RSC Photophysics and Photochemistry Group Newsletter Summer 2018

August 2018

Editorial

Welcome to the summer 2018 edition of the RSC Photophysics and Photochemistry Group newsletter. This issue sees some changes, none more noticeable than our new group name! We would like to thank the membership and the RSC for supporting this change, which we believe more accurately reflects the current and future activities of the group .

We would like to welcome Dr Catherine de Castro (Swansea) and Dr Olof Johansson (Edinburgh) to the committee as our Early Career Representatives. Both recruits have thrown themselves into committee activities, with Catherine co-organising the next Early Career member meeting and Olof co-organising our symposium at the 2019 Faraday Joint Interest Group Conference. We are glad to have you both on board.

2018 has already been an active year for the Group. We sponsored a symposium at the 27th IUPAC International Symposium on Photochemistry, held in Dublin in July and the Ultrafast Chemical Physics in Scotland meeting in March. Full meeting reports can be found in this newsletter, along with a list of upcoming events in 2018/2019 of relevance to the Photochemistry and Photophysics scientific communities.

Our next event is the Early Career Member meeting, which will be held at Swansea University on 20th-21st September 2018. The call for abstracts is now open and the registration deadline is 4th September. Please see the website for further details: www.rsc.org/events/detail/33561/rsc-photochemistry-group-early-career-members-meeting

The Group is continually looking to expand and diversify its portfolio of activities. As part of this initiative, we are delighted to share a new segment of our newsletter, which aims to highlight opportunities for photophysics and photochemistry experiments in the undergraduate laboratory. Our first Feature Article comes from Dr Michael Seery at the University of Edinburgh and looks at the flash photolysis of azobenzenes. We are looking for contributors for our next issue, so please get in touch!

Finally, membership of the RSC Photophysics and Photochemistry Group is free to all members of the RSC. If you are reading this newsletter, then you are probably already a member, but we would greatly appreciate your help in spreading the word so we can grow our membership. So if you have a colleague, student or friend that you think may be interested in our work, please do ask them to consider signing up to become a member .

Thank you to all who have contributed an item to this issue of the newsletter.

Rachel Evans and Robert Edkins

Newsletter contributions

If you would like to contribute to forthcoming newsletters (events for the calendar, conference reports, or suggestions for features), please contact the Group's Secretary Bob Edkins by email: robert.edkins@strath.ac.uk

Inside this issue

Chair's Report

The first year of my term as Chair of the RSC Photochemistry Group has flown by, in part due to the many activities and changes that the group has undertaken during this period. A key priority this year was to change the name of the group so that it more accurately reflected the diversity and breadth of topics that fall under our remit. Following consultation with our members, the committee formally proposed to the RSC that we should become the Photophysics and Photochemistry Group (PPG). I am delighted to announce that this change has now been approved by the Member Networks Committee and Membership and Qualifications Board. I would like to thank our membership for supporting this change, which we believe is a critical first step in helping us to diversify our activities and grow our membership.

The recent growth in our committee size has also helped us to expand the number of events that we are able to run. Following demand from our members, our biennial Early Career Members symposium will now be run annually, with the next edition being held in Swansea in September 2018, co-organised by one of our new Early Career Representatives, Dr Catherine de Castro, along with our Secretary, Dr Robert Edkins. I would like to take the opportunity at this point to congratulate Robert on his recent appointment as a Chancellor's Fellow at The University of Strathclyde. Well done and good luck, Bob!

Looking forward to 2019, we are excited to announce that we will be organising a joint meeting with the Gruppo Italiano di Fotochimica, our counterparts in Italy, in Lipari on the Eolian islands on the 24th-26th June 2019. Be sure to save the date! We will also be participating in the second RSC Faraday Joint Interest Group Conference.

Due to committee retirements, we will shortly be announcing a call for Expressions of Interest to join the committee. We are particularly keen to attract an industry representative, but welcome applications from anyone who is passionate about photophysics/photochemistry and is willing to get actively involved. We look forward to hearing from you!

Rachel Evans, University of Cambridge
Chair, RSC Photophysics and Photochemistry Group

Upcoming RSC Photophysics and Photochemistry Group Events

Early Career Meeting

Register and submit your abstracts now. We are pleased to be organising another edition of our Early Career Members' Meeting, this year at Swansea University, 20th-21st September 2018. We have an exciting and varied line up of invited speakers as well as presentation of the 2018 RSC Marlow Award. We hope you can join us and present your research. There are a number of small travel bursaries available for attendees delivering an oral or poster presentation. Deadlines: Registration 31st August, Poster abstracts 4th Sept.

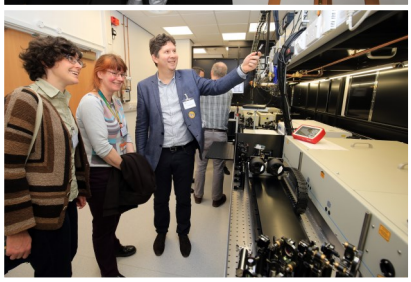
www.rsc.org/events/detail/33561/rsc-photochemistry-group-early-career-members-meeting

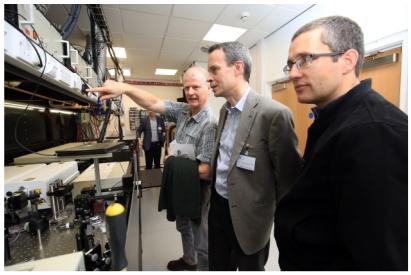
Joint meeting of the RSC and Italian Photochemistry Groups

Save the date. We are pleased to announce that we will be joining with colleagues from the Italian Photochemistry Group for a meeting in 2019, the first of its kind. This exciting event will be held on the beautiful island of Lipari 24th-26th June 2019. One not to miss, we suggest! Further details will be communicated shortly.

Conference Report

Opening of the Lord Porter Laser Laboratory, University of Sheffield





On the 14th March 2018 a special one-day event was held at the Department of Chemistry, University of Sheffield to mark the opening of the new EPSRC-funded laser facility named in honour of Lord George Porter. The laboratory is headed by Prof. Julia Weinstein, alongside Dr Adrien Chauvet and Dr Jenny Clark and an extended academic team of scientists from many departments in Sheffield. Dr Dimitri Chekulaev will run the facility.

A full programme of talks was arranged and a large section of the photophysics and photochemistry communities from across the UK and Ireland gathered to mark the occasion. The facility was officially opened by Lady Stella Porter and Dr Andrew Porter in a ceremony including the unveiling of a name plaque. Attendees of the event were invited on a tour of this impressive facility.

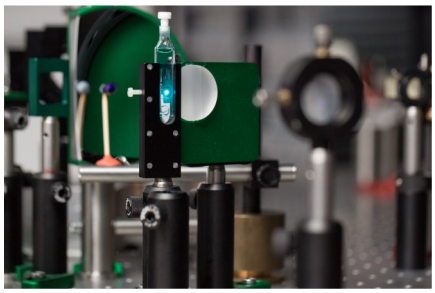
The meeting started with the RSC Physical Organic Chemistry Award Lecture from Michael Wasielewski from Northwestern University, USA, who gave a very insightful talk on the development of self-assembled organic nanostructures for solar energy harvesting. Other talks on the day included a historical account of Lord Porter's work from David Philips (Imperial), an overview of complementary ultrafast X-ray methods for studying spin and structural dynamics from Majed Chergui (EPF Lausanne), and an overview of some of the work from the Central Laser Facility from Tony Parker (RAL), whose talk also conveyed the importance of a long-term research vision. We even learnt from Jenny Clark (Sheffield) about the importance of dye aggregates in determining the colour of lobsters! Excellent lectures from Adrien Chauvet, Andrew Orr-Ewing and a series of five short talks from members of 'Sheffield Ultrafast' completed this enjoyable day.

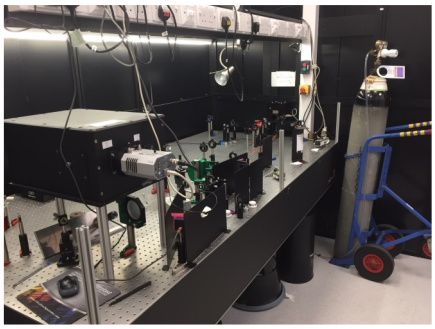
The RSC Photophysics and Photochemistry Group would like to congratulate the Sheffield team on the opening of this facility, which will be an excellent resource not only for Sheffield but for the wider photophysics community in the UK.

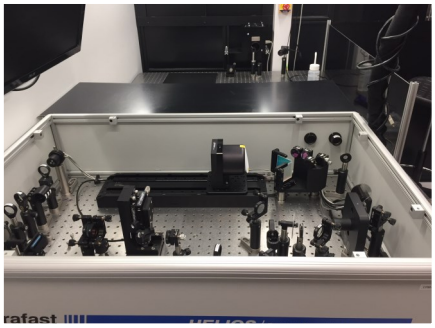
We thank Julia Weinstein, Dimitri Chekulaev, and Jenny Clark for contributing an outline of the technical details of the facility, which you can find overleaf.

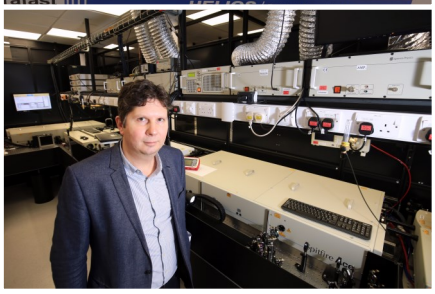
Robert Edkins, University of Strathclyde

Technical Report
The Lord Porter Laser Laboratory, University of Sheffield









A brief overview of the equipment available at the Lord Porter Laboratory and the range of photophysical experiments that can be performed there.

LIGHT SOURCES

Spitfire Ace PA 1,
5 KHz, 100 fs, 14 W
SHBC: Second Harmonic Bandwidth Compressor
- 400 nm, ps – into - picoseconds

OPA TOPAS 400
- 470 – 2600 nm
- Extra mixers: 240 - 480 nm, 2400 - 10000 nm

Seed: MaiTai, Ti:Sapphire 84MHz, 25 fs

Seed pulse opto-mechanical and electronic synchronisation delay

Spitfire Ace PA 2,
10 KHz, 40 fs, 12 W
OPA TOPAS PRIME (UV-Vis)
- 235 - 2600 nm
- Time-plates: 2nd Harmonic 400 nm, 3rd Harmonic 267 nm

OPA TOPAS PRIME (Mid IR)
- 2600 - 15000 nm (for probing approx. 3800 cm^{-1} – 800 cm^{-1})

EXPERIMENTS

Transient Absorption UV/Vis/NIR
80 fs – 8 ns
Excitation: Spitfire Ace PA 2
Detection: Helios (*Ultrafast Systems*)
Broadband detection in:
UV/vis 350 -750 nm
Vis 450 - 950 nm
Near IR 800 - 1600 nm
Fiber-coupled sensors:
CMOS (δλ 4 nm); InGaAs (δλ 13 nm)
Acquisition rate: 9500 spectra/s
Shorter excitation pulses and longer (ms) scale: in progress

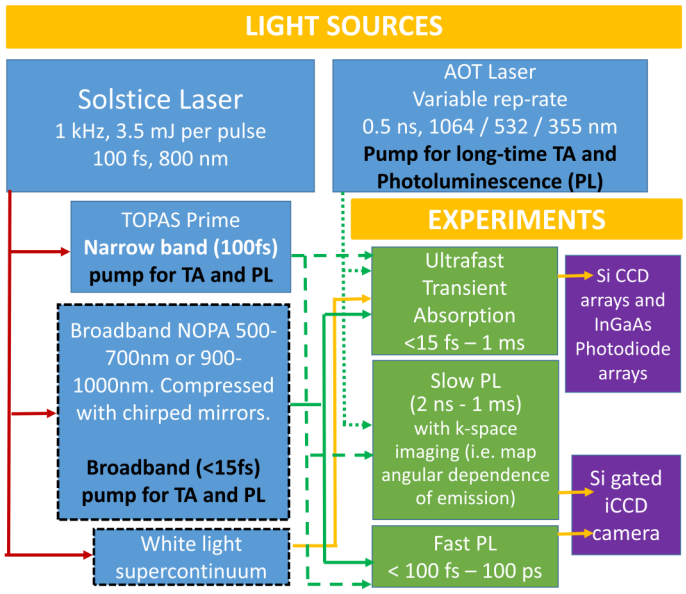
FLUPS: Femtosecond Fluorescence Upconversion
With Prof Niko Ernsting, Humboldt University Berlin

Pump: **400** nm (upgrade to other λ in progress)
Gate: 1340 nm
Detection: *Andor CCD*
$\lambda_{Emission}$ 400-750 nm,
$\lambda_{Upconverted}$ 300 – 500 nm

Current time resolution:
~180 fs, planned < 100 fs

TRIR: Time-Resolved Infrared, ~100 fs – 4 ns
Excitation: tunable, UV/Vis
Detection: MidIR range, Broadband, variable resolution (>4 cm^{-1}), MCT array detectors/electronics by *Infrared Associates /Infrared Systems Development*

2D-IR: Two-Dimensional Infrared
IR Pulse Shaper (*PhaseTech);*
IR narrowband picosecond pump (SHBC)



Dimitri Chekulaev, Jenny Clark and Julia Weinstein, University of Sheffield

Conference Report
Ultrafast Chemical Physics in Scotland

The RSC PPG were pleased to sponsor this UCPS meeting

A one-day meeting was held on the 19th of March in Edinburgh with the aim to bring together research groups in Scotland working on ultrafast chemical physics. There was a wide range of topics covered from bio and materials to fundamental light-matter interactions. Speakers included Eleanor Campbell (Edinburgh), Jeremy Coe (Paterson group, Heriot-Watt), Gordon Hedley (Glasgow), Neil Hunt (Strathclyde), Olof Johansson (Edinburgh), Anita Jones (Edinburgh), Adam Kirrander (Edinburgh), Arvydas Ruseckas (Samuel group, St Andrews), Dave Townsend (Heriot-Watt), and Klaas Wynne (Glasgow). The large number of groups participating, both from theory and experiments, demonstrates that ultrafast chemical physics is indeed very active in Scotland. The meeting was very well received and there was an overwhelming majority that wanted to turn the meeting into an annual event and so a new online forum for ultrafast chemical physics in Scotland was created http://ultrachemphys.org.

We also had a specially invited international speaker, Oriol Vendrell (Aarhus), who spoke about the new field of cavity femtochemistry. There was also a talk from Mark Goossens, representing local laser manufacturer Chromacity, who connected applications in chemical physics with the large photonics community in Scotland. We had a long lunch break during which lively discussions among the 35 participants were held. The meeting also attracted interested from outside Scotland with participants from northern England.

The organisers would like to thank ScotCHEM and the RSC Photochemistry and IOP Molecular Physics Groups for funding.

Feedback from participants

> *"I think it was a great day and very useful for the community."*
>
> *"I had great time at the meeting, most of the talks were very informative and helpful. I do think that it ought to be an annual event."*
>
> *"Inspiring to attend as an undergraduate. The topics were interesting and the speakers were good. Talking to some of the researchers was useful as well, learning about their work and what kind of groups there are working in this area of research."*

"It was very good, the venue too and the truth is that I got some good ideas with the talks. It's a great idea to bring together those of us who do ultrafast chemical physics and who are close by."

Neil Hunt, University of Strathclyde
Olof Johansson, University of Edinburgh

Conference Report
27th IUPAC Symposium on Photochemistry

The IUPAC Symposium on Photochemistry is one of the largest conferences in the photosciences. Between the 8th-13th July 2018, the most recent edition of this biennial meeting took place at University College Dublin, organised by Susan Quinn (UCD, Ireland) and Michael Garcia-Garibay (UCLA, USA). The meeting attracted over 500 participants and covered all areas of modern photochemistry, photophysics and photobiology with a good balance of plenary, invited and contributed talks, as well as over 200 posters.

The RSC PPG were pleased to be able to sponsor two of the parallel sessions on the first full day of the meeting. Included in this was an invited talk from Gerald Meyer (UNC Chapel Hill, USA) who discussed "*Excited-state sensing, release, and oxidation of halide ions"* as a route to alternative solar fuels using ruthenium photocatalysts. The topics covered in the contributed talks in our sessions were varied, and ranged from studies of charge recombination (Trevor Smith - Melbourne, Australia), development of light-harvesting systems (Yi Li - CAS, China), photocatalytic H_2 generation (Julien Warnen - Cambridge, UK), TDDFT studies of pyridine chromophores (Rodrigo Morales Cueto - CIQ, Mexico), supramolecular photocatalysis (Johannes Vos - DCU, Ireland) and copper complexes for solar cells (Marina Freitag - Uppsala, Sweden). These sessions were well attended, and we hope those who were there enjoyed them.

One particular highlight was a lunchtime session run by Sylvia Braslavsky, which showcased female contributions to photochemistry and in particular IUPAC photochemistry meetings. It did however act as a reminder to everyone to consider and improve equality and diversity when selecting speakers for future events, which the RSC PPG committee strongly support and are working to achieve.

The plenary talks were diverse and enlightening, highlighting the strengths of all areas of the photosciences. They were delivered by a stellar line up of Michael Grätzel, Julia Weinstein, Laura Herz, Thorsten Bach, Christopher Barner-Kowollik, Gonzalo Cosa, Anna Krylov, and Tetsuro Majima.

The next IUPAC photochemistry symposium will take place in Amsterdam, The Netherlands, 12th-17th July 2020 organised by Fred Bouwer and promises to be an equally unmissable conference.

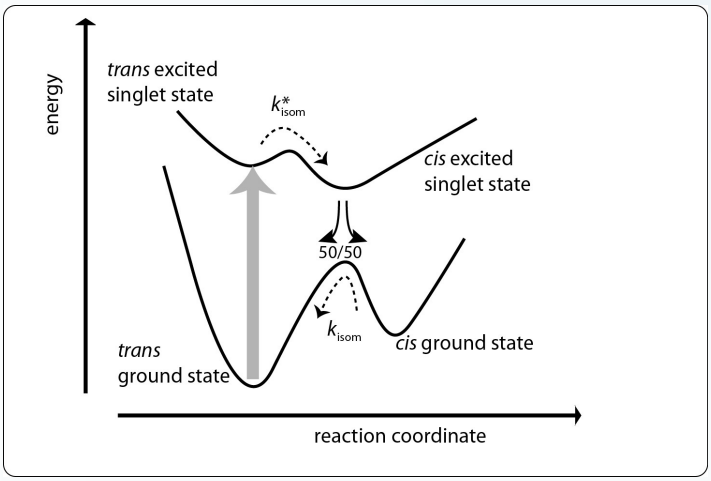
Robert Edkins, University of Strathclyde

RSC PPG thank Alex Doran for the photos. More of Alex's photography can be found on Instagram and Flickr.

Feature Article

Undergraduate Photochemistry Practical Experiments: Flash Photolysis of Azobenzenes

Incorporating practical photochemistry into undergraduate teaching can be difficult, because of the nature of equipment required, reaction timescales, and sizes of class groups. One that has worked very well in our hands is the study of photo-isomerization of azobenzenes, which is of continuing interest.[1] As they absorb in the visible region, the excited state can be generated by a camera flash, and any *cis*-isomer formed slowly reverts back to the *trans* form over a few hundred seconds in non-polar solvents, easily monitored by a basic UV/visible spectrometer.



We use the experiment described by Hair,[2] where students study the *cis* to *trans* reformation of 4-anilino-4'-nitroazobenzene. They study it first in cyclohexane solution, and look at the reformation times at temperatures up to 50 °C in this solvent, so as to determine the activation energy of the *cis* to *trans* process, relating to k_{isom} in the figure shown. Students then investigate THF and acetone solutions at lower temperatures to draw conclusions about solvent dependence. Getting data in acetone can be a bit trickier, but in general this experiment looking at different solvents and different temperatures works well in our hands, and takes our third year students up to three hours to complete.

More recently, we have changed the set-up to be a two-part experiment, whereby students complete the first part as described, and then are asked to investigate another azobenzene over a further three laboratory sessions. The intention is that they take what they know from the first part and use this to explore the effect of pH on the *cis* to *trans* process. For this, it is easier to have a water soluble dye, and we use the *o*-methyl red system described recently by Larsen,[3] but with our set-up. We ask students to develop a hypothesis on what effect pH will have on the rate of isomerisation based on what they learned in the first part, and then they are required to devise some experiments to test out that hypothesis.

Larsen's paper also gives some useful information on the "transient" *cis* form, which just about appears around 340 nm, and students looking for a challenge are encouraged to hunt this out, in our case the old-fashioned point-by-point way. We have found that this is a really great experiment and the combination appears to be working well in getting students to think about solvent and temperature effects generally, but also some of the specific terminology and considerations of photochemistry, but in a way that doesn't need any specialist set-up.

(1) Garcia-Amoros, J., Sanchez-Ferrer, A., Massad, W. A., Nonell, S., & Velasco, D. (2010). *Phys. Chem. Chem. Phys.*, *12*, 13238-13242. (2). Hair, S. R., Taylor, G. A., & Schultz, L. W. (1990). *J. Chem. Ed.*, *67*, 709. (3). Larsen, M. C., & Perkins, R. J. (2016). *J. Chem. Ed., 93*, 2096-2100.

Michael Seery, University of Edinburgh

Ed: The RSC PPG thank Michael for writing this feature article and welcome suggestions and contributions from readers for future newsletters.

Events 2018-2019

Lots of events relevant to the photochemistry and photophysics communities are scheduled to take place in 2018/19. Here is just a flavour of some of them. Apologies if we have missed your event—why not get in touch and let us know about it so we can feature it next time around?

Photodynamic Therapy and Photodiagnosis Update	Kochel-am-See, Germany	19th-22nd September 2018
RSC PPG Early Career Meeting	**Swansea, UK**	**20th-21st September 2018**
Nanophotonics and Micro/Nano Optics International Conference (NANOP 2018)	Rome, Italy	1st-3rd October 2018
Artificial Photosynthesis Faraday Discussion	Cambridge, UK	25th-27th March 2019
Ultrafast Photoinduced Energy and Charge Transfer Faraday Discussion	Ventura, CA, USA	8th-10th April 2019
Artificial Molecular Switches and Motors GRC	Holderness, NH, USA	9th-14th June 2019
RSC PPG/Italian Photochemistry Group Joint Meeting	**Lipari, Italy**	**24th-26th June 2019**
Photochemistry GRC	Stonehill College, USA	14th-19th July 2019
29th International Conference on Photochemistry	Boulder, CO, USA	21st-26th July 2019
Joint 17th International Congress on Photobiology & 18th Congress of the European Society for Photobiology	Barcelona, Spain	25th-30th August 2019
28th IUPAC Symposium on Photochemistry	Amsterdam, The Nether-	12th-17th July 2020
International Conference on Synthetic Metals 2020	Glasgow, UK	26th-31st July 2020

ROYAL SOCIETY OF CHEMISTRY | PHOTOCHEMISTRY GROUP

RSC Photophysics & Photochemistry Group Meeting

20th-21st September 2018, Swansea University, Bay Campus

Our Early Career Meeting will bring together students, researchers, academics and industrialists from across the United Kingdom and Ireland to showcase recent developments in all areas of photochemistry and photophysics.

Deadlines
Oral Abstract: 10th August
Registration: 31st August
Poster Abstract: 4th September

Bursaries
We are offering travel bursaries, please let us know when registering if you would need one, priority will be given to persons giving oral or poster presentations.

Confirmed invited speakers
Dr Susan Quinn (Univeristy College Dublin)
Dr Matthew Carnie (Swansea University)
Dr Louise Natrajan (University of Manchester)
Dr Artem Bakulin (Imperial College) – Prize lecture 2018 RSC Marlow Award

Exhibitors or Sponsors

If you are interested in sponsoring the event please contact Catherine De Castro (c.s.decastro@swan.ac.uk) or Robert Edkins (robert.edkins@strath.ac.uk).

Organising Committee
Dr Catherine De Castro (Swansea University)
Dr Robert Edkins (University of Strathclyde)

To find out more about the event please visit tinyurl.com/y8uv44zk or email photochemistry.meeting@gmail.com. Follow us on Twitter @RSC_Photochem and #RSCPhoto2018.

Sponsors

specific

Swansea University Prifysgol Abertawe

Photochemical & Photobiological Sciences

ROYAL SOCIETY OF CHEMISTRY | ENVIRONMENT SUSTAINABILITY AND ENERGY DIVISION

Benefits of PPG membership

- Keep up to date with national and international developments in photophysics and photochemistry
- Regular newsletter
- Periodic e-alerts promoting upcoming events
- Annual early career meeting in the UK/Ireland
- Student bursaries to aid attendance at meetings

How to join the Group

If you are a member of the Royal Society of Chemistry, membership of three interest groups is already included as part of your membership fee and we would be delighted if you would join us.

Joining us is easy - simply contact RSC Membership Administration and provide the following information:

- your name
- membership number
- name of the group you wish to join – the Photochemistry Group!

The contact details for Membership Administration can be found here:

www.rsc.org/Membership/Networking/InterestGroups/joingroup.asp

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Find out more about the RSC Photophysics and Photochemistry Group at:
www.rsc.org/Membership/Networking/InterestGroups/Photochemistry/

Follow us on Twitter:
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If you have any feedback or suggestions for future editions or group activities, please contact us!