



CONNECTING TEACHERS TO THE WORLD OF MATERIALS,
MINERALS AND MINING

news

Issue 41

Autumn Term 2012

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A NEW YEAR AND A NEW START!

Welcome to the first electronic-only copy of the SAS newsletter. For the moment I am going to stick with the same format with a central four page technical article. This may evolve as we all get used to the new system and if you have any comments or suggestions as to how the newsletter should look or what it should contain in the future please get in touch. Hopefully, if all the technical wizardry is working as it should you can contact me simply by clicking on the hyperlink to my email address which appears throughout the newsletter.

If you have sixth form students studying physics, chemistry and design & technology why not book to take them on one of our Autumn Open Day Programme events. These are now in their 11th season and still as popular as ever. Full details can be found on page 3.

This issue features two other areas of interest to the Design and Tehcnology teachers amongst you. Firstly the briefs for the 2013 Schools Starpack competition have been announced recently. These all link in nicely with the KS3, 4 and AS level syllabus, particularly for graphics and are a great way of encouraging your students to participate in real life projects.

On page 6 you can find out about the prestigious Arkwright Scholarships which are designed to support, inspire and nurture the next generation of engineering leaders Studying D&T is a requirement for all applicants.

There is all the usual stuff as well so I hope that you enjoy reading! Perhaps see you at the ASE conference in January.



This newsletter is produced by Dr Diane Aston, Training and Education Executive.

If you have any comments or articles please contact Diane by emailing Diane.Aston@iom3.org or write to her at The Institute of Materials, Minerals and Mining, Grantham Regional Centre, The Boilerhouse, Springfield Business Park, Caunt Road, Grantham, Lincolnshire, NG31 7FZ

POLYMER STUDY TOURS 2013

Following the success of the Polymer Study Tours this year, the organisers were keen to publicise the dates for 2013 early to give you as much chance as possible to get permission to attend! In 2013 the courses will be running as follows:

Edinburgh Napier University	23 to 26 June
London Metropolitan University	30 June to 03 July
Manchester University	07 to 10 July

The four day residential courses are a unique blend of lectures, workshops, laboratory sessions and industry visits. They have been designed to improve your knowledge of polymers in terms of their structure, properties, processing and sustainability.

A typical programme includes:

Day 1 Starts Sunday afternoon to allow travel to the venue

- Introduction to the course and plastics industry
- Education support from the Institute of Materials Minerals and Mining
- Dinner followed by an informal ice-breaker event

Day 2

- Lectures on Polymer Materials and Applications
- Workshop in the labs including hands-on processing and testing
- Dinner with guest lecture from local industrialist or academic

Day 3

- Industrial visits to local plastics processing companies
- Course dinner with short speech by an Officer from the Worshipful Company of Horners

Day 4 Course closes by 1600 allowing for travel arrangements

- Practical on polymer identification and testing
- Lectures on History and Design of Polymer Products, Sustainable Environment, Polymer Industry and Support for Schools
- Final session – evaluation, development and improvement

The courses are always well received by teachers and here is what some previous delegates had to say about their experience...

“I now have a clearer more comprehensive understanding of the important role that plastics play in society”

“I had been concerned that the course might be aimed at chemistry teachers and although I might find it interesting it would not benefit my product design classes, how wrong could I have been!”

“Our day in the labs enabled us to get hands on contact with a variety of processes that we had little experience of”

The courses are fully sponsored by the Worshipful Company of Horners, the BPF and companies operating the polymer industry. However, in order to secure your place a £50 deposit is required, which will be returned with your attendance certificate following completion of the course. You can find out more about the courses and register by visiting www.polymer-teaching-resources.co.uk or www.iom3.org.uk/sas. If you would like to check availability before you book please email diane.aston@iom3.org.



The University of Manchester



AUTUMN OPEN DAYS 2012

You still have a little bit of time left to register to attend one of the Autumn Open Day Programme events later this term.

These events, which have been going for over 10 years, are designed to give you the chance to have a lesson outside that classroom using equipment and resources that are not available in school. It also gives your students the chance to experience working in a world class research department and find out more about courses in materials.

The sessions are typically led by lecturing staff and postgraduate students who do an excellent job of bringing materials to life. Students are able to test and observe materials themselves.

The following dates and venues are still available:

VENUE	MAX NUMBER	DATES AVAILABLE (TIME OF SESSION)
University of Birmingham	30	07 Nov (1400 to 1630)
Edinburgh Napier University	40	07, 28 Nov (1230 to 1530)
Imperial College	20	28 Nov (1230 to 1600)
University of Leeds		Fully booked
University of Loughborough	15	06 Nov (1300 to 1530)
University of Manchester	25	21 Nov (1400 to 1600)
University of Oxford	20	14 Nov 1030 to 1500
Queen Mary, University of London	40	09, 16, 23 Nov 1030 to 1500
University of Sheffield	20	28 Nov (1300 to 1500)
University of Swansea	35	21 Nov (1230 to 1530)

Please note, since the last issue QMUL and Swansea have both added dates.

These events are free of charge for you and your students to attend; you just need to make your own arrangements to get to and from the venue.

Bookings are allocated on a first come first served basis so get in early to avoid disappointment! To do this you can download a form from the website, www.iom3.org/AODP. Here you will also be able to get the most up-to-date list of dates and venues available.

TEXAS INSTRUMENTS- NSPIRE CX 'EVALUATION KITS' ARE NOW AVAILABLE

TI-Nspire CX evaluation kits are available specifically for **Mathematics, Biology, Chemistry** and **Physics**, which enable you to discover all the opportunities that using TI-Nspire can offer you and your department.

Mathematics Kits

The mathematics kits include five TI-Nspire CX handheld devices, TI-Nspire Teacher Software (90-day trial version) and a TI-Nspire CX Docking Station for handheld storage, recharging and file sharing.

Science Kits

The science kits also include TI-Nspire Lab Cradles and a selection of sensors and probes that are suitable for your specialist subject area.

To find out more and to arrange your loan now, click the link below, visit <http://education.ti.com/calculators/products/UK/loan/> or email etcuk@ti.com.

[Reserve your TI-Nspire CX Evaluation Kit »](#)

SCHOOLS STARPACK PACKAGING DESIGN AWARDS 2013

- *Gain recognition for your school*
- *Prizes of up to £500*
- *Certificates for all winning students*

The Schools Starpack Packaging Design Awards, now in their 14th year, form part of IOM3's Annual Awards programme. The briefs provide excellent opportunities for individual Key Stage 3, 4 and AS level students.

They link in nicely to the KS3, KS4 and AS level D&T syllabus, particularly for graphics, and are a great chance to enter your best students to a prestigious competition with very little extra work on your part.

In addition to monetary prizes, this year one of the sponsors is offering an all expenses paid trip for up to 40 students to their most advanced manufacturing plant!

SNAPSHOT OF THE 2013 BRIEFS

Brief A – Toiletry Gift Pack Key Stage 4 and AS level.

Sponsored by Benson Group

Using predominantly cartonboard, design and construct a gift pack to hold a range of 100ml miniature toiletry items. Develop a pack for the chosen brand considering identity and target market.

Brief B – Ribena Drinking Bottle Key Stage 3 and 4

Sponsored by Logoplaste UK Limited

Design and model a Ribena container to replace the current tetra carton with straw. The design should be targeted at being used in lunchboxes for children.

Brief C – A new concept in recycling waste packaging Key Stage 3, 4 & AS Level

Sponsored by the British Polythene Industries plc

Design an innovative and multifunctional collection receptacle for waste packaging, together with a logo or symbol which raises awareness of the need to recycle.

For a brochure giving full details of the briefs, guidelines and advice for teachers please contact Rachel Brooks by emailing Rachel.brooks@iom3.org or 'phoning 01476 513885.

Alternatively visit www.starpack.uk.com/schools.

The closing date for entries is 01 March 2013



Starpack Awards

The Benson group



British Polythene Industries PLC

Starpack is organised by IOM Communications Ltd and endorsed by the Packaging Society, a division of the Institute of Materials, Minerals & Mining.

SAS NEWS

Firstly can I say a huge thank you to all that have responded to our letter asking for confirmation that you still want to remain part of the Scheme and providing the best email address. We will slowly start to introduce our half-termly update and send notification of the newsletter by email. Please do make sure that you let us know if your email address has changed and provide us with an alternative if possible. Email will be our main method of communication in future and we would hate for you to miss out!

Conference news

I would also like to say thank you to the people that attended our conference for teachers in July. 'A sporting performance by advanced materials' took place at our London Headquarters on 04 July and was part of the Institute's International Week. The ten delegates were treated to fascinating talks from Jenny Tilley, Chris Hallas and Gervais Sawyer on a range of topics relating to materials in sporting applications. They also got to meet the finalists taking part in the Young Persons World Lecture Competition and find out what inspired them to go in to careers relating to materials. The afternoon practical session, run by Anne Martyn, gave teachers the chance to play with some materials commonly used to make sports equipment, particularly composites.

The next event will be taking part in July 2013 on Biomaterials to link in with the SAS resource for 2012-2013. Details will appear on the SAS site as soon as the venue and date have been confirmed so watch this space for details!

School visits

Although the number of visit I do has decreased with increasing commitments in other areas of my role I am still able to offer about 70 bookable slots per year and am willing to travel anywhere in the UK. The sessions on offer are curriculum related and suitable for any age group and any size group. They can be used to support a particular area of the curriculum or give students an inspiring overview of the world of materials to encourage them to consider STEM careers.

The charges will remain the same this year - £150 for one talk or £200 for two talks and we would encourage you to spread the cost by inviting other local schools along to listen.

I still have plenty of dates available for this academic year so for more information or the list of available dates please [get in touch!](#)

Discovery Boxes

It feels like it has taken an eternity to get here but the Materials Discovery Boxes are finally ready to go!!

We have ten boxes ready and waiting to be booked by you! All you need to do is decide which week you want to borrow the box and then contact my colleague, [Jacqui Clark](#) who is looking after bookings. Your box will be delivered by courier by 1200 on the Friday preceding you chosen week so that you have the weekend to familiarise yourself with the contents. You then have it to play with all the following week. You will need to ensure that everything is packed away in its rightful place and the box left somewhere safe in reception by the end of school on Friday as the courier will come to collect it again sometime on the next Monday.

The cost to borrow a box is £40 plus a £200 refundable deposit.

We hope that you and your students will have great fun exploring the unusual examples of materials contained in the boxes and that you will give us detailed feedback on what you have done with the box so that others can benefit.

PRESTIGIOUS ENGINEERING SCHOLARSHIPS

Established in 1991, the Arkwright Scholarships Trust is a charity that inspires and nurtures future leaders in engineering and related areas of design.

Arkwright achieves this aim by awarding Engineering Scholarships to high-calibre Year 11 pupils (S4 in Scotland) to support them throughout their studies in Years 12 and 13 (S5 & S6). The Scholarships are sponsored by Industry, Charitable Trusts, the Armed Services, Professional Institutions, Trade Associations and Personal Donors.

The Scholarships consist of:

- a £600 Scholars' financial award to support the purchase of books, equipment and project materials;
- enrichment activities such as company visits;
- free or discounted membership to some professional institutions;
- free CREO design software and training in its use.
- Schools receive £400 for each Scholarship awarded to their students.

The scheme has proven benefits and case studies demonstrate the outstanding exam results and excellent careers that Scholars have gone on to achieve.

Arkwright's track record means that it is one of the most prestigious Scholarship schemes in the UK. Dr Martin Thomas, National Director, says: "Arkwright Scholars are not only academically excellent, but also show a strong practical problem-solving ability. For this reason, our Scholarships are highly respected by university admissions tutors and industry recruiters."

Arkwright requires all applicants to be taking GCSE Design & Technology and to complete a two-hour aptitude paper following submission of their application. The best candidates are then interviewed.

Arkwright works with the Design & Technology Departments in over 780 schools across the UK and works in partnership with IOM3 and others to maximise the scheme's benefits.

Schools must be affiliated to the Arkwright Scholarships Trust in order to submit applications. Affiliation is quick, simple and **FREE**, visit www.arkwright.org.uk/schools for more details or call the Arkwright team for a no-commitment chat on 01926 333210.

Dr Martin Thomas, National Director of the Arkwright Scholarships (and a Materials Engineer!) talks about these prestigious awards.



Arkwright Scholars receive their awards.



MATERIALS POSTERS FOR SCHOOLS

For a number of years I have been visiting Bath Spa University to talk to the students on the Physics Enhancement Course. On a couple of occasions I have been asked to judge their competition in which students had to design a poster on a materials theme. One of these posters will be featured in each issue this year.

TITANIUM

This striking poster by James Hudson explores the properties, origins and applications of titanium.

A PDF version of the poster is available to download under the 'Technical Articles' section of the SAS website. This will print nicely at A3 or larger if you have the facility to do so.

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Images from fotolia image library. Available from: www.fotolia.com



NITROGEN

- ♦ Nitrogen has atomic number 7 and atomic mass 14. It sits in Group 15 (VA) of the Periodic Table between carbon and oxygen and with phosphorus below.
- ♦ Nitrogen melts at -210°C and boils at -196°C and has a density of 1.251g.l^{-1} at 0°C . Solid nitrogen has a density of 1.035kg.m^{-3} at 4K.
- ♦ At room temperature it is a odourless, colourless gas. Nitrogen forms diatomic molecules, N_2 , in which the two nitrogen atoms are very tightly bound together by a triple covalent bond.
- ♦ Nitrogen accounts for 78% of the Earth's atmosphere but is relatively rare in the crust.
- ♦ Compounds of nitrogen have been known for hundreds of years, for example the Alchemists of the Middle Ages new nitric acid as *aqua fortis* (strong water).
- ♦ It was not until the late eighteenth century that nitrogen was identified as an element in its own right. A number of notable scientists of the time, namely Henry Cavendish, Joseph Priestley, Carl Wilhelm Scheele and Antoine Lavoisier, were carrying out experiments on air but did not isolate or identify nitrogen as an element. The first time that it was suggested that nitrogen was an element was in the doctoral thesis of a Scottish student, Daniel Rutherford in 1772.
- ♦ The name nitrogen originates from the Greek *nitron* and the French *genes*.
- ♦ Nitrogen gas is produced by the fractional distillation of air. It has many uses which rely on its inert nature. It is used as an inert atmosphere for packaging, as a dielectric gas in high voltage equipment, as a protective layer on top of explosives and for filling car and aircraft tyres. It can also be used to replace carbon dioxide as the propellant in the widgets in beer cans.
- ♦ Liquid nitrogen can be stored and transported under pressure. It is used as a cryogenic agent for preserving blood and other tissues and to cryogenically remove warts. It is used to keep sensitive laboratory and computer equipment cool.
- ♦ Nitrogen is the fourth most abundant element in the human body and is a key ingredient of amino acids and DNA. It is also vital to plants.
- ♦ The most commonly used nitrogen compound is ammonia, NH_3 , which is made in vast quantities using the Haber Process and is used in fertilisers.
- ♦ Many compounds of nitrogen are explosive, notably trinitrotoluene (TNT), nitrocellulose (guncotton), nitrogen triiodide and nitroglycerin (the explosive ingredient in dynamite). It is also one of the key elements in the production of gunpowder.
- ♦ Nitrous oxide (N_2O) or laughing gas is used as an anaesthetic and another oxide of nitrogen, N_2O_4 , is used as the oxidising agent in many rocket fuels.



Liquid nitrogen is a colourless liquid which boils at -196°C . From <http://en.wikipedia.org/wiki/File:Liquidntr nitrogen.jpg>.



Explosive compounds of nitrogen such as TNT and nitroglycerin in dynamite are extensively used in rock blasting. From http://commons.wikimedia.org/wiki/File:Blasting_honkanummi_4-6.jpg

Where can I find out more?

<http://en.wikipedia.org/wiki/Nitrogen>

<http://www.webelements.com/nitrogen/>

<http://www.chemicool.com/elements/nitrogen.html>

<http://education.jlab.org/itselemental/ele007.html>

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