



## CONNECTING TEACHERS TO THE WORLD OF MATERIALS, MINERALS AND MINING

# news

**Issue 44**

**Autumn 2013**

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### GOOD BYE SUMMER, HELLO AUTUMN

I always find the summer holidays a good time to try and catch up on some of those jobs that have not quite got finished (or started!) during the hectic term time, reflect on the year that has ended and start planning for the upcoming chaos of September.

So with this issue I'd like to try and highlight some of the interesting and useful things that are coming up that I hope you will find helpful in your planning.

I have included information on our Autumn Open Day programme and Starpack awards, and to really help you with your forward planning, details of the 2014 Polymer Study Tours.

There is still time to register to take part in the 2013-2014 Armourers and Brasiers Sixth Form Materials Prize and inside you can find out more information on how you can do this. If you already have you might want to think about booking a Discovery Box. On page 8 one member talks about how he used the box and why he found it useful.

Finally I hope you have a great term and look out for the next issue in January!



***This newsletter is written and edited by Dr Diane Aston, Education Executive.***

If you have any comments or articles please email [diane.aston@iom3.org](mailto:diane.aston@iom3.org) or write to her at the Institute of Materials, Minerals and Mining Grantham Centre, The Boilerhouse, Springfield Business Park, Caunt Road, Grantham, Lincolnshire, NG31 7FZ.

## AUTUMN OPEN DAYS

This is a final reminder that there is still time to book on to one of our Autumn Open Days for this year.

We have been working with the materials departments around the UK for many years now to put on a programme of events that is specifically designed to enrich the teaching of materials in post-16 courses. You will have access to equipment not normally available in school and experts in materials that your students can question.

The following events still have spaces available and all you need to do to book is email [diane.aston@iom3.org](mailto:diane.aston@iom3.org) with your chosen date!

| Venue                       | Max number | Dates available (time of session) |
|-----------------------------|------------|-----------------------------------|
| University of Birmingham    | 30         | 06, Nov<br>(1400 to 1630)         |
| Edinburgh Napier University | 40         | FULLY BOOKED                      |
| University of Leeds         | 40         | FULLY BOOKED                      |
| University of Loughborough  | 15         | FULLY BOOKED                      |
| University of Manchester    | 25         | 20, 27 Nov<br>(1400 to 1600)      |
| University of Oxford        | 20         | 12 Nov<br>1030 to 1500            |
| University of Sheffield     | 20         | 28 Nov<br>(1300 to 1500)          |
| University of Swansea       | 35         | 20 Nov<br>1230 to 1530            |

**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! If you have a particularly large group you are more than welcome to book two sessions at the same venue.

To book you can or visit the [website](#) and download a registration form. The most up-to-date list of dates and venues available is also published on the website.

Many schools have been return bookers since the launch of this initiative in 2002 and I think that is a great way to demonstrate their value.

In addition to being able to use world class research facilities they are also an excellent opportunity for your students to meet undergraduates and find out about careers in materials.

## Typical activities

The exact nature of the activities varies from venue to venue, but they are all designed to give students a greater insight into the world of materials and link in with the curriculum.

Typical activities include:

- ♦ Mechanical testing. Tensile testing and impact testing of a range of materials to look at how properties are related to structure.
- ♦ Optical and electron microscopy. Students will be able to view materials on a range of scales.
- ♦ General introductory lecture on materials and their uses.
- ♦ Special sessions on biomaterials, smart materials, nanomaterials, magnets and forensics.

Once you have booked you can contact the member of staff in the department to discuss your exact requirements so that the session can be tailored to your specific needs.

For more information please [get in touch!](#)

## SCHOOLS STARPACK 2014 – NOW OPEN FOR ENTRY!

### Celebrating Excellence in Packaging Design & Technology

The Starpack School Awards 2014 are now open for entry and we are looking for new schools to enter and show us what your students are capable of! With a **closing date of 7 March, 2014** you have plenty of time to get your students working on a brief.

#### Brief A - Movie night with friends

We all enjoy spending an evening at home with family and friends watching a good film. The challenge is to design a pack that combines two snacks in a fun and creative way to share around the group. Popcorn, sweets and nachos are all popular snacks, but if you have another favourite include this instead. Consider the sharing element of the pack and how users interact with the packaging. Can the pack be themed for a particular film or brand?

#### Brief B - Miniature washing up liquid container for leisure markets

Design a miniature washing up liquid container for use by campers and caravan holidaymakers where size, convenience and ease of use are really important as much as the pack being optimised for travel. The solution could be a bottle, pouch, or other suitable container.

#### Brief C - Car Kid Tidy

With the long summer holidays come the long summer car journeys. To maintain family harmony, it is essential that each child's 'stuff' is kept easily accessible; distinct from sibling 'stuff' and safe from absorption into the folds of the upholstery. To meet this perennial need the student is asked to design a Car KidTidy that can be packed prior to the journey with each child's journey essentials.

Details of the full briefs can be found at

[www.starpack.uk.com/schools](http://www.starpack.uk.com/schools)

Follow @starpackawards on Twitter

'Like' on Facebook [www.facebook.com/starpackawards](http://www.facebook.com/starpackawards)



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

## SNAPSHOT OF THREE WINNERS FROM 2013

In 2013, the Starpack Schools Awards welcomed more than 200 entries. Schools from Yorkshire to China sent in their packs to compete for the top prizes. **Bungay High School** in Suffolk blew away the competition and in addition to numerous individual prizes for students, took the Best School Award from two sponsors – British Polythene Industries and Logoplaste UK Ltd.

### 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.

**Gold star winner:** Charlotte Flanagan, Hull College  
Judges' comments: "Beautiful, absolutely gorgeous piece of novel packaging. Ready for market – stunning."



### 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.

**Goldstar winner:** Kate Racho, Bungay High School  
Judges' comments: "An explosion of colour and ideas well developed to given brief. Excellent presentation and graphic skills throughout."



### 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.

**Goldstar winner:** RiannaCoote, Bungay High School  
Judges' comments: "Integrated thought and design and clear suitability of logo and receptacle."



## ARMOURERS AND BRASIER'S TATA SIXTH FORM MATERIALS PRIZE

Although the official closing date for registering your interest to take part in the 2013-2014 Armourers and Brasiers Sixth Form Prize has passed you still have a couple of 'last minute' weeks to sign up.

The Prize is being run as a competition throughout the upcoming academic year and it has been designed to encourage your students to think about the broad range of careers in STEM and, in particular, to learn more about the materials that are used around them.

The Prize has been structured such that you can work through one module each half term and the themes of the modules have been chosen to show students the impact materials have had on our technology and to link in with aspects of post-16 STEM courses.

There is no restriction on the number of pupils from one school taking part, but at the end of the year you will need to choose your top five candidates to put forward to the national competition. You should base your judging on the Portfolio of Experiences that your students will have been building throughout the year and on the short presentation they have to give as part of the final module.

The judges will select their top 6 candidates to come and present at the final in London in early December 2014. The Prizes for the finalists and their schools are pretty impressive!

|                      | Student   | School                        |
|----------------------|-----------|-------------------------------|
| First prize          | £1500     | £1000 and IOM3 SAS membership |
| Second prize         | £750      | £500 and IOM3 SAS membership  |
| Best portfolio prize | £500      | £500 and IOM3 SAS membership  |
| 3 runners up         | £250 each | IOM3 SAS membership*          |

You can find out more about the competition and sign up by visiting [www.iom3.org/A&B-TataPrize](http://www.iom3.org/A&B-TataPrize). The very last date you can sign up to take part (or just have a look at the course materials!) is Friday 13 September 2013.



**TATA STEEL**

## POLYMER STUDY TOURS 2014

The 2013 Polymer Study Tours are now a distant memory and we are already ploughing ahead with our planning for 2014. Venues have already been booked and in 2014 the courses will be taking place as follows:

**Edinburgh Napier University** 22 to 15 June  
**London Metropolitan University** 29 June to 02 July  
**Manchester University** 06 to 09 July

The timetable is broadly the same at all three venues; each course is a mixture of lectures, lab classes, workshops, discussions and industry visits with some socialising thrown in for good measure.

\\I know that you have read about the course content in newsletters many times before so I thought it might be better for some previous delegates to tell you why you should attend!

*“The Polymer Study has opened my eyes to the world of plastics and their capabilities. We take these wonderful materials for granted and do not realise how much they are incorporated into our everyday lives. This tour has allowed me to see how far we have come within the plastic industry as well as giving me an insight into how much more we can do and achieve with polymers.”*

*“I have already urged several of my colleagues to keep an eye out for next year’s event and have used the knowledge and resources gained from the course to update this year’s projects.”*

*“I am a newlyqualified Chemistry teacher and am keen to integrate D&T with my subject. I believe that polymer construction, making, and manufacturing is a great way to do this. The tour provided me with the knowledge and resources to allow me to teach confidently and comfortably about all aspects of polymers and I would highly recommend it to my future colleagues.”*

*“The four days of study was intensive and beneficial and I am sure the knowledge I have gained will benefit my students.”*

The courses are fully sponsored by the Worshipful Company of Horners, the BPF and companies operating in 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.iom3.org.uk/pst](http://www.iom3.org.uk/pst). If you would like to check availability before you book please email [diane.aston@iom3.org](mailto:diane.aston@iom3.org).



**The PST Steering Committee would like to thank the following companies for their kind sponsorship of the courses in 2013:** Advanced Insulation Plc, Scottish Plastics & Rubber Association, Tangram Technology, Harlequin Plastics, Victrex Polymer Solutions, British Polythene Industries PLC, INEOS Technologies, Gabriel-Chemie UK Limited, BPF EPS Group, BPF Polymer Distributors & Compounders Group, British Plastics Federation (BPF), Manchester Polymer Group, RPC Containers, Distrupol Ltd, BASF.

## SAS NEWS

This year is looking to be a busy one with lots of visits already planned throughout the year and some exciting opportunities in terms of new projects and ventures. In the SAS News section in this issue you can find out more about the latest SAS resource, read about one teacher's experience of borrowing a Discovery Box, and see where the most recent issues of MW could help with your teaching.

### SAS resource for 2013-2014

We were very lucky to have an intern with us over the summer developing the new SAS resource for this year. Daniel Stevens had just finished his first year studying materials at Manchester when he joined us for the summer and had to go back to school! The fabulous resource that Dan developed (I'll let you read more about it in the article on page 12) just needs a bit of final tweaking and then it will be uploaded to the SAS website for you to download and use. We hope that you will be able to use it with everyone from year 6 pupils during transition to sixth formers wanting a more light-hearted way to investigate materials! If you like this resource (or don't) please [let us know!](#) This is the first time we have developed anything like this and it has been a fun experience!

### Diane's Diary!

Here are my bookings so far this term. As you can see there are spaces still available so if you would like to discuss or book a visit please [get in touch!](#) We can offer something tailored to your needs, you just need to ask!

|       |                                      |
|-------|--------------------------------------|
| 20/09 | Broomfield Primary School, Leicester |
| 26/06 | Goldsmiths, Univ of London           |
| 30/09 | Ampleforth College, nr York          |
| 03/10 | Servite Primary School, London       |
| 04/10 | Stonyhurst College, Clitheroe        |
| 18/10 | Birmingham City Uni                  |
| 23/10 | IoP Teacher CPD, Dulwich             |
| 04/11 | Sibford School, Banbury              |
| 12/11 | Wolverhampton College                |
| 14/11 | Holy Cross Primary, London           |
| 18/11 | Crypt School, Gloucester             |
| 02/12 | St Alban's School                    |
| 09/12 | Tameside College                     |

Events for 11 to 19

Events for 7 to 11

Events for teachers

## Sir Colin Humphreys Education Award

Nominations are now open for the 2014 Sir Colin Humphreys Education Award. This is one of the Institute's Premier Awards and it was set up to recognise the efforts of those that make a difference in the 11 to 19 education sector by improving students' knowledge of materials. If you think you should be the next winner you need to get your head teacher or head of department to nominate you! You can find out how to apply by visiting

<http://www.iom3.org/content/iom3-medals-prizes>



The winners of the Sir Colin Humphreys Education Award for 2013 were presented with their Prize at an awards ceremony on board HMS Wellington in July. Mark Rogers (Head of Design Technology) and Warren Dransfield-Scott (Head of Physics) from King Edward VI School in Lichfield received their award from Institute President Jon Binner.

## USEFUL ARTICLES FROM MATERIALS WORLD

Materials World can be a great source of information but it can be quite a slog reading it from cover to cover to pick out the useful bits. So to save you time we've done it for you! Here is a round-up of the useful articles from the last 4 issues. Don't forget, you can read Materials World by logging on to the [website](#) and clicking on [Materials World](#).

| Month                           | Article title                                     | Page  | Description  | Key words   |
|---------------------------------|---|---|--|---|
| May 2013                        | The many guises of Asphalt                        | 3   | Information on the varied uses of asphalt  | Construction materials                              |
|                                 | A magnetic future                                 | 10  | Investigation in to the uses of ferrite magnets  | Magnets - physics                                   |
|                                 | Hard graft  | 13  | A summary of a lecture given on biomaterials for skeletal repair   | Biomaterials - biology - chemistry - medicine       |
|                                 | Closing the skills gap                            | 20  | Companies are finding it hard to recruit materials science graduates and this article looks at the impact of this trend.                     | Materials Science - Engineering - Careers           |
|                                 | Professional Development                          | 22  | Information on the importance of choosing an accredited course and the benefits of becoming chartered  | Careers   |
|                                 | Bullet proof                                      | 26  | An insight into a collaborative project looking at how ceramics can be used in armour  | Ceramics - mechanical properties                    |
|                                 | A meeting of materials                            | 30  | An explanation of how researchers in China are developing new ceramics based on biological materials.  | Ceramics - biology - characterisation               |
|                                 | Q&A with Dr Charles Marsden                       | 32  | An interview with Dr Charles Marsden, Technical Director at Dynamic- Ceramic.  | Ceramics - careers                                  |
|                                 | Driving Force                                     | 34  | An overview of the current and potential uses of ceramics in the automotive sector.  | Automotive - ceramics                               |
|                                 | In training                                       | 38  | A round up of progress in the Crossrail project  | Transport - tunnelling                              |
| Materials for aeroplane engines | 52  | An overview of the materials used in aeroplane engines. | Metals - aerospace   |   |
| June 2013                       | <b>Printable bionic ear</b>                       | 5   | Researchers are developing technology to combine cell cultures with electronics.   | biomaterials - electronics - biology                |
|                                 | Brimstone to fire batteries                       | 12  | A process has been developed for using a sulphur-based plastic in batteries.   | chemistry - batteries                               |
|                                 | Dreams of a melting house                         | 14  | Construction used in large scale art installations.  | Construction - art - materials                      |
|                                 | Silicon circuits for biomedical devices gain flex | 17  | A research team from South Korea has developed a range of flexible and large scale integrated devices for biomedical wireless communication. | Engineering - medicine - biomaterials - electronics |
|                                 | Rare Earth Elements                               | 22  | An insight in to the issues facing the supply of rare earth elements and where they are used.  | Chemistry - periodic table - rare earth elements    |

|             |   |    |   |  |
|-------------|---|----|---|--|
|             | Q&A Alex King                                       | 28 | An interview with Alex King, Director of the Ames Laboratory in Iowa.   | Careers                                    |
|             | What's in your laptop                               | 31 | An overview of the materials used in your laptop.   | Materials - applications                   |
|             | Q&A Tim Crossley                                    | 37 | An interview with Tim Crossley, CEO of Trans-Tasman Resources.  | Mining - careers                           |
|             | Material of the month - Aggregated Diamond Nanorods | 48 | Everything you wanted or needed to know about aggregated diamond nanorods!  | diamond - carbon - nanotechnology          |
| July 2013   | <b>Planning for a nuclear future</b>                | 10 | A roundup of the discussion held at the Next Generation Nuclear Energy conference on nuclear energy in the future.  | Electricity generation - nuclear           |
|             | Petrol in the framework                             | 16 | Researchers have developed a new filter material which may allow refineries to produce higher grade petrol fuels, with increase fuel efficiency.                                      | Oil - chemistry                            |
|             | Concrete towers bring wind of change                | 17 | Researchers have developed a new ultra-strong concrete which could be used to replace steel in the construction of wind turbine towers.   | Construction - energy - concrete - steel   |
|             | Q&A Paul Newbatt                                    | 27 | Interview with Paul Newbatt of Innovnano.   | Nanotechnology - careers                   |
|             | Material of the month - Sheet glass                 | 52 | Everything you ever wanted or needed to know about sheet glass.   | Glass                                      |
| August 2013 | <b>Wood fibres batteries</b>                        | 7  | Scientists are investigating the use of wood fibres in batteries as flexible and durable substrates for rechargeable battery electrodes.  | Wood - batteries - electricity             |
|             | Plastics to the rescue                              | 9  | A roundup of the recent Design Innovations in Plastics Award. For more information visit <a href="http://www.designinnovationinplastics.org">www.designinnovationinplastics.org</a> . | Plastics                                   |
|             | Miniature batteries 3D printed                      | 11 | Researchers have used 3D printing to create Li-ion batteries just 1mm wide  | Nanotechnology - 3D printing -             |
|             | Graphene for next generation computer chip          | 11 | Researchers at MIT are investigating the use of graphene and ferroelectric materials to develop the next generation of computer and data storage chips                                | Magnets - graphene                         |
|             | Fighting tooth decay with glass                     | 14 | Recent winners of the A&B Venture Prize are using dissolving glass particles in toothpaste to prevent tooth decay and repair teeth  | Biomaterials - dentistry - biology - glass |
|             | Ones to watch: 35 under 35                          | 19 | An insight into the careers of 35 young people working in materials, minerals and mining related fields   | Careers                                    |
|             | Steel giving  | 47 | An overview of the history and applications of stainless steel  | Steel - metallurgy                         |
|             | Material of the Month - Superhydrophobic materials  | 51 | Everything you ever wanted or needed to know about superhydrophobic materials   | nanotechnology - surface chemistry         |

## THE DISCOVERY BOX – OR HOW I RULED THE CLASSROOM

My name is Paul Johnson and I am a Science Teacher – makes me sound like an Alcoholic but that's another story! I teach in a very large comprehensive school in East Grinstead – famed for being the home of Mormons, Scientologists and numerous other sects who can practice their beliefs in tranquil serenity. If that doesn't help then it is close to Gatwick Airport – handy for a quick getaway.

As a bit of background I have not always been a teacher, having only taught here for 18 years. My first degree was actually in Materials Science and Technology way back in the late 70's when Materials Science was in its heyday, unlike now when it is benefitting from a welcome renaissance due to media awareness and the exciting explosion of Nanotechnology. I worked for several years at De Beers developing synthetic diamond technology and then spent 10 years developing and improving materials for use in Duracell's Alkaline cell range of products.

### And so to teaching!

I have always been keen to bring my “real job” experiences into the classroom (sorry teachers but that is how we are still perceived in industry) and to show students just how the science they learn in the classroom translates into the science going on in our lives today. In particular I have always sought opportunities to use my knowledge of Materials Science to “jazz” up an otherwise dull and starchy lesson. The National Curriculum has topics and lessons which lend themselves nicely to this. The only problem is when you are talking about the benefits of this material or that you usually have to

accomplish this in the abstract, not having relevant samples of the material in question to exemplify your argument.

When an opportunity to give my opinions of how Materials Science is covered in schools arose I jumped at the chance and found myself at 1 Calton House Terrace (Head Office of IOM3) with a relatively small group of likeminded teachers trying to shape the thoughts and ambitions of the IOM3 into the realities of mainstream education. My one overriding plea was for real, large samples of materials to allow students to see, touch, feel and taste real “stuff”. Finally IOM3 came up trumps thanks to the outstanding efforts of Diane Aston. She had impressed our school with the delivery of her “little” talk on materials, using her own box of samples and after much discussion had developed a number of “Discovery Boxes” which schools could borrow and use to awe and inspire future generations of scientists and technologists (not to mention engineers),

Now comes the moment of truth – “**you wanted it so put your money where your mouth is and use it**” was the cry from Diane. So it was with a little apprehension that I agreed to deliver a series of lessons to excitable Year 7 students over the course of a week.

The Discovery Box comes with a whole range of pre-produced presentations covering a variety of themes but I decided to go with the idea of how material selection has changed for a number of applications from historical times up to today and beyond. By borrowing slides from a variety of presentations I put together a much smaller, custom-made presentation covering material categories and how their use has evolved historically. It was wonderful to have actual samples

available for students to hold in their hands and see for themselves things like:-

1. The difference in densities of metals (and wood)
2. The strength and lightness of carbon fibre composites.
3. The use of nanotechnology in fabrics and their coatings.
4. Biomedical materials

The list goes on...

Added to this the use of You Tube clips showing weird and wonderful new materials, for example the use of D3O in shock absorbing applications (<http://www.youtube.com/watch?v=9VDeJ7rLUYU>) then it was possible to provide a very rapid potted history of materials development which captivated and encouraged students to think about how the world around them is dependent on materials and their constant improvements and innovations.

In all I gave the 1 hour lesson to 10 year 7 classes and 4 year 8 classes. As this was getting on for the start of the final half term of school – notorious for having finished the lesson content and desperately looking for some kind of activity to engage the little darlings I was extremely encouraged to see how well they reacted and participated in the various activities. Touching and feeling was definitely one of the enjoyable activities but I have to say the highlight for most groups was the discovery of the water resistant capabilities of a simple ASDA-bought school skirt coated with Teflon!

The feedback I got from staff and students alike was extremely positive – the format of the lesson was very different from normal ones and the availability of material samples (together with their laminated info sheet) made it extremely memorable.

Although I have an interest in Materials, teacher who watched the lesson felt encouraged to “have a go” themselves as when you once take the trouble to read the information on the help cards then it is the materials themselves that “do the talking” and, of course, any difficult questions can be answered by “why don’t you Google that and feedback to the class”.

The Discovery box is also an ideal source of amazement for Science Clubs and the like and is equally adaptable across the key stages – from 6 to 18, and across the ability levels from the least able groups to the in depth attentions of a sixth form gifted and talented group.

I have recently returned to teaching at Key Stage 3, subsequent to my delivery of the materials lessons and find myself quite a celebrity as the “Geezer with the passion for Materials” – something I am quite unused to! We are now putting into our lesson plans opportunities to deliver this type of lesson across the board, planning the next opportunity to borrow the discovery box again, hoping to share this practice with our local cluster of secondary schools and arranging twilight sessions to inspire and give confidence to other teachers.

In short, the arrival of the Discovery Box has the potential to inspire and educate a new breed of scientists into the amazing world of Materials. Why not give it a try and amaze yourself. It worked for me.

You too can experience the joys of borrowing one of our Discovery Boxes! You can borrow it for a week for the princely sum of £40, which covers the cost of the courier. If you would like to find out more please [drop me a line!](#)

## GUESS WHO!

**In July Daniel Stevens joined us for an eight week internship. His job: to create the new SAS resource for teachers and something a bit different! Here Dan shares how he came about joining us and how he developed his project.**

Summer came and initially I found myself at somewhat of a loose end. There isn't an abundance of work experience opportunities for first years so I was pleased to be invited to attend the InnoMatNet materials and innovation summer school. Shortly after this I received an offer from IOM3 to complete an eight week internship. The project – creating some educational resources for use in schools seemed genuinely exciting; increasing awareness of the field of materials science is something that is important to me, after all, if it weren't for a conversation with one of my teachers I may not have ended up studying it!

My enthusiasm for the project was further increased after seeing some existing IOM3 outreach resources. In particular the Discovery Boxes struck me as a fantastic idea. My own project was to produce some educational resources that could be used to increase the awareness of and enthusiasm for materials science. My supervisor, Diane Aston, made me aware of some outreach resources that had been produced by universities and businesses before outlining her own vision for a resource that I would be working on creating for the next eight weeks.

The first step was to look at resources that are currently available for teaching materials science in schools. I noticed that a fairly large proportion of the resources I was able to find online were vocabulary lists or other vocabulary related resources. It was clear to me that there must be demand for these in order for there to be so many of them in existence. It seemed that the proposed materials guessing game could fit in well with these resources as a fun and interesting way to teach the language of materials science and provide school pupils with an introduction to materials that they may not have previously encountered.

I researched the National Curriculum to find out where materials science was included and how this potential resource would fit in. The results of this were pleasing – I was able to identify a number of Key areas where the proposed resource would support teaching.

My research told me that this idea had potential and it seemed to be worth pursuing so I set about devising a list of 24 materials to include in the guessing game. This was surprisingly difficult – there are just far too many interesting materials to make coming up with just 24 easy. Eventually with a little help I was able to come up with a list of materials and produce a prototype game board. At this stage the game board prototype was very crude, consisting just of names of materials written in squares on pieces of paper but it allowed us to test the game mechanic and the suitability of the materials we had chosen. This provided me with some ideas for changes which I included in the first proper game board I produced.

Following the success of the first game board and due to the fact we had to miss out a lot of materials from my initial list we decided to produce a second game board, again featuring 24 materials,

to provide the game with some longevity.

Some of the materials included on the game boards are not materials that school children are likely to have encountered before so I created a card to accompany each individual material on the game board providing them with a picture, some background on the properties and uses of the material, the class of materials that it belongs to, the price per kilogram of the material and a fun fact. Whilst these small cards are by no means comprehensive they certainly provide enough background information in order to be able to play the game and to provide a good overview of each material. In addition to the 48 cards required to accompany the game cards I added cards for 10 interesting materials that were not featured on either of the game boards for one reason or another, bringing the total to 58 cards each featuring a different material.

Most school teachers are not materials specialists so to make the resource even easier to use I developed a comprehensive teachers' pack providing teachers with the information that they need in order to implement this resource effectively with a minimum of prior knowledge required. This set of resources includes 58 A4 cards which each correspond to one of the material cards that pupils will be using. These cards provide additional information about each material that teachers will be able to use in lessons or just to make them feel more confident whilst teaching using this resource. Some of these cards also provide ideas for other activities that could be done relating to a particular material. For these activities sheets for teachers and sheets for pupils are provided where required. Finally, the guide for teachers includes a comprehensive glossary of all of the technical terms used throughout all of the resource materials and a table detailing the activities that could be linked to particular National Curriculum outcomes.

Overall I am very pleased with how the project has developed during the course of my time at IOM3 and I hope that it will see some use in schools in the not too distant future. Early feedback on the resource has been positive and throughout the project I have had some excellent guidance so I have every reason to believe that this project will be a success. Finally, I would like to thank The Institute and especially Diane for giving me the opportunity to work on this project; I think I have gained a lot from it and I hope the

resource I have created over these 8 weeks can go some way to raising the profile of materials science in schools.

## WHY I CHOSE MATERIALS

Since studying for my GCSEs I had an interest in the sciences. This interest in science subjects led me to apply for and subsequently receive an Ogden Trust Sixth Form Science Bursary to attend Nottingham High School for Boys where I studied A-levels in Physics, Chemistry, Maths and Further Maths. This opened up a range of science and engineering based university courses to me; ultimately I found myself torn between Physics and Mechanical Engineering.

Towards the end of year 12 I was talking to my physics teacher about university applications and the conversation eventually came to where my interests in physics were. I mentioned that I found the physics of materials very interesting and this prompted him to suggest that a degree in Materials Science might be the right route for me to take. I set about doing some research into where I could study it and what I would be studying. I decided that materials science was the route I wanted to take after reading J. W. Martin's excellent book "Materials for Engineering" as well as some others and completing a week of work experience at a local composites manufacturer. Open days helped me to decide on five universities to apply to and by January of year 13 I had decisions back from all five. Soon after this I decided on my firm choice university. After receiving my A-level results in August I was delighted to find that I would be attending my firm choice, The University of Manchester.

My first year at university proved to be everything I had hoped for and more. I thoroughly enjoyed being involved with a variety of extracurricular activities and I found my course very engaging. The first year curriculum provided an introduction to structural and functional materials, nanotechnology and the underlying physical and thermodynamic principles of materials science. For achieving the best first year exam marks in my year group I was awarded the Rolls Royce/Armourers and Brasiers' Prize.

I'm going back into my second year and am still at the stage where everything is fascinating to me. At the moment, I find composite materials particularly interesting but I also found learning about the classification of different materials using microscopy fascinating. I am looking forward to learning more about materials throughout the course of my degree.

**Daniel Stevens gives us an insight into the factors affecting his decision to study materials science.**

