilities include well known

examples such as CERN, the Diamond Light Source and the Lovell Telescope at Jodrell Bank.

A number of science sectors will be represented, including space, telescopes and energy research, and also a number of product and service sectors - such as instrumentation, facilities engineering and IT.

This event offers a great opportunity for commercial people, engineers, technology transfer officers, researchers and procurement managers to network and learn about existing and planned large facilities.

Organised by the Sensors & Instrumentation Knowledge Transfer Network (SIKTN), the Science & Technology Facilities Council (STFC), the National Physical Laboratory (NPL) and UK Trade & Investment (UKTI), the day is guaranteed to be a success.

To register to attend as an exhibitor or as a delegate, please e-mail meetthebuyer@stfc.ac.uk

For further information please visit <http://www.qi3.co.uk/events/event.asp?EventID=201>



If you would like further information on any aspect of

NPL Engineering Precisely, please contact:

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Forthcoming events

1st British Composites Society Conference

2 – 3 September 2008, NPL, Teddington

The purpose of this conference is to bring together active members of the UK composites community, informing and providing an overview on current areas of research.

Contact: melanie.boyce@iom3.org
<http://www.npl.co.uk/server.php?show=ConWebDoc.2808>

Meet the Buyer Event for Industry: Doing Business with the World's Scientific Research Facilities

16 September 2008, Royal Horticultural Halls, London

<http://www.qi3.co.uk/events/event.asp?EventID=201>

Another Side of Fashion - The Fashion for Smart Materials

18 – 19 September 2008, Dana Centre, Science Museum, 65 Queen's Gate, South Kensington, London SW7 5HD

The aim of this networking event is to raise the profile and awareness of the value that fashion and design can bring to the development and commercialisation of new products and materials amongst the science and technology communities. Includes:

• Products & Materials Bazaar

18 – 19 September, All day, d.lounge, Dana Centre

An exhibition of materials, products, demonstrators, posters and fashion visualisations to inform and inspire.

Open to the public, free admission. If you would like to showcase your technology, materials, products or concepts in the Bazaar, or submit a poster, please email Sharon Baurley: s.baurley@csm.arts.ac.uk

• Public Debate

18 September, 7.00pm – 8.30pm, d.café, Dana Centre

Features presentations by experts in the fields from fashion, smart materials, and digital communications, and will be facilitated by Rory Cellan Jones, the BBC's technology correspondent.

To participate please book tickets via the Dana Centre: www.danacentre.org.uk
Admission is free and tickets will be available from August.

• Workshop for Specialists

19 September, 9.30am – 4.30pm, d.studio, Dana Centre

The aim of this workshop is to inform the research agenda for smart materials by producing a set of research priorities and a roadmap for the area of smart materials and digital technologies in fashion.

If you would like to attend, please register your interest by emailing Odette Valentine: odette.valentine@npl.co.uk
<http://www.npl.co.uk/server.php?show=ConWebDoc.2739>

Radiometric Calibrations of Instrumentation

24 September 2008, NPL, Teddington

<http://www.npl.co.uk/server.php?show=ConWebDoc.2749>

NanoFinance 2008: Fostering Wealth Creating SMEs in UK Nanotechnology

25 September 2008, Institute of Directors, Pall Mall, London

<http://www.npl.co.uk/server.php?show=ConWebDoc.2809>

CompTest 2008

20 – 22 October 2008, Dayton, Ohio, USA

The 4th International Conference on Composites Testing and Model Identification

Contact: bill.broughton@npl.co.uk
<http://academic.udayton.edu/stevendonaldson/comptest2008.html>

Nano-Molecular Analysis for Emerging Technologies III & Surface Science of Biologically Important Interfaces 10

5 – 6 November 2008, NPL, Teddington

Contact: louise.dean@npl.co.uk
<http://conferences.npl.co.uk/nmaet/>

Time and Frequency User Club meeting

12.00pm – 5.00pm, 3 December 2008, IET, Savoy Place, London

This meeting will have three themes: time and timekeeping, location based services and timing in science. If you would like to present within any of these topics, please contact: gill.roe@npl.co.uk
<http://www.npl.co.uk/server.php?show=ConWebDoc.2395>

Wheatstone Lecture: Time By Wire: 175 years of the Greenwich Time Service

3 December 2008, IET, Savoy Place, London

This event starts at 6.00pm with a networking buffet. The lecture will start at 7.00pm

The lecture is free to attend. There is a charge of £15 for the buffet.
<http://www.theiet.org/events/2008/wheatstone.cfm>

14th International Congress of Metrology

22 – 25 June 2009, Paris, France

http://www.metrologie2009.com/index_en.php