Editorial

2014 was a very busy year for our Group. Besides the usual NanoteC meeting, we had a follow-up of the December 2013 graphene meeting in May at the RSC headquarters. Then there was the Faraday Discussion on new carbon materials in which we played a leading part and on which Chris Ewels gives us here his impressions. As is usual for these Discussions, the paper presented and the recorded discussion will be published by the RSC, probably later this year. Then, because the RSC had quite independently found that it had awarded 3 of its prestigious awards in the field of graphene and nanocarbons, it asked us to organise a symposium at Burlington House where the talks of the medallists could be presented. We were delighted to have this opportunity and added to it the 7th Ubbelohde lecture, given by Chris Ewels. This made a most successful and fulfilling event.

This year, we are starting with a spring meeting, organised by Peter Branton and hosted by BAT at their laboratories at Southampton. This issue includes full details and a registration form. It is a totally free meeting but those wanting to take part are asked to register beforehand. I should say that the 2015 AGM of the Group will be held during the meeting and to this end, the official notice of the AGM and a copy of the minutes of last year's AGM appear in this newsletter.

NanoteC 15 will take place at the University of Oxford this year in September. A flyer giving the latest details is included in the newsletter. Finally, the series of meetings on nuclear graphite, INGSM, will reach the 16th in the series and is being organised by Tony Wickham with collaboration with the BCG, at Nottingham in September. All these, plus of course meetings on carbon held by other allied bodies, not forgetting the International Conference on Carbon in Germany this year, will mean a very busy year for conference goers.

That leads me neatly to the subject of how these International Conferences are allocated and arranged. Our Chairman, Malcolm Heggie has written a short account of how this is arrived at and you can satisfy your curiosity by reading his article. Also, the ever-present topic of a logo for the British Carbon Group has come up for discussion again. There is an item in these pages on a possible competition for a new logo.

Norman Parkyns norman.parkyns@tesco.net

Forthcoming BCG-sponsored meetings

"The many faces of carbon"

Spring Meeting of the British Carbon Group (RSC, IOP & SCI) 2015

Date and Location: 16th April 2015 at British American Tobacco Group Research & Development, Regents Park Road, Millbrook, Southampton SO15 8TL

Dear Colleague,

I am pleased to announce the programme for the Spring meeting of the British Carbon Group entitled "*The Many Faces of Carbon*". Carbon is a unique substance with many forms each one with the potential to enrich our lives. From its use in everyday objects such as tyres to the beauty of diamonds and the recently discovered graphene with its potential to revolutionize the electronics industry, carbon has a lot to offer. This one day meeting brings together group of academic and industrial scientists to talk about the various forms, their production and their application. This meeting provides an excellent opportunity for cross fertilization of ideas and techniques in carbon science.

Press registrants are welcome. There is no registration fee.
For the latest details, please visit the British Carbon Group website at *www.britishcarbon.co.uk*: the website also details registration, travel and accommodation.
Please feel free to forward this message to any colleague who may be interested in the meeting. For local information contact: Danielle Ormshaw (danielle_ormshaw@bat.com)

Malcolm Heggie, Chairman - British Carbon Group

09.30	Arrival and Coffee	
10:00	Welcome and Introductions	
10:15	Prof. Julie McPherson, Warwick University	*Industrial applications of diamond electrodes*
10:45	Colin Atkinson, Materials Processing Institute, UK	*Perspectives on coking*
11:15	Prof. Tony Wickham, Manchester University	*Nuclear Graphite: the first 73 Years and the next 100,000*
11:45	Dr Chris Norris, ARTIS	*The properties of carbon black recovered from waste tyres*
12.15	British Carbon Group Annual General Meeting	
12:30	Lunch and networking	
13:30	Prof. Sergey Mikhalovsky, Brighton University	*Nanostructured carbon adsorbents for medical protection against CBRN hazards*
14:00	Dr. Andy Goodwin, Thomas Swan & Co. Ltd	*Graphene – why the excitement?*
14:30	Dr. Gareth Neighbour, Oxford Brookes University	*Carbon past and future perspectives*
15:00	Tea and Coffee	Optional tour of BAT Research Facilities (GR&D)
16:30	Depart	

The British Carbon Group

The British Carbon Group is a Registered Charity
Registration Number 207890

www.britishcarbon.org/spring15/

CONFERENCE REGISTRATION FORM

The Many Faces Of Carbon

Group Research & Development, British American Tobacco, Southampton
16th April 2015

REGISTRATION DEADLINE : 27th March 2015

Surname:……First Name: ……

Title: ……. *(Prof/Dr/Mr/Ms Etc.)* Institution: ……

Address : ……

……

Post Code/Zip: …….. Country ……

Telephone:…… Fax: ……

E-Mail: …… ……

SIGNATURE ……

DATA PROTECTION STATEMENTS
Registration information on behalf of participants in this Meeting will be held by The British Carbon Group which has Notified as a Data User under the Data Protection Act, 1998 and subsequent amendments. Personal data as supplied by delegates will be used only for the purpose of administering this meeting and for publicity for future meetings, and for the production of a register of attendees for distribution to delegates. By submitting this registration form you will be indicating your consent to receiving email messages regarding future BCG sponsored events UNLESS you have indicated an objection to receiving such messages by ticking this box ☐

No Registration Fee

Lunch, coffee and tea will be provided

Accommodation

A free reception will be held in the Holiday Inn, Eastleigh (close to Southampton) on the evening of the 15th .

Please indicate if you would like to attend this…….

A number of rooms will be held at this hotel at the special rate of £90 b&b.
(Budget hotels are also available in the near area).

Please book me a room at the Holiday Inn ( ). I will get my own accommodation ( )

Other Information (Optional)

We shall do our very best to accommodate any special requirements that you may have in order to make your stay in Southampton as pleasant as possible. We invite you therefore to tell us about:

Any special dietary requirements? …….

Any mobility problems? ……..

Anything else we can help you with? ……

Next of Kin (for use only in the event of any emergency): Name.....

Phone.....

Please check that you have completed <u>ALL</u> sections of the form and post or email to:

Danielle Ormshaw
Group Research & Development
British American Tobacco
Regents Park Road
Millbrook
Southampton
Hampshire
SO15 8TL

e-mail : danielle_ormshaw@bat.com

INGSM-16

IMPORTANT DATES:

- **Abstract Submission Deadline: June 30, 2015**
- **Registration and Payments Deadline: July 31, 2015**

The 16th International Nuclear Graphite Specialists Meeting will take place at the Conference Centre of The National College for Teaching and Leadership, Triumph Road, Nottingham, UK, commencing 6pm on Sunday September 13th 2015 and concluding 4pm Thursday 17th September 2015. Note that this is one full day longer than previous INGSM meetings, to allow time for additional presentations and discussion.

Prof AJ (Tony) Wickham confer@globalnet.co.uk

Conference Organiser

This page is posted on our website www.britishcarbon.org from which the registration and other data can be reached.

NanoteC15

Nanotechnology in Carbon and Related Materials

14th – 17th September 2015

Corpus Christi College, Oxford

www.britishcarbon.org/nanotec

We are pleased to announce **NanoteC15** at the Corpus Christi College, in the University of Oxford from lunchtime Monday 14th to Thursday 17th September 2015.

One of the longest running carbon nanoscience conferences in Europe, **NanoteC** brings together scientists working in the broad area of **carbon science at the nanoscale**: nanotubes, fullerenes, nanohorns, graphene, nanowires, sp^3 forms, etc. 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.

NanoteC15 will contain dedicated sessions including synthesis, microscopy and spectroscopy of carbon nanotubes, graphene and related systems, nanocomposites, carbon chemistry, devices and electronic applications and theoretical modelling, combining both fundamental knowledge with applied research.

A special session on carbon grand challenges will involve participants in some blue-skies thinking and discussion about the challenges and new frontiers still waiting to be tackled in carbon nanoscience.

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.

To encourage student participation registration this year is only 150 pounds, and inexpensive accommodation [B&B GBP 261, en-suite GBP 338 both covering three nights (Monday-Wednesday) including all meals and conference dinner] is available. Additional nights (Sunday and Thursday) are priced at GBP 49.50 (B&B) and GBP 74.50 (en-suite) per night. Numbers will be restricted to 135 due to the lecture hall size, so we encourage you to register early (deadline 12th June).

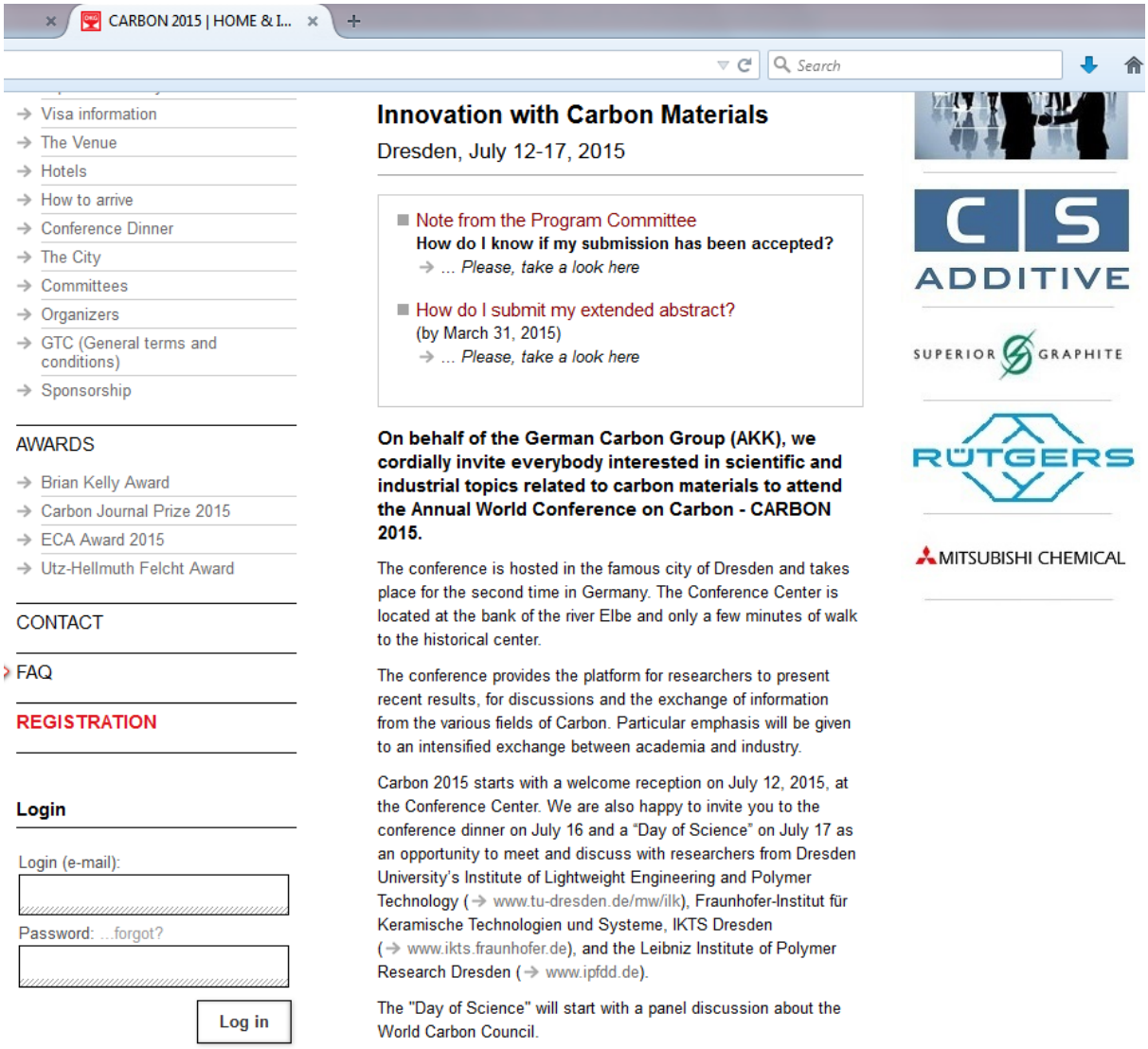
Full details including a preliminary list of invited speakers and registration details are available at http://www.britishcarbon.org/nanotec

Looking forward to seeing you there!

Professor Nicole Grobert
On behalf of the organising committee
(Nicole Grobert, Chris Ewels, Greg Van Lier and Malcolm Heggie) and the local organising committee (Frank Dillon, Juan Lozano and Adrian Murdock)

Other meetings not organised by the BGC

Carbon 2015



1st Chemistry in Energy Conference (1st CEC)

This conference is being organised by the Energy Sector of the RSC at the Heriot-Watt University, Edinburgh from July 20-22nd 2015. Full details from *www.maggichurchouseevents.co.uk/cec* . Some of the themes are relevant to carbon.

Reports of meetings

British Carbon Group-Faraday Division
Nanostructures Award Symposium
Friday 31 October 2014

It has now been usual for several years for the BCG to hold a Christmas meeting at which various advances in the field of carbon research are reviewed by experts. Last year we held a highly successful meeting at Manchester at which naturally enough, the latest developments in graphene science were presented. In 2014 however, circumstances arose that meant that we could hold a very prestigious meeting somewhat earlier in the year.

The Royal Society of Chemistry announced its annual awards of medals and prizes, among which no fewer than three were given to recipients working on carbon nanostructures. It is usual for the recipients to present a lecture on their work and the Faraday Division of the RSC invited the British Carbon Group to organise a symposium at which these three would give a talk. Your committee felt that this was too good and important an occasion to miss and were delighted to help in organising this meeting and not to hold a Christmas meeting this year. It was also decided to complete the programme with an award of the Ubbelohde lectureship to Dr Chris Ewels in recognition of his outstanding work on nanocarbons. The full programme is given below and the lectures fully lived up to the promise of the occasion.

13:00 Lunch

13:25 Opening remarks

13:30 Cinzia Casiraghi, University of Manchester
"Raman spectroscopy of graphene and other nanocarbons"
2014 Marlow Award Winner

14:15 Chris Ewels, University of Nantes
"Atomic-Scale Nanocarbon Design : An Alliance of Microscopy and Modelling"
7th Ubbelohde Memorial Lecture

15:00 Afternoon tea

15:30 Milo Shaffer, Imperial College London
"Versatile and Scalable Approaches to Chemical Processing of Nanocarbons"
2014 Corday Morgan Prize Winner

16:15 Eiichi Nakamura, University of Tokyo
"Chemistry at Mesoscopic Regime Connecting the Molecular and the Real World"
2014 Centenary Prize Winner

17:00 Medal Presentation

17:10 Wine reception

The first lecture for the Marlow medal, was given by Dr Cinzia Casarighi, now at the University of Manchester but who had worked previously in Italy and Germany. She described how Raman spectroscopy had become a vital tool in characterising graphene and graphene-related carbons. The knowledge they had gained in this study was now being extended to other forms of carbon. For example, diamond-like carbons showed a mixture of sp^2 and sp^3 bonded atoms that are easily recognised by their Raman signal. Absorption at 1350 cm^{-1} was associated with the breathing mode of benzenoid rings while that at 1550cm^{-l} was associated with rings and chains. Excitation by "visible" laser beams tended to excite the sp^2 vibrations while that of "UV" excited the sp^3, with a peak at around 1000cm^{-1}.

The exact position of the G peak at 1550cm^{-1} was dependant on the wavelength of the irradiating light. This seems to arise from the dependence of the size of the electronic band gap, which becomes very large for sp^2 carbon chains. For diamond-like materials (DLC), where there is hydrogen present, rings are opened up and show up as topological disorder. Characterisation of DLCs has become increasingly important because of their widespread use in computer storage where thicknesses of less than 2 nm are common.

The family of graphene materials is also an area where Raman has been a vital tool in investigating properties. Beside the G band at 1550 cm-1, a 2D band appears at around 2700 cm-1 and this is sensitive to the number of graphene layers. On hydrogenating graphene increasing number of sp^3 bonds is readily seen.

Finally, Dr Casarighi showed that BN was a good, neutral substrate for graphene. Rotation of a superposed graphene layer over the BN showed up Moiré fringes with the differing angle of rotation.

It then fell to me as one of Prof. Ubbelohde's many past research students, to make a brief resumé of his career and the reasons why the British Carbon Group had decided to institute a lectureship to commemorate his work on carbon and graphite. Prof. Malcolm Heggie, in his role as our current Chairman, then introduced Dr Chris Ewels as the 7^{th} Ubbelohde lecturer. Chris has done excellent work in the field of nanocarbons over the years, as well as being an active member of the BCG's committee and is a most fitting a person to receive the honour.

Chris pointed out that over the course of his career, electron microscopy had become more and more powerful, so that it was possible now to image individual atoms. It was now possible to see defects in the graphite lattice where single atoms were missing. This went hand in hand with increasing computing power being available so that structures could be computed very rapidly. At the same time, calculations of molecular dynamics were now readily available. It is indeed possible to calculate the structure and properties of individual nano-objects containing many atoms, even where a lack of symmetry prevented short cuts in the computing. We can see the effect of buckling the graphene lattice and of N-doping on single walled nanocarbons.

After the tea break Prof. Milo Shaffer from Imperial College gave the Corday Morgan prize lecture. He pointed out that the practical applications of nanotubes had taken off in the past

few years. He was particularly interested in chemical modification to nanotubes. For example, incorporating of O-functionalities rendered them able to react with other things in the gas phase and not just in solution. Removing the O-functionalities (*in vacuo*?) then exposing activated carbon nanotubes to a variety of reactants and polymers gave great possibilities. He had found that EELS (Electron energy loss spectroscopy) very useful for characterising such treated CNTs.

One interesting developments was the ability to make $Na^{+}CNT^{-}$ in solution. Similarly one could make $Na^{+}Gr^{-}$ and this reacted with alkylbromides to alkylate graphene. Gr- can also be made electrochemically and by using the positive electrode, "nanotubium" $CNT^{+\cdot}$

(As an aside, may I say that the ghost of Ubbelohde must have stalked the meeting. He investigated the properties of the intercalation of potassium in graphite and particularly the electronic properties. He would have been extremely excited at the content of this symposium).

The final talk was given by Prof. E Nakamura from Tokyo, the recipient of a Centenary Prize. It is very difficult to do justice to his fascinating presentation in words as much of it was showing electron micrographs in very high resolution. The highlight was pictures of molecular structures emerging from graphene lattices where motion was shown in real time. Prof. Nakamura said wryly that these had not been received without strong reservations by some reviewers, to put it mildly! Clearly however, the RSC panel that awards prizes had been very impressed by this extraordinary work and Prof. Nakamura held his audience spellbound by these amazing pictures.

About 60 attended the symposium, many of them research students, and there was a very brisk discussion in the short Q&A session at the end of each lecture. At the very end, the various prizes and awards were given to their recipients and the meeting finished with a very welcome wine reception, where no doubt, many of the issues raised were discussed in more detail.

The meeting was jointly organised by Dr Alisa Becker on behalf of the RSC Faraday Division and by Prof Tony Wickham from the BCG and both deserve congratulations on providing such an important and interesting event in the elegant surrounding of the RSC

I am grateful to Peter Minshall for providing some photographic record of the presentations. We had unfortunately failed to provide a photographer to record the event but Peter stepped into the breach with those shown below, taken from his mobile phone.

Norman Parkyns

The recipients of the awards with Malcolm Heggie, clockwise from left to right are:

Chris Ewels, Cinzia Casiraghi, Milo Schaffer and Eiichi Nakamura

1 - 3 September 2014, RSC Burlington House, London UK

The start of September saw a British Carbon Group supported meeting at the Royal Society of Chemistry on the subject of carbon nanomaterials. This was my first Faraday meeting and it was an eye-opening experience.

A Faraday meeting is a normal conference, turned on its head. Conventional conferences often seem to turn into a factory farming exercise, churning from presentation to presentation with no time for discussion, or drawing together of conclusions from different things you've seen. Even worse, many of my best questions only come later on the bus home, after I've had time to digest what the speaker was presenting. I've often wondered how the conference format could be changed to improve this, and the answer is apparently that the Faraday lecture series was already there, over 100 years before me.

The first Faraday discussion meeting was held in 1907, on "osmotic pressure". The format, as far as I know, is unique. Firstly, authors are required to submit a conference proceedings paper on their subject well in advance of the meeting. We all received a hefty package in the post just before the summer holidays kicked in, providing some excellent beach-side reading, and ensuring that everyone had already taken time to digest and reflect on the subjects to be presented.

The meeting itself took place in a wonderful location, inside the main library at the RSC. Unlike the conventional '20 minutes presentation, 0 minutes questions', presentations were restricted to just 5 minutes (time to remind the audience of the subject), after which we had up to an hour and a half to discuss the presentations, which were grouped together by theme. Although initial questions were addressed at the speakers they quickly turned into collective discussions and exchanges, sometimes punctuated by impromptu 5 minute unscheduled presentations, when participants had something relevant to add. Conversation migrated away from the timetabled programme, an example was an early question on nomenclature in nanocarbons which became a running theme throughout the meeting (notable questions included "What is an allotrope?" in the context of nanocarbons). Being largely stripped of my conventional powerpoint presentation crutch was surprisingly liberating, and allowed us to devote more time to discussing areas that different participants found interesting or relevant, rather than straitjacketing everyone to the schedule of the speaker. I found that conversation quickly migrated to areas of overlap and common themes between presentations, allowing presenters time to highlight the relevance of their results to previous talks. As this was one of the aims of the meeting – drawing out common ground in fullerene, nanotube and graphene research – the meeting was a spectacular success.

What many of us didn't realize at first was that quietly, diligently in the corner, the RSC representatives were noting down all of our conversation, which you then receive via email for corrections. This allows you to add references, refine the text into the elegant prose you wish you'd come out with instead of the partially formed ramblings that you often did, and the final collection of these will be reproduced in the Faraday discussion issue along with the initially submitted documents. The result is an excellent public record of both the initial submissions and the conference response to these, a halfway house to publishing referee reports alongside the articles.

The field of nanocarbon research is extremely broad, and while the organizers made an admiral job of effectively grouping the presentations by theme, I would imagine that a Faraday discussion would work even better when focused on one or two specific, controversial questions. We finished with an excellent well-lubricated meal at the RSC and the traditional passing of the somewhat mysteriously named "Loving Cup", with much nodding and bowing and discussion of Fish!

My overall impression of the Faraday meeting was extremely positive, and I would like to thank the organizers and the RSC for an impressive amount of work bringing it all together. In his "*Experimental Researches in Electricity (1839)"*, Michal Faraday said "I must confess I am jealous of the term atom; for though it is very easy to talk of atoms, it is very difficult to form a clear idea of their nature". Over the course of the Faraday meeting on carbon nanomaterials we managed, if not to form a clear idea on the nature of carbon atoms, at least to advance a little in our understanding of their bonding and behaviour; I'm sure Faraday would have approved.

Useful links (the RSC Webpage for the meeting, and the journal home page):

1. http://www.rsc.org/ConferencesAndEvents/RSCConferences/FD/FD173/index.asp
2. http://pubs.rsc.org/en/journals/journalissues/fd

Conference Description

Carbon nanomaterials have a unique place in nanoscience owing to their exceptional electrical, thermal, chemical and mechanical properties and have found application in areas diverse as composite materials, energy storage and conversion, sensors, drug delivery, field emission devices and nanoscale electronic components. Conjugated carbon nanomaterials cover the areas of carbon nanotubes, fullerenes and graphene. Carbon nanotubes continue to gain attention and have impacted many fields and the number of potential applications continues to grow. The chemistry of carbon nanotubes, control over electronic properties and the assembly of nanotube devices are particularly active areas. Work in fullerenes has renewed vigour with significant advances in the field of superconductivity, thin films and supramolecular assembly being made over the last few years. Graphene is perhaps the newest of the carbon nanomaterials and promises to be a very active field. Already since its 'isolation' in 2004 it has grabbed the attention of the chemistry, materials and physics communities. It promises to rival carbon nanotubes in terms of properties and potential applications with the number of publications rising from ca. 130 in 2005 to ca. 2,800 in 2010.

Carbon nanomaterials cross many disciplines and therefore makes an ideal subject for a Faraday Discussion. The audience was diverse, given the different fields the topic impacts, and with broad experiences making for interesting and lively discussions and the airing of different perspectives. The meeting deliberately identified three key areas, carbon nanotubes, fullerenes and graphene which although look very different have much, often unrealised, common ground. Much of the work on carbon nanotubes has origins in fullerene research and now graphene is building on carbon nanotube work.

- Optoelectronics and spectroscopy, electronic properties
- Functional materials and theory
- Applications, composites, nanoelectronic devices

- Functionalisation, separation, solvation and assembly

(We are greatly obliged to Chris Ewels for this very interesting and personal account of this Faraday Discussion. I can probably elaborate on the significance of Fish during the conference dinner. Tony and Angela Fish were prominent in the activities of the RSC 30 years or so. I met Tony once but didn't really know him. I did however know Angela very well as she was the official manager of the Faraday Division, a job she held for many years and ran with great efficiency and smoothness. Her early death was a sad loss, regretted by those who knew her. In the terms of their Will, Tony and Angela left a considerable amount of money to the RSC, which is used today for the benefit of younger chemists and is available for applications, for example for travel grants. ndp)

News on Carbon Matters

World Carbon Conferences

The World Carbon conferences are organised by national carbon groups and I am currently Chairman of the the British Carbon Group http://www.britishcarbon.org (BCG).
By international agreement, the carbon conferences cycle between Asia, Europe and America and each has its own carbon association, the European Carbon Association being a federation of national groups including BCG. Very recently there has been a formal federation of European, Asian and American carbon societies into the World Carbon Council.

These are the last three conferences run by BCG:
1988 Newcastle-upon-Tyne
1996 Newcastle-upon-Tyne
2006 Aberdeen

It is reckoned that 2021 would likely be our next opportunity for UK and perhaps the fact that our last carbon conference was held in Scotland (and indeed Northern UK) might be an incentive to look elsewhere in the UK. Also, by and large, we look for a location which has a strong carbon science research base so that faculty and research staff can provide support to the conference. (This is why the conference was held twice in Newcastle, where the Northern Carbon Research Laboratories were).

Nevertheless we do not have closed minds. In addition, it is always possible that we could make a case for a conference earlier in the cycle, if for example there were no volunteers from other countries to organise.

As I recall the recent and proposed conferences were/are:
Aberdeen, UK (Europe) 2006
Seattle, USA (America) 2007
Nagano, Japan (Asia) 2008
Biarritz, France (Europe) 2009
Clemson, USA (America) 2010
Shanghai, China (Asia) 2011
Cracow, Poland (Europe) 2012
Rio-de-Janeiro (America) 2013

Jeju, Korea (Asia) 2014
Dresden, Germany (Europe)2015
Penn State, USA (America) 2016
Australia (Asia) 2017
Europe 2018
America 2019
Asia 2020
Europe 2021

Within European cycle:
France, Poland, Germany have run the conference recently, but not Spain, which has a strong carbon community (and there might be new entrants into the cycle as well. So 2021 is the probably the next shot at things for BCG/UK.

Anyway, the BCG is responsible for proposing UK venues and the ECA chooses between the different European venues proposed, the BCG being one of the members of the ECA.

Malcolm Heggie

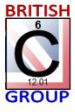
(*Editor's note: this is an edited version of the response Malcolm made to an offer from a major city in the UK which was interested in hosting such a conference).*

BGC logo

You will have seen our present Logo at the top of the Registration form for the Spring meeting. It's normally in red but for reasons of economy, appears there in glorious black and white. It has served us well over the years but the committee does mull over whether there could be a 21st century version. To that end, you are asked to consider if you could do better. There may even be a prize attached, so if you have any ideas send them on either to me at norman.parkyns@tesco.net or to Malcolm, m.heggie@surrey.ac.uk

Below are just a few back of the envelope efforts we have considered so far. I leave the judgement to you.

British Carbon Group logo



The British Carbon Group

Notice of 2015 Annual General Meeting

Notice is hereby given that the 2015 Annual General Meeting of the British Carbon Group will be held Thursday, April 16th, 2015 at British American Tobacco Group Research & Development, Regents Park Road, Millbrook, Southampton SO15 8TL, starting at 12:15pm.

The business of the Meeting is as follows: -

1. Apologies for Absence
2. Minutes of the previous AGM (Held at Burlington House, May 2014 and published in the Carbon Newsletter, June 2014)
3. Matters Arising
4. Chairman's Report
5. Treasurer's Report
6. To Receive Notice of the Representatives of the Sponsoring Bodies
7. Election of Officers and committee members.
8. Any Other Business

At the 2015 AGM the Chairman, Vice-Chairman, Treasurer and Secretary must stand down. The Treasurer and Secretary are not eligible for re-election. Nominations for these positions are invited. In addition the position of an ordinary Committee member falls vacant this year and nominations for this position are also invited.

Nominations duly proposed and seconded and with the consent of the nominee, should be received by the Honorary Secretary before April 9th, 2015 at the following address:

Dr P. C. Minshall
Oldbury Technical Centre,
Oldbury Naite,
South Gloucestershire
BS35 1RQ

Or by email at peter.c.minshall@magnoxsites.com

THE BRITISH CARBON GROUP

Minutes of the 2014 AGM held at the Royal Society of Chemistry, London, 1st May, 2014.

Present

Malcolm Heggie (Chairman), Norman Parkyns (Vice-Chairman), Tony Wickham (Hon. Treasurer), Peter Minshall (Hon Secretary), committee member Peter Branton and 5 BCG Members.

Apologies for Absence

Geoff Fowler, Abbie Jones, David McCaffrey, Steve Ragan, Kavintheran Thumbiratriam, Nassia Tzelepi, Ray Whitby.

Minutes of the Last AGM

The minutes of the previous AGM, held on November 6th, 2013 at Imperial College were accepted as a true record. [Proposed: John Patrick, seconded: Tony Wickham, accepted *nem con*.]

Matters Arising

There were no matters arising.

Chairman's Report

Malcolm Heggie welcomed everybody to the May Day Graphene meeting and the 2014 AGM of the British Carbon Group. The Group had adopted a policy of bringing forward the AGM to a point that was as close as possible to the end of the previous year, in order to shorten the reporting time to four to five months. This had thus been a short year to report on as the last AGM had been in November 2015.

Since the last AGM the Group had organized two meetings. One, on Sustainable Carbon, was held in November at Imperial College and incorporated the Ubbelohde lecture, given by Prof. Francisco Rodríguez-Reinoso of the University of Alicante. This meeting was organized by Geoff Fowler and Norman Parkyns and attracted about 40 participants, including several from overseas.

The Group's customary Christmas Meeting was held in Manchester on the subject of Graphene. Organised by Malcolm Heggie and Peter Minshall, this attracted 80 participants and was over-subscribed. The current meeting, May Day Graphene, was conceived as a follow-on to the Xmas meeting and has about 40 participants and 13 posters.

The Group is looking forward to the EdF Nuclear Graphite Conference next week; currently with 104 registrants, but still increasing. NanoteC14 will be in Brussels this year, in August. The Group is also supporting Faraday Discussion 173, New Advances in Carbon Nanomaterials, to be held in London on the 1st to the 3rd of September.
Malcolm thanked the Officers and Committee members of the BCG for their support, in particular Steve Ragan and Abbie Jones who were stepping down at this AGM.

Treasurer's Report

The accounts for 2013, in the RSC format, were presented by Tony Wickham.

Total income was £23,675.84 and total expenditure was £21,304.68. The balance on 1st January, 2013 was £53,577.43 and on 31st December, 2012, £55,948.59. There was thus a surplus of £2,371.16 for the year.

The Group's funds were healthy, with about £35,670 available to the BCG. The BCG also administered two trust funds: the Brian Kelly, standing at £13,405.71 and the Roger Taylor, standing at £3,207.09. The Treasurer noted that the Group's funds were high as they had been boosted by the last International Carbon Conference held in the UK. As the next such Conference will not be until at least 2021, the money has to be spun out over a number of years.

In 2013, 80% of the funds invested by the Group were placed in an RSC deposit account, yielding 3% annual interest. The balance was placed in a fund with short term access.

The Group organized three conferences in 2013. NanoteC13, in September, made a surplus. The Ubbelohde lecture and Sustainable Carbon meeting in November cost £437 net. The Xmas meeting on Graphene in Manchester was free to participants and cost £1 438.

The Group also receives grants from its sponsoring bodies (IOP, RSC and SCI) and these pay for the Newsletter and committee meetings.

The Group remains registered for VAT.

The meeting accepted the accounts as presented [Proposed: Norman Parkyns, seconded, John Patrick] and thanked Tony Wickham for his excellent work with what are more complex accounts than is usual for interest groups of learned societies.

<u>To Receive Notice of the Representatives of the Sponsoring Bodies</u>

The following will be notified to the sponsoring bodies as representative for 2014:

RSC	Norman Parkyns
IOP	Peter Minshall
SCI	Geoff Fowler

<u>Election of Officers and Committee Members</u>

Nominations had been received for Chairman [Malcolm Heggie: proposed Peter Minshalol, seconded Norman Parkyns] and Vice Chairman [Norman Parkyns: proposed Tony Wickham, seconded Peter Minshall]. There being no other nominations, the meeting elected both *nem. con*]

As no nominations for Treasurer or Secretary had been received, the meeting agreed to suspend standing orders and appoint Tony Wickham and Peter Minshall for further terms of office as Treasurer and Secretary, respectively.

Peter Branton was proposed by Peter Minshall and seconded by Norman Parkyns as a member of the committee.

Chris Ewels was proposed by Tony Wickham and seconded by Norman Parkyns as a member of the committee.

As the number of nominations was less than the number of vacancies, both were elected unopposed to the committee.

Any Other Business

There being no other business, the meeting closed at 3.35pm.

Who'd have thought it?

Prediction is very difficult, especially where the future is concerned *Niels Bohr (attrib)*

I'm fast approaching my 80th birthday but am not yet in my dotage, or at least, so I reckon. On the other hand I am well into what others have rather unkindly referred to as my anecdotage. This accounts for the sometimes rather discursive pieces that appear at the end of the British Carbon Group's newsletter, especially when, as I'm afraid is often the case, the amount of material, although excellent in quality, may lack rather in quantity. This accounts, in case you might have been wondering, for little end pieces such as the following.

I wonder whether Harry Kroto and his fellow workers had any idea of what would become of their discovery of the structure of C60? They had stumbled on-no, that's not right-they had *uncovered* this new form of carbon. Very interesting no doubt and did throw new light on the origin of forms of carbon in the universe but would the World at large be much affected by the discovery? Well, we now know the answer to that and the media spotlight is now on graphene where it's rather too soon to say if life has been changed by this.

There are many discoveries like this that caused quite a stir in the scientific world but which lay dormant for years before there was much impact on the man (person?) in the street. I've had a couple of experiences of my own that have underlined that.

Many years ago, in the middle of last century when I was just starting out my career by enrolling as a student of chemistry at Imperial College, a fellow student drew my attention to a notice that had appeared on the noticeboard of the Physical Chemistry Department. This was a list of colloquia being held in the Physics Department, which in those days shared the same building. Among the research topics being presented was one entitled "Proton Nuclear Magnetic Resonance Spectroscopy". We both agreed that this was a most impressive title of which neither of us had any idea what it was about. We also agreed that it was one of these remote specialist research areas of which no-one would ever hear again. I'm glad that I never had to make decisions in my future life about new ideas if I could get that one so wrong.

The other memory I have is attending a seminar held in the Physics Department at IC in the early 1970s. This was celebration of the 50th anniversary of the demonstration of the wave-like character of the electron as apart from its corpuscular nature that had been assumed hitherto. The possibility of wave-like behaviour of electrons and other such bodies had been predicted by de Broglie and demonstrated by the now-classical experiments of Davisson and Germer. At the same time and quite independently, G P Thompson had done parallel work in Aberdeen using higher-energy electrons, the two papers being published within a very short time of each other. These results confirmed the validity of quantum

mechanical ideas that de Broglie had used and deservedly gained the Nobel prize for 1937. They firmly established the use of quantum mechanics in physics and as such, were a high point in the rather recondite and specialised world of theoretical physics.

Prof. Davisson had died some years before this celebratory event but Prof Germer was there as was Prof Thompson, who had moved to IC as professor of physics after his work at Aberdeen. Somewhat sadly, Sir George, as he now was, revealed that although Germer had gone on to be famous in his own right, his co-worker at Aberdeen, Reid, had been killed shortly after in a motorcycle accident, otherwise he too would have made a name for himself.

The rather large lecture theatre was packed, partly of course for the chance of hearing from the lips of these famous men how the work was done but also for the fact the Germer's work had escaped the confined and rarefied regions of theoretical physics and was now being used, almost in a routine manner all over the world. Davisson and Germer had diffracted electrons accelerated by around 100 Volts from a metal surface and obtained a characteristic 2-D diffraction pattern. They had done what they set out to do, and that was it: end of story. What raised the topic to its current level of interest was its subsequent application, led by Prof. Germer, to the morphology of crystal surfaces. The development of Ultra High Vacuum (UHV) technique in the 1950s had meant that metal surfaces could now be cleaned up and would stay clean while their properties and their interaction with adsorbing gases could be investigated. The application to heterogeneous catalysis was obvious and the results that this technique, now re-named (or possibly re-branded) LEED, Low Energy Electron Diffraction, had really revealed an enormous amount of information about the nature of catalytic surfaces. Not only metal surfaces of course but also those of semi-conductors, so you can see where the enthusiasm of the large audience came from. But as I say, could any of the distinguished discoverers of the work have foreseen what it would lead to?

I've just finished reading the obituary of Charles Townes, who with Arthur Schawlow discovered the laser. They certainly didn't start out to invent CD players or supermarket check-out devices. They were employed by the US Navy to make more powerful radar sources. As I remember, and this may not be right, they were using the rotation lines of the ammonia molecule and they got the idea that they could amplify the intensity by this technique that they called microwave amplification by stimulated emission of radiation, so the first laser was in fact, a maser. The extension to radiation in the visible spectrum came later. For a long time, it was regarded as solution in search of a problem, incredible as that may seem today. Other scientists cottoned on to the fact that the laser beam was not only coherent and intense but monochromatic with an incredibly narrow bandwidth, so the application to laser-Raman spectroscopy rejuvenated that branch of molecular spectroscopy. Where would we be today without lasers but in the early 1960s, as I say, who'd have thought it?

Norman Parkyns