

Editorial

We don't always have a midsummer edition of the newsletter but I draw your attention to three major meetings in which the BCG is playing a major role. NanoteC11, the latest in these highly successful meetings to discuss the most recent developments in the world of carbon nanotechnology takes place in Nantes, France. An important meeting is being organised by Prof. Sergei Mikhailovsky at the University of Brighton and is devoted to accounts of European research, mainly in the field of medical biotechnology in which carbon artefacts play a major part. Finally, there is a meeting on Electrochemistry in September at the University of Bath, organised jointly by several groups, including of course the BCG. You can find full details of the conferences as well as others of relevance to carbon research, elsewhere in the newsletter.

The potential of applications of graphene is now an increasingly important field. We have a couple of articles that summarise what is going on here. There is an announcement from the EU about a proposed major programme on graphene, followed by a more popular article that appeared in the national press but explains in layman's terms what the implications might be.

On the personal level, we are glad to congratulate our current Chairman, Dr. Gareth Neighbour on his appointment as reader at Oxford Brookes University. His new address and contact numbers are shown elsewhere in this newsletter.

We also feature the new SCI award "Carbon in Industry". This has been promoted with the involvement of the BCG to try to bring to the attention of a wider audience how carbon in its various forms has a major impact in modern technology. The first award was made at our 2010 Christmas meeting to Dr James Reed of EDF Energy (formerly British Energy) and a full account of his lecture that accompanied the award is given here. We also include the announcement for nominations for the 2011 award. This new award is a symptom of the interest that element 6 is evoking in all corners of society, as of course is the article on graphene referred to above.

Future BGC-sponsored meetings

NanoteC11

Following the success of our last overseas trip with NanoteC to Brussels in 2009, we've decided to once more unpack the passports, dust off the travel bags and dig the sunscreen out of the cupboard, this time to hop on the ferry across the channel to the west coast of France.

NanoteC11 will be held in Nantes, just south of Brittany and recently voted by the French as their favourite city to live in. Nantes sits on the Loire about 30 minutes from the west coast of France, and was formerly a major ship-building town and active port. NanoteC will be held in the "Institute of Materials Jean Rouxel", one of the three largest materials research centres in France.

The conference starts on Wednesday August 31st and runs until midday Saturday September 3rd. If you intend to come we'd recommend you stay on over the weekend, as this year the conference coincides with a large free jazz festival at Nantes starting on Friday and running over the weekend, with eight open-air stages and a plethora of other concerts throughout the city.

NanoteC is one of the longest running series of international nanoscale carbon conferences in Europe (since 1998). It brings together scientists working with nanoscale carbon materials: nanotubes, graphene, diamond- and fullerene-related nanostructures. While each of these materials attracts its own dedicated community of researchers, NanoteC draws on common themes and allows researchers to share insight into this unique element at the nanoscale.

The NanoteC conferences are renowned for their relaxed and friendly atmosphere, with emphasis on discussion and participation. We endeavour to achieve as much student participation as possible, and we anticipate that the keynote talks will be strongly influential on the next generation of nanotechnology scientists. Contributed talks are also mainly attributed to young researchers. Notably to encourage participation of younger researchers, the registration fees this year are extremely low (only 150 pounds) and cheap accommodation options are available.

We expect ~100 (maximum 130) participants from around the world, 12 sessions (non-parallel) with about 10 keynote and 30 contributed talks, as well as a poster session, with posters available for discussion throughout the conference

Full details of the conference including registration forms are available at: <http://www.britishcarbon.org/nanotec/>

Medical Devices and Carbon Materials: Current issues in Health and the Environment

 University of Brighton



First Announcement



Knowledge Transfer Network & British Carbon Group Meeting

September 21st -22nd 2011

University of Brighton, School of Pharmacy & Biomolecular Sciences

This 2-day event is organised jointly by the British Carbon Group and the co-ordinators of the FP7 Marie Curie Industry-Academia Partnerships and Pathways (IAPP) MONACO-EXTRA project (218242)

Day 1: will be devoted to Medical Device Technologies

Day 2: will explore the use and future of carbon for medical and environmental applications

For updates and further details go to
www.brighton.ac.uk/monaco



The British Carbon Group



The University of Brighton in collaboration with the British Carbon Group and the Health Technologies Knowledge Transfer Network will be holding a two-day event;

Medical Devices and Carbon Materials: Current issues in Health and the Environment from 21st-22nd September 2011.

The event is co-sponsored by the project “Monolithic Adsorbent Columns for Extracorporeal Medical Devices and Bioseparations”- MONACO-EXTRA, which is part of the Industrial Academic Partnership Pathways, FP7 PEOPLE programme, and brings together the themes of carbon and medical device technologies. The conference will be held in the new purpose built Centre for Biomedical & Health Science Research at the University of Brighton.

Day 1 will focus on Medical Devices and Technologies, held in collaboration with the Health Technologies Knowledge Transfer Network, UK and co-sponsored by Welland Medical Ltd.

Day 2 will focus on Carbon Materials for Environmental and Health Protection, held in collaboration with the British Carbon Group, UK and co-sponsored by MAST Carbon International Ltd.

Presentations covering these topics will overlap on both days and it is hoped that this event will bring together both academic and industrial participants from both themes. A number of internationally renowned scientists –Francisco Rodriguez-Reinoso (Spain), Yury Gogotsi (USA), Galina Petukhova, Yuri Kryazhev (Russia), Nick Kartel (Ukraine), Peter Thrower (Editor-in-Chief, Carbon), Peter Lodewyckx (Belgium), G Neighbour (UK), have already confirmed their participation. To create a friendly environment for networking, the meeting will be restricted to 100 participants. There will be a poster competition for young researchers on Day 1 (Medical Devices) and Day 2 (Carbon Materials).

The conference dinner will be organised on the evening of the 21st September at a historic Stanmer House built in 1722 and located in Stanmer Park, on the outskirts of Brighton.

Details of how to participate can be found on the Conference website

<http://www.brighton.ac.uk/monaco/conference/index.htm>

or by contacting a member of the Organising Committee via e-mail address:

monaco@brighton.ac.uk

or directly

Sergey Mikhailovsky s.mikhailovsky@brighton.ac.uk

Carol Howell c.a.howell@brighton.ac.uk

Ray Whitby r.whitby@brighton.ac.uk

Electrochemical Horizons

Abstract submission now open:
www.regonline.co.uk/electrochem_abstract

Faraday Medal of the RSC
Electrochemistry Group 2011:
The Faraday Medal Award
Lecture: Professor Hector Abruña
(Department of Chemistry and
Chemical Biology, Cornell
University)

Evans Corrosion Symposium
The Evans Award 2011 Lecture:
Professor Jerry Frankel
(The Fontana Corrosion Center
at Ohio State University)

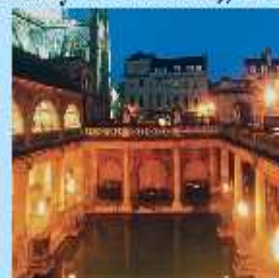
University of Bath

5th - 6th September 2011

The Evans Corrosion Symposium	Convenors: Dr. Nick Stevens & Dr. Gareth Hinds
Nano-Electro-Crystallization Symposium	Convenors: Prof W. Schwarzacher & Dr. S. Bending
Sensor Innovation and Electroanalytical Processes	Convenors: Dr. John Hart & Dr. P. Fielden
Nano-Electroanalysis Symposium	Convenors: Dr. Nathan Lawrence & Dr. Greg Wildgoose
International Year of Chemistry – Sensors for Africa	Convenors: Dr. K. Ozoemena & Dr. J. Limson
Nano-Carbon Technology Symposium	Convenors: Dr. Ian Kinloch & Dr. Katherine Holt
Microbial Electrochemistry Symposium	Convenors: Dr. Petra Cameron & Dr Ioannis Ieropoulos
Electrochemical CO ₂ Conversion Symposium	Convenors: Dr. David Fermin & Dr. Frank Marken
Fundamental Electrochemistry Symposium	Convenors: Dr. Jay Wadhawan & Prof Robert Dryfe
Light Driven Electrochemistry	Convenors: Andrew Collins & Dr. F. Marken
Electrochemical Processes in Exotic Media	Convenors: Dr. Darren Walsh & Dr. Daren Caruana
Electrosyntheses: Processes in New Reactors and Media	Convenors: J.D. Watkins & Dr. F. Marken

Confirmed speakers: Prof. Hector Abruña (Cornell), Prof. Jerry Frankel (Ohio State), Dr. Richard Nichols (University of Liverpool), Prof. Alexei Kornyshev (Imperial College), Dr. Jochen Blumberger (UCL), Dr. Andy Wain (NPL), Prof. Fritz Scholz (University of Greifswald), Prof. Guido Mul (Twente University).

Dates: 5th - 6th September 2011
Location: University of Bath, Bath, BA2 7AY, UK
Accommodation: University of Bath Campus Village
Conference Dinner 5th September at the Roman Baths
Registration site: www.regonline.co.uk/Electrochem_2011
Abstract submission site: www.regonline.co.uk/electrochem_abstract
More information: Frank Marken – Email F.Marken@bath.ac.uk



Electrochem 2011 is organized jointly by the RSC Electrochemistry Interest Group, the SCI Electrochemical Technology Group, the Electroanalytical Group, the British Carbon Group, and the ICorr Council. Sponsors: ISE

Other meetings on Carbon not organised by the BCG

Polish



Carbon Society

Information for Participants

Travel

Cracow is easily accessible by air, rail, or car.

There are two airports located in the proximity of Cracow: John Paul II International Airport Cracow-Balice and Katowice International Airport in Pyrzowice.

The Cracow international airport at Balice, just 15 kilometers from the city centre, has direct flights to: Paris, London, Zurich, Frankfurt am Main, Vienna, Rome, Tel Aviv, New York, Chicago.

The city has a reliable train network linking Cracow with other cities of Poland and Europe. It is also possible to come to Cracow by coach or car. Our city is linked to the main Polish and European roads and thus the access is very easy.



Carbon 2012

The Annual World Conference on Carbon



Conference Office

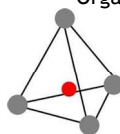
AGH - University of Science and Technology
30 Mickiewicz Ale., Cracow, Poland
Phone: 48-12-6172239
Fax: 48-12- 6173371
E-Mail: blazew@agh.edu.pl

June 17 - 22, 2012

Cracow, Poland

Organized by: the Polish Carbon Society

You are welcome to forward this message to your colleagues or students who may be interested in the related research areas



In 2012, the Annual World Conference on Carbon, for the first time, will be held in Poland in Cracow.

Carbon 2012 is an international conference dedicated to the latest advancements in the science, technology and applications of carbon. The conference provides a platform for academic and industrial researchers, engineers, students, innovators and entrepreneurs. The conference organized by the Polish Carbon Society, under patronage of the AGH – University of Science and Technology, will be held at a lecture theatre complex, Auditorium Maximum, located at the centre of the city of Cracow.

Cracow is an historic city of great renown, where even a short visit may become the source of many pleasant memories and unadulterated satisfaction. This is what we want to recommend to you: to take part in our conference and to look at Cracow that will let you breathe and savour the atmosphere of the city.

General information

How to get to Cracow? The Cracow international airport at Balice, just 15kilometers from the city centre, has direct flights to :Paris, London, Zurich, Frankfurt am Main, Vienna, Rome, Tel Aviv, New York, Chicago. The city has a reliable train network linking Cracow with other cities of Poland and Europe. It is also possible to come to Cracow by coach or car. Our city is linked to the main Polish and European roads and thus the access is very easy. On behalf of the organizing Committee and the Polish Carbon Society we invite you to attend Carbon 2012 at Cracow University.

Topics of the conference

- Natural carbons
 - Graphene, nanocarbons, engineered carbons,
 - Carbons manufactured from various precursors
 - Carbon for energy, biology, health and environment
 - Carbon-based composites and nanocomposites
 - Physics and chemistry of carbon
 - Electronic, opto-electronic properties and applications
 - Nuclear, solar and thermal properties and applications
 - New methods and technologies of carbon materials
 - Industrial
-

Conference on fibre materials, including carbon fibres

(NB. The deadline date for papers at the conference shown below is now well past but some of the contents of the meeting are of interest)



THE FIBER SOCIETY



The Fiber Society, AATCC, and the National Textile Center

present an

International Symposium on *New Frontiers in Fiber Materials Science*

October 11–13, 2011
Charleston, South Carolina, USA

Call for Papers

The Fiber Society, AATCC, and the National Textile Center are collaborating to offer a symposium on *New Frontiers in Fiber Materials Science*. The symposium will be held at the Francis Marion Hotel in Charleston, South Carolina, USA, October 11–13, 2011. We are happy to announce our plenary speaker, Professor Julian Vincent from the University of Bath, renowned materials scientist working at the intersection between biology and materials. Papers on fundamental research related to the science and engineering of fibers and fibrous materials will be presented during the 2-1/2 day event. The symposium is organized in a series of mini-symposia, and papers are solicited for submission to one of the following topics of particular interest to carbon researchers:

- Carbon Fibers and Composites, chair *Dr. Amod Ogale, Clemson University, USA*
- Fibers from Carbon Nanotubes, chair *Dr. Philippe Poulin, CNRS, France*
- Protective Clothing and Wetting of Textiles, chair *Dr. Jeffery Owens, AFRL, USA*

Online submissions will be accepted beginning December 1, 2010. Access the website at www.fibers2011.org and follow the link for submission. Formatting guidelines for all oral and poster submissions are provided online. **Submission deadline is April 4, 2011.**

Presenters wishing to publish their full-length papers are invited to consider the *Journal of Engineered Fibers and Fabrics (JEFF)* and *AATCC Review* as possible opportunities. A special issue of *JEFF* containing selected papers presented at this symposium is planned. Contact information for each journal is available on the symposium website.

For inquiries regarding the *abstract submission process*, contact Pam Gabriel, the Fiber Society, at psgabrie@ncsu.edu. For inquiries regarding *abstract content and specific mini-symposium focus*, contact Dr. Konstantin Kornev at kkornev@clemson.edu.

News and views

Gareth B .Neighbour

Our redoubtable chairman has found a new post at Oxford Brookes University. His new address and details where he can be reached is :

Dr. G .B .Neighbour

Reader,

Head of Mechanical Engineering and Mathematical Sciences

Oxford Brookes University

Headington Campus

Gipsy Lane,

Oxford OX3 0BP, UK

Chair: British Carbon Group www.britishcarbon.org

Chair: UK Graphite Core Committee

Tel: 01865 484517

e-mail: gneighbour@brookes.ac.uk

The Brian Kelly Award 2011

The
British Carbon Group

The application date for this year's award is now past and the award will be made at Carbon 2011. As is usual, candidates must be from outside the host country, in this case, China. For interest, a list of past holders of the award is shown below.

- 1996: Y. Kawabuchi, Kyushu University, Japan.
- 1997: J. Barbosa-Mota, Inst. Biologia Experimental e Tecnologica, Portugal.
- 1998: B. Fathollahi, University of California, San Diego, USA.
- 1999: No award.
- 2000: J. Klett, Oak Ridge National Laboratory, Tennessee, USA *and* J. Andresen, Penn State University, USA (*two awards*).
- 2001: Z.-X. Ma, Tohoku University, Japan.
- 2002: J. Y. Howe, Oak Ridge National Laboratory, Tennessee, USA *and* M. Guellali, University of Karlsruhe, Germany (*two awards*)
- 2003: No award.
- 2004: Q. H. Yang, Tohoku University, Sendai, Japan.
- 2005: No award.
- 2006: An-hui Lu, Max-Planck-Institut für Kohlenforschung, Germany *and* E. Flahaut, Université Paul Sabatier, Toulouse, France (*two awards*).
- 2007: P. Adelhelm, Max-Planck-Institute of Colloids and Interfaces, Germany.
- 2008: D. Hulicova-Jurcakova, ARC Centre of Excellence for Functional Nanomaterials, University of Queensland, Australia.
- 2009: G. Haffenden, Department of Chemistry, University of Sussex, Brighton, United Kingdom
- 2010: J.-P. Tessonier, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany.

AGM and Christmas meeting, Manchester, December 15th 2010

Our Christmas meetings have followed a similar pattern over the past several years and have all proved very successful. This year's was no exception. Although we held them initially in London, last year Oxford was the venue and the success of this meeting encouraged us to choose Manchester for 2010. The Staff House at the University proved a very suitable location and the Christmas lunch (free!) to all who came was no doubt an added attraction.

Around 35 members and associates came to the event, which started with our AGM. Gareth Neighbour gave his Chairman's report, reviewing a very successful past year. He said that we had signed a reciprocal agreement with the Ukrainian Carbon group and that they as well as the Turkish group would probably be applying to join the European Carbon Association, of which we are of course a founding member. Tony Wickham, our treasurer gave his report that although it showed an apparent major deficit for the year up to December 2009, left us in a strong financial position. He

explained that the deficit came about because we had to pay some expenses up front for conferences, but we would get the money back in the following year when the receipts came in. Finally, the new committee was voted on and we welcome Dr. Peter Branton as a new member. There was an unexpected and pleasant surprise as Gareth awarded a commemorative plaque to John Fisher, a long-serving member of the committee to mark 30 years as SCI member and representative on our committee. John is still happy to continue to serve in this capacity.

The format of our Christmas meetings has been for speakers to give a general account of progress in their area, in an informal but informed way. This year, we had the novelty of the first talk being given by the recipient of the first SCI/BGC “Carbon in Industry” award. This consists of a prize of £500 and a certificate and it goes to someone who in the opinion of the BCG committee, makes a significant contribution to carbon science and technology in any area. The first recipient of the award was chosen to be Dr. James Reed of British energy, now EDF energy, and Gareth presented him with his certificate to general acclamation. Dr. Reed then gave his talk that was linked to the award. (A press announcement from the SCI about Dr. Reed’s award is shown below-also the announcement of a further award for the current year.)

He gave an extremely informative talk about the use of graphite moderator in the British Advanced Gas-cooled Reactors and the problems that arose from their use. He started by saying that EDF Energy had now taken over the functions of the former British Energy and in addition to the 7 AGRs had one Pressurised Water Reactor (PWR) at Sizewell. The graphite moderators in the AGRs slows down the emitted neutrons, thereby increasing their cross-section capture by fissile nuclei. They take the form of modular bricks, about 1 m high, of which there are some 300 per reactor. They are made so as to key together and allow the fuel cans to be loaded in, channels for the control rods and access of the CO₂ as coolant. The main problems in operation are the loss of carbon due to attack by CO₂ and the lattice damage that occurs when carbon atoms are knocked out of the graphite lattice. For the most part the displaced atoms find suitable vacancies to relocate themselves and no overall damage results but sooner or later irreversible damage occurs, the lattice buckles and cracks start to appear. Fortunately, for the most part these do not affect performance of the reactor as there is a certain allowance for this built into the design.

The main task is therefore to build up a model that allows predictions of how the cracks will propagate before reaching the outside of the graphite brick and cause serious damage. This information is shared internationally (see for example Tony Wickham’s article on the IEAE database in the Newsletter for November 2010) and the series of INGSM conferences that the British Carbon group has helped to organise have been important here. Experiments can be carried out by irradiation graphite specimens in a special reactor. It is also possible to check wear on the bricks when the reactor is shut down. Dr. Reed showed a speeded-up version of how special tools are loaded into the channels where feelers pick up any variations from the original shape.

Prof. Mark Thomas of Newcastle University then gave us an excellent talk on work he and his group have been doing recently on the adsorption of hydrogen on various surfaces, including of course, carbon. He pointed out that the recent emphasis on the use of hydrogen as a clean fuel implied that it has to be carried around in transport vehicles. The US DOE had estimated that 5-13 kg would be needed for the average

car. Currently, it is stored in heavy gas cylinders at up to 700 bar pressure, a major drawback. Adsorption onto porous materials had been seen as a possible alternative, using much lower pressures. This technique had received an enormous boost from early reports that considerable amounts could be stored on activated carbon fibres, reports that turned out unfortunately to be erroneous. None the less, it was worth while examining uptake at 77K to see if there still were commercial possibilities. He pointed out that the apparatus had to work under very clean conditions to avoid uptake of water that had been responsible for the early and incorrect reports. Just as for methane at 25⁰C, there was a fairly good relationship between uptake and surface area albeit with a considerable scatter. Also, as for adsorbed natural gas, the uptake /volume is crucial for commercial use of hydrogen and this rules out many of the very high surface area carbons, which have very low apparent densities.

Beside high surface area carbons, he had examined the possibility of using inorganic compounds with metal-organic frameworks (MOF). They have regularly-defined channel of only a few Å and these would be perfect for H₂ molecules to pass through. He had obtained 7-13% (by weight?) uptake with these materials and had also noticed that some of the adsorption isotherms showed some hysteresis. Adsorption at room temperature was however too small to be of use.

He had also done some work on the kinetics of adsorption, in many ways a neglected subject. Using both H₂ and D₂, he had observed some molecular sieving using carbon molecular sieves but the MOFs were better for investigating this because of their regular crystal (and hence pore) structure. Some of these effects could be explained by quantum effects, where the pores and the adsorptive have very similar size and the difference is comparable to the de Broglie wavelength. He found that it was difficult to fit the Langmuir-Freundlich to the whole range of the hydrogen isotherm: much better fit was obtained using a virial equation. (As an aside, I must say that this is not surprising. The LF isotherm is only really a semi-empirical 3-component fit to the isotherm, as opposed to 2 for the simple Langmuir, the model of which does not in any case really apply to physical adsorption under these conditions).

Paul Munnery of Manchester University then took us through the various things that 3D imaging can tell us. The basic data are obtained by taking a series of X-radiographs along different slices of the solid object. The computer can then put all these slices together to give a really informative 3-dimensional view. With the laboratory X-ray machines they have, resolution of down to 1µm is easily obtained, with synchrotron radiation down to 0.1µm. He said that they were building a dedicated station on the new Diamond source.

Their main thrust is making a Finite Element (FE) model from the data, so that they could do “what if” simulations on the computer. Although this is very useful for carbon-carbon composites of which he showed some examples, they are also very interested in applications to biomechanics. They had done CT scans on a dinosaur claw and were able to show not only that it had been repaired by someone in the past but also to give some indications in how it had been used by the beast. From this, he went on to describe how models could be used to show how animal and human bones might behave under extreme stress. Crocodile legs had been examined in detail and the model used to show how the crocodile moves. The hope is to be able to apply data like these to repair damage in the bones of human babies.

For our last presentation, Tony Wickham gave a light-hearted seasonal, but none the less, substantial account of whether it would be possible to develop a small, so-called “backyard” nuclear reactor. The answer seemed to be at present “No, but...” The basic idea is to have a reactor that was small enough to be skid-mounted and delivered to provide power for remote locations for up to 5-10 years. A couple of designs have been proposed and are being worked on without so far, any indication of near commercial success. He had been involved in a new design from the Technical University of Delft. The idea was to have as simple a reactor as possible, with no moving parts. Cooling of the reactor would be by natural convection. TU Delft envisaged a High Temperature Reactor (HTR) moderated by graphite. He and his colleagues at Manchester University had been enrolled on the basis that the UK had more expertise than most countries in graphite-moderated reactors. TU Delft had wanted a closed cooling system using CO₂ but Tony had considerable doubts as to whether graphite would withstand such conditions, because of the difficulties Dr. Reed had outlined in his talk. None the less, tests had been done irradiating graphite rods in a test facility and after a relatively short time (compared anyway with 5 years) considerable damage had indeed been caused to the specimen. The problem is thus not a simple one and much thought remains to be given to the matter.

(Press release from the SCI)

Carbon in Industry Award for James Reed



Dr James Reed, Group Head at EDF Energy - Existing Nuclear, is pictured here receiving his SCI Carbon in Industry Award just before giving his lecture 'Graphite in Nuclear Energy' on 15 December 2010.

The SCI Carbon in Industry Award recognises those individuals that have made a significant contribution / impact within an industrial sector either by the creation of knowledge (eg evidenced by patents, development of industrial plant, etc) or having shown excellence and a high degree of industrial leadership within their organisation by making a significant impact upon the UK's social, environmental and economic well-being. The awardee will hold the respect of their colleagues and their contribution well-known in their particular field.

The lecture was very well received with 40 people from both industry and academia attending the Annual Christmas Meeting of the British Carbon Group (and AGM).

The
British Carbon Group

The SCI 'Carbon in Industry' Award & Lecture 2011

This prestigious award has recently been established by the Society of Chemical Industry and the Award will be given for the second time in 2011. The award seeks to recognize the contribution made by leading industrial scientists and engineers to carbon science and technology such as any significant contribution to developmental work, pre-commercialization, and / or promoting interaction with other sectors of society, *e.g.* public understanding of science.

Nominations are now requested without the knowledge of the candidate and with a supporting 250 - 500 word citation. The BCG Executive Committee will then determine the awardee on the basis of independent scoring against the criteria of track record, citation submitted and industrial impact. Self-nomination is not permitted. The successful candidate is likely to have more than 10 years industrial experience and have made a significant contribution / impact within an industrial sector either by the creation of knowledge (*e.g.* evidenced by patents, development of industrial plant, *etc.*) or having shown excellence and a high degree of industrial leadership within their organization by making a significant impact upon the UK's social, environmental and economic well-being. The awardee will hold the respect of their colleagues and their contribution well-known in their particular field.

The 'Carbon in Industry' Award will consist of £500 prize and a certificate. We will expect the recipient, as a condition of the award, to receive their award at one of our meetings, usually the Christmas meeting, and to present an award lecture outlining their contribution to carbon in industry. Reasonable travel expenses will be paid by the BCG. Thus, the second award lecture is likely to occur in December 2011.

The closing date for nominations will strictly be 4pm BST **1st September 2011**. No submissions after this date will be accepted. Applications may be submitted electronically to the Chairman of The British Carbon Group, Dr Gareth Neighbour, at gneighbour@brookes.ac.uk or, exceptionally, mailed to him at the following address:

Dr Gareth Neighbour,
Chairman, The British Carbon Group,
Head of Mechanical Engineering and Mathematical Sciences
Oxford Brookes University
Headington Campus
Gipsy Lane,
Oxford OX3 0BP, UK

The British Carbon Group (registered charity 207890) is affiliated to The Royal Society of Chemistry, The Institute of Physics and The Society of Chemical Industry



Report of other meetings

PACIFICHEM 2010

Carbon from an Electrochemists point of View

Winter ACS meeting - Honolulu, Hawaii

15th- 20th December 2010

This winter I was very fortunate, thanks to the British Carbon Group, to spend a week in paradise (and avoid the apocalyptic snow of England). What better setting for the discussion of chemistry than sunny Hawaii. The PACIFICHEM meeting is held every 5 years and seeks to be a forum for Asian and American researchers to meet in a location halfway between them. Thanks to the 'Aloha spirit' of the islands (and the wide array of blindingly loud shirts) this meeting also has the quality of being very relaxed compared to most meetings while also having a very high level of chemistry. Europe would have also been a near compromise but its funny how Hawaii seems more popular.

Aside from the obvious benefits of holding an international conference in Hawaii it was an excellent opportunity to meet and discuss chemistry with many researchers from Japan and China who I would otherwise be hard pressed to encounter. Some I was already familiar with after spending many a day searching through literature and others less well known to myself.

With lectures in four different venues each with more than ten rooms and speakers talking from 7:30am until 9:00pm there was no shortage of chemistry. Obviously at such an event I was unable to attend even a fraction of the huge amount of chemistry being discussed and so was forced to choose to attend fragments of various symposia on the topics of carbon materials, electrochemistry and microfluidics (my main areas of interest).

I was however most fortunate to attend the plenary lecture which was presented by Prof. Paul Corkum of the Ottawa Laboratory for Attosecond Science. The lecture presented a new method for visualising orbitals of simple molecules by using the interference of valent electrons as removed by high powered lasers. This lecture was followed by a delicious buffet and wine reception on the main lawn of the Sheraton Hotel looking out over the Pacific Ocean.

As an electrochemist I was most interested in the applications of carbon materials in electrodes and frequently felt out of my depth discussing the topics of nanotubes and nano-structured carbon but was able to follow many talks concerned with the modification and growing of such structures. One topic that took my interest in particular was on the subject of using nanotubes not as a high surface area nanostructure but as ultra smooth nanoscale pipe line capable, with a bit of end modification, of identifying and transporting drug molecules across a barrier much as a cell in the body might do.

I presented a poster (Hopefully I was better at presenting posters than I was at surfing) on the topic of the surface modification of amorphous carbon nanoparticles.

This was to allow the manufacture of cationically surface charged nanoparticles useful for the layer by layer deposition method used in our lab to make modified electrodes. This gave me a great opportunity to discuss my subject with other presenters, one in particular gave me some very useful insights into carbon nanotube based membranes which I have been recently been using in electrosynthesis.

Overall this conference was the perfect venue to meet the leaders in my chosen fields of chemistry both professionally and socially and a relaxing atmosphere for the discussion of science. I thank the British Carbon Group for the opportunity to experience this incredible opportunity which will benefit me far into the future.

John Watkins

University of Bath

Latest news on graphene

(I am grateful to Chris Ewels for the following):

The EU is going to plough vast sums of money over the next ten years into two projects that have the potential to really change the world, at least the European section - think 'the space race' for this decade. Groups were invited to submit proposals and Graphene is number two in the list at the moment. They have narrowed down to 6 proposals and each has received 1.4 million euros for one year to develop the project and infrastructure. Next year a decision will be made which two of the six to fund for ten years. It is clear that this will be a major factor in the nanoscale carbon research landscape in Europe. The website <http://www.graphene-flagship.eu/GF/index.php> is now set up so that interested groups can register to be part of the project and I would strongly recommend BCG member groups with an interest in graphene research to do so.

Chris Ewels

The information given below is an edited version of the complete web page. The original can be obtained by clicking on to the address given above.

Welcome to the Graphene Flagship website

This pilot action GRAPHENE-CA paves the road to the FET Flagship "Graphene-Driven Revolutions in ICT and Beyond" (GRAPHENE). The GRAPHENE flagship ambition is to bring together a focused, interdisciplinary European research community that aims at a radical technology shift in information and communication technology that exploits the unique properties of graphene and related two-dimensional materials. Graphene research is an example of an emerging translational nanotechnology where discoveries in academic laboratories are rapidly transferred to applications and commercial products. Graphene and related materials have the potential to make a profound impact in ICT in the short and long term: Integrating graphene components with silicon-based electronics, and gradually replacing silicon in some applications, allows not only substantial performance improvements but, more importantly, it enables completely new applications.

News

Graphene in Morph concept.

May 04, 2011



Press-releases

GRAPHENE-CA appointed an EU Future Emerging Technology Flagship Pilot.

May 04, 2011



Flagship Calendar

Jul NT11 Satellite Symposium on Graphene Technology (Cambridge, UK).

15
2011

July 15-16, 2011



Sep Graphene Roadmap Consultation Workshop (Lancaster University, UK).

14
2011

September 14-16, 2011



Oct Graphene for Future Emerging Technologies: Challenges and Opportunities
(Madrid, Spain).

18
2011

October 18, 2011



Jobs

Job Position: "Senior Researcher, Nanotechnology (Graphene Nanoelectronics)"
Nokia Research Center (Finland) - Posted: 08/07/2011



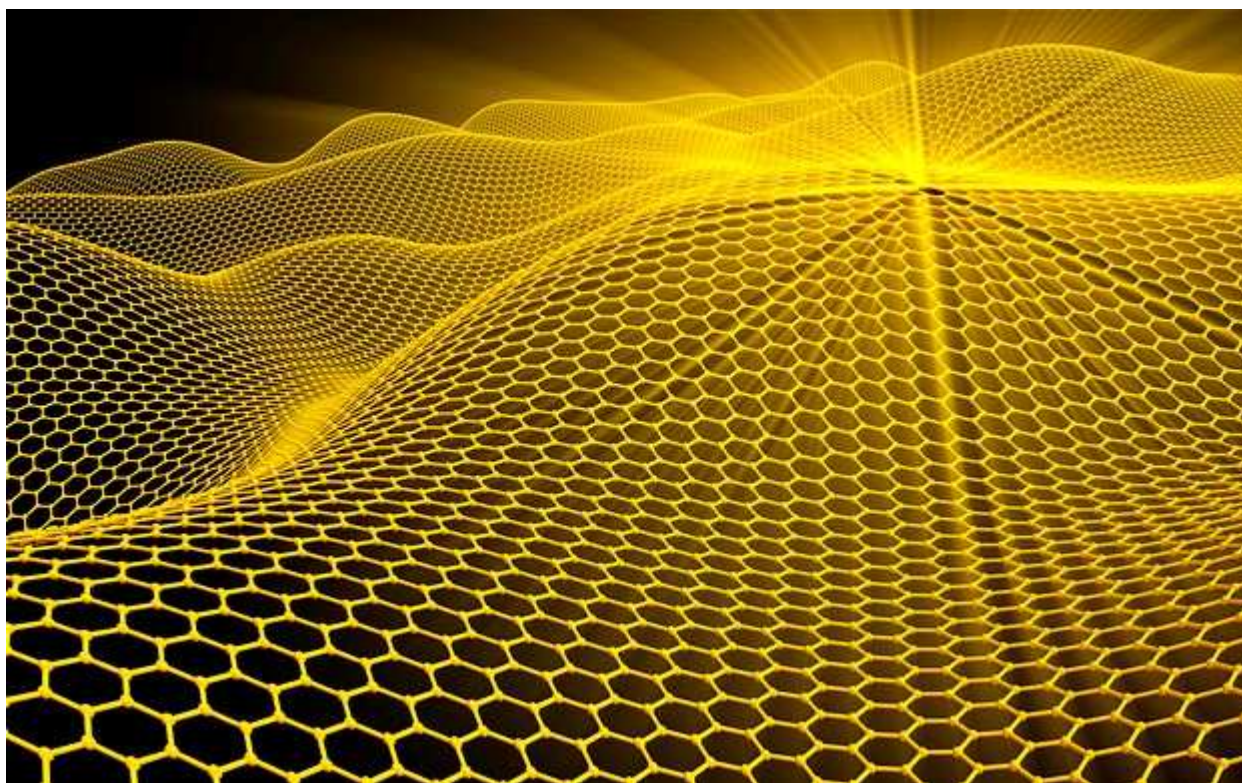
PhD Position: "Theoretical Studies on Graphene Plasmonics"
Chalmers University of Technology, (Sweden) - Posted: 08/07/2011



(This article appeared in a supplement to the Daily Telegraph in December 2010. It appears by kind permission of the author, to whom I am much obliged. ndp)

Graphene: our miracle material

Graphene is harder than diamond, just a single molecule thick and conducts electricity. Kat Hannaford talks to the two Nobel prize-winning scientists who discovered it about why it could revolutionise everything.



They say diamonds are a girl's best friend, but in the coming years that could all change. Stronger than diamonds, more conductive than copper, so stretchable that just one gram could cover several football pitches, graphene is being hailed as the miracle material that could one day replace silicon.

It's not often that a new substance comes along that is so useful it defines an era. We named the Bronze Age after a metal that kick-started the early civilisations, and the next age after an even more helpful metal - iron. The Plastic Age sounds less impressive somehow, but it was the last new discovery that had such a profound and pervasive effect on our world. ?

But what about the Graphene Age? It's the latest wonder stuff which resulted in two Russian-born Manchester University professors winning the Nobel prize for physics in October, for groundbreaking experiments regarding the two-dimensional material graphene. Ironically, Englishman Alexander Parkes collected a mere bronze medal for exhibiting the first plastic at London's Great Exhibition of 1862, but like polymer, graphene has a huge potential. Professors Andre Geim and Konstantin Novoselov obtained the first samples simply by applying a piece of Sellotape to a pencil tip and peeling off layers of graphite.

Graphite consists of weakly bonded layers of graphene, which is itself comprised of carbon atoms arranged in linked hexagons, measuring just one atom thick and therefore having just two dimensions. Professor Geim described graphene as having a range of superlatives which no other material can be proud of, including its incredible thinness and conductive qualities which see electric currents passing 100 times faster than copper manages.

You'd think having such attributes - not to mention its high flexibility and impregnability to gas and liquid - would make it suitable for various applications. That is true, but what Professor Geim calls a fertile and huge area is also a juvenile one: Graphene is really only five years old, and despite thousands of researchers working on it, it remains a badly investigated area, with some patches remaining completely undiscovered.

So what's it good for? Rather a lot of things, actually. IBM and Samsung are already trying it out in numerous electrical devices, with the first fruit borne by IBM in the shape of a transistor, which uses graphene to achieve the record-setting speed of 100GHz. The fastest alternative using silicon is 40GHz, and given that graphene can be tooled in exactly the same way to produce these components, many experts are speculating that silicon's days are now numbered - including Professor Geim, who says that thanks to silicon running out of its potential, we are standing at the same stage as we were back in the 20th century, when people found polymer. While he admits that graphene is not substituting plastic, he does credit it as being equally pervasive as plastic".

Meanwhile, Samsung has realised that being both transparent and conductive, graphene could be perfect for the company's many touchscreen devices. Ever since the iPhone rendered buttons unfashionable, touchscreen interfaces for smartphones, tablets and even computer monitors have proved extremely lucrative for many consumer electronics companies.

The ever-ambitious graphene's résumé doesn't stop there. Researchers at Rice University have found a way to synthesise graphene using table sugar, giving the material impeccable green credentials. In the same American state, engineers at the University of Texas have even discovered that by replacing the carbon used in ultra-capacitors with graphene, it's possible to store double the amount of energy. That in itself could revolutionise the renewable energy industry that is currently looking for a new way to store the energy produced by its burgeoning solar and wind farms. If the so-called "smart grid" is to prove successful, a way to store energy for when it's not sunny or windy is essential.

It's not just industrial energy storage where graphene could step in and save the day, either. We use batteries for many electronic devices, and they're all too often the limiting factor. If graphene really can double battery capacity at a stroke, it could catch on very quickly.

Over at Linköping University in Sweden, scientists have been exploiting a very different property. By passing a small electrical current through a transparent electrode made of graphene, a very pure light is emitted. Given that the bulk of energy we use every day is in lighting, graphene provides a very attractive low-carbon alternative to traditional solutions. According to Ludvig Edman from nearby Umeå University: this paves the way for inexpensive production of entirely plastic-based lighting and display components in the form of large flexible sheets. This kind of illumination or display can be rolled up or applied as wallpaper or on ceilings.

Thanks to its flexible nature, graphene could also prove to be the ideal building material, with the trick being to incorporate it into a matrix like a polymer or a metal,

where the load is borne by the graphene layer. So far we're only limited by the lack of a super-strong material to incorporate graphene, but once that's discovered, we can expect the average household to be as aware of graphene as they are of plastics.

Professor Geim concludes: At the moment it's a dream, but it's a good dream - and in 20 years from now, who knows, graphene may replace silicon."

Tailpiece

(This last item I picked up from the RSC's Grapevine. It's a bit difficult to imagine the same furore erupting here but as Laurence Sterne said in A Sentimental Journey "they order these things better in France." On the other hand, he was being sarcastic after having had a run-in with the French authorities. ndp)

Chaos at French nanotech debates

22 January 2010

Protestors have caused the public to be banned from four debates on nanotechnology taking place across France. After Grenoble in December, and Rennes and Lyon in January, Marseilles saw the local debate organised by the Special Commission for Public Debate (CPDP) shut down by protestors on Tuesday. They clapped, whistled, shouted, threw paper balls, and raised banners with slogans such as 'Nano, it's not green, it's totalitarian'.

Although earlier debates had seen these protests questioning the legitimacy of the debates, organisers attempted discussion for more than thirty minutes before retreating to a private room to webcast the debate and interact with the public through the page's forum. In addition to discussing nanotechnology with an audience of the general public, panellists from scientific, health, and environmental organisations planned to debate topics related to nanotechnologies. Nine other debates have successfully been held in other cities since October of last year.

If the Parts and Labour organisation of Grenoble is not directly organising the protests, it certainly appears to be encouraging them through its website and a second nanotech-focused site. The organisation declined to comment when contacted by Chemistry World. Both websites host articles which attempt to discredit the debates on grounds of funding, from the French Government, and the credibility of the independent panellists. The criticism was enough for the CPDP to post a letter on the debates' website in November, defending debate participants against accusations that they were government-controlled, through money or affiliation, rather than independent voices.

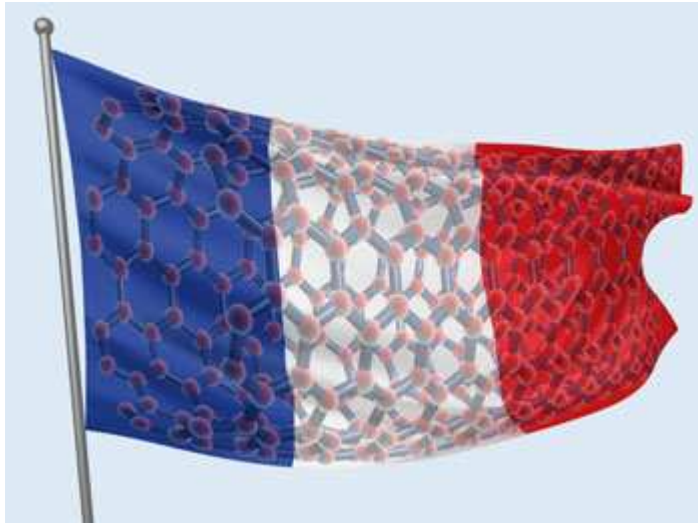
Marc Sentis, director of the Lasers, Plasmas and Photonic Processes laboratory in Marseilles and one of Tuesday's panellists, says he decided to get involved with the debates in part because nuclear facilities were never the subject of such public discourse. 'I am 52, so I remember very well as a student, there was no possibility to debate about this important question,' he recalls. 'I didn't go to try to convince people. I still have to have some input [from the public] to know what is good or not.' Sentis says that he understands to an extent the protesters' belief that

'everything is decided,' but says that in a democracy if you don't go and try to debate the issues, there is little chance of change.

The decision by one of the environmental groups due to take part in the debate to pull out on 13 January added a sense of legitimacy to the protesters' claim that the debates are 'phony' and 'antidemocratic'. According to Marie-Christine Gamberini of Friends of the Earth, the important questions on nanotechnology aren't being posed. The organisation lists nanoparticle toxicity, identification nanotechnologies that encroach on private life, and nanotechnologies for war as issues that need to be addressed. Tuesday's debate, however, included three panellists from defence backgrounds and one from toxicology, suggesting that these topics are being considered.

In the web forum for Tuesday's webcast one contributor, Paul Cuivre of Paris, wrote that although many decisions had doubtless been made already, a public debate is still worthwhile. 'When I see the attitude of some immature individuals [...] who succeeded at perturbing the debate this evening, I ask myself questions about the future of participative democracy in France.'

Kate McAlpine



France's public debates on nanotechnology have been disrupted by protesters