RSC/SCI Joint Colloids Group Newsletter – Summer 2015

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Editors Introduction:

In this newsletter, you will find a description of the very recent event organised alongside the award of the Rideal medal to Prof. Paul Luckham. There is also a particularly interesting interview of Paul highlighting some specific areas of his career to date. Other events recently organised and hosted by the committee are reported on. We also announce here upcoming UK meetings of interest.

A particular request is made at the end of the newsletter for active members of the colloid community in UK to get involved with the events we organise and with the committee activities in general. We would particularly appreciate enquiries from younger members of the community, including students.

Claire Pizzey and Olivier Cayre

CHAIR'S WELCOME

Welcome to the Joint Colloid Group Summer 2015 newsletter.

2015 has already been a busy year for the Joint Colloids Group. We have already organised two meetings this year: *Arrested Gels: Dynamics, Structure and Applications* in March, in Cambridge and *Polymers in Colloid Science*, in April at the SCI in London. The latter being the Rideal Lecture which was given by Professor Paul Luckham (of Imperial College London).

We also held our Annual General Meeting in April, which saw some changes to both the officers and committee members. I would like to thank Dr. Shahriar Sajjadi and Dr. Malcolm Faers who retired from the committee at the AGM. We are particularly grateful to Malcolm who has chaired the Joint Committee for the last two years. As incoming Chair, I would like to welcome the new committee members: Dr. Richard Greenwood (University of Birmingham), Professor Vitaliy Khutoryanskiy (University of Reading), Dr. Christopher Blanford (Manchester Institute of Biotechnology) and Dr. Chris Lorenz (King's College London). The diversity of their research backgrounds really does highlight the breadth of Colloid and Surface Science today. Dr. Cécile Dreiss (King's College London) takes over as the SCI Chair and Prof Nguyen TK Thanh (University College London) and Dr. Nicholas Darton (Arecor) taking over as RSC and SCI Secretaries.

I feel it is a real privilege to act as Chair of the group and I am really excited about the future meetings we are planning and look forward to working with the new committee. We are co-organising the *MIBio 2015: Stability of biopharmaceuticals – From molecular interactions to successful products* (jointly with FSTG/APS) on 21st October 2015 at Magdalene College, Cambridge. We then have an award meeting for the *2014 and 2015 McBain Medal Winners* Professor Rachel O'Reilly (University of Warwick) and Professor Giuseppe Battaglia (University College London) on 8th December 2015 at SCI in London. Planning has also started for the 2017 UK Colloid Multi-day meeting. This is our flagship event and I am keen for us to build on the success of the first two meetings. Organising an event of this magnitude is a substantial undertaking and the entire committee will be involved.

We are continuing to plan future meetings/ conferences for 2016 and 2017. We have some positive ideas for meeting topics, but would very much welcome suggestions for future meetings, particularly which will help engage younger members to become involved. If you have suggestions, please do get in touch. Also, should you be interested to contribute to the Colloids Group and the UK colloid, interface science and nanoparticle community, we welcome motivated scientists both from academia and industry, please do get in touch.

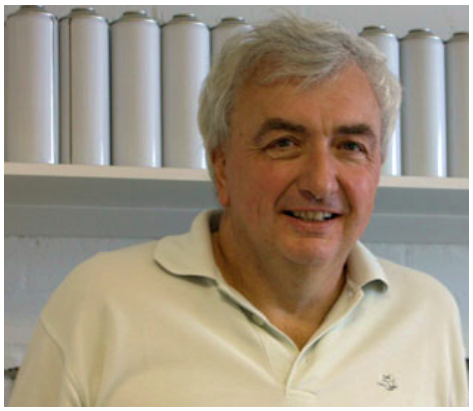
We look forward to seeing you at our future events!

Best regards

Pete Dowding

RIDEAL MEDAL

Prof Paul Luckham of Imperial College is the 2015 winner of the Rideal Medal.



Prof Luckham delivered a lecture on 'The effect polymers have on modifying the properties of surfaces and particles'.

Here Prof Luckham gives us an insight into his career.

What sparked your interest in science?

As a child I was always interested in nature, indeed I still am. I was into butterflies and moths, birds and reptiles and amphibians which I managed to breed in my bedroom (my mother was very tolerant!). So really I wanted to be another David Attenborough (I am old enough to have seen the old Zoo Quest series on the BBC). I can remember reading the book "The Year of the Gorilla" by George Schaller I think who was the first person to get gorillas used to humans so that they could be observed (pre Dian Fossey) It was an inspiring book. However academic biology (at school) did not appeal; it seemed that you had to be able to draw well, be neat and tidy and good at spelling. I fail in all of these; whilst chemistry and physics had logic to it; enabling you to work things out, far more rewarding.

And in colloid and interface science?

I became interested in colloid and interface science as a student in Bristol, which at that time was the home of Colloid Science in the UK. My interest was first sparked by two second year lecture courses: one by Dr Aitkin Cooper, who told us of an experiment on Clapham common by Benjamin Franklin, who found that a teaspoonful of olive oil when poured onto the surface of the pond damped the waves and eventually spread over an area of half an acre which, when you do the maths, would correspond to a film thickness of around 1 nm; a second lecture by Prof Ron Ottewill explained why rivers form estuaries and deltas when they come into the sea. (The particles aggregate due to a reduction of the electrical double layer caused by the increasing salt concentration).

What keeps you interested?

Research students; the inquisitive mind of young researchers constantly inspires new thoughts and challenges the accepted view. I hope that my experience coupled with their inquisitiveness moves us forward.

What do you think are the main challenges facing scientists working in this area?

This is an interesting question. When I started in this field direct physical testing of theory was lacking, however techniques were just beginning to come on stream like neutron scattering and reflectivity and surface forces experiments which could test current theory, and provided the impetus for theories (particularly in terms of polymers in colloidal systems, or at interfaces) to develop further. At the moment this area has largely reached maturity. Now the challenge is in applying this knowledge in either complex formulations or in new systems.

RIDEAL MEDAL

Complex formulations have been made for a long time of course, but now with a good knowledge of how the system is behaving a lot less trial and error is possible. New systems would include stimuli responsive systems, self assembly into complex structures the area of nanotechnology, which is really colloid science anyway! *etc.*

If you had not pursued a career in this field, what would you have done?

Hard to say, I would really have liked to have had a go at my first scientific love of nature, but as I choose not to do that I guess that shouldn't count. I can remember at school having to fill in an aptitude questionnaire to give you an idea as to which career to choose. My top three were a chemical engineer (I didn't know what that was then!); a metallurgist; or a priest!

What has been the highlight of your career to date?

Again hard to say; my first PhD student getting their PhD; when one of my PhD students who had a severe mental illness passed his PhD would be very high, but probably the highlight would be when I performed an experiment in my early days at Imperial College, using the surface forces apparatus where we squashed two phospholipid bilayers together and visually saw them fuse. You could see a small part of the contact area, not always the middle, but a weak point, would suddenly move together by 3-4 nm as a bilayer was pushed out, this region then grew over around 10 seconds as more and more of the contact area, giving us an insight into how membranes fuse in processes such as phagocytosis, vesicle fusion with cells *etc.* A wonderfully exciting moment. Then there was the fashion show at Imperial College, somewhat surreal really!

Would you have done anything differently?

Yes loads of small things of course, but nothing major I can think of.

What impact has your involvement with CSCG/CISG (joint SCI/RCS Colloids Group) had on your career?

It's been huge. On and off I have been on the CSCG in various guises for around 25 years I guess. For around the first 15 years or so of my involvement the SCI organised evening lectures in Belgrave Square, where someone would come and give a lecture on a colloid science topic once a month. I would go regularly and meet up with other committee members and discuss both the lecture and what we were doing in an informal way. It was a great way of collaborating, both formally and more important informally. I was lucky of course, Belgrave Square is a 15 minute walk from Imperial College but as time progressed people became busier, finding it harder to attend both the committee meetings and the lecture; attendances dropped and so the evening lectures died. The Founders Lecture (which has now been merged with the Rideal lecture; the founder of the Colloid and Surface Chemistry group of the SCI was Sir Eric Rideal) survived and has now evolved into initially a half-day meeting, but now a full day meeting. Looking at the list of lecturers, I, and I am sure future and past recipients, feel very humbled to be placed in the same category as them.

What advice would you give someone starting their career to achieve a similar level of success as you?

Keep going, do what you want, don't worry about success. If what you are doing is good that will happen.

What is your next goal?

I have been approached to help organise the 3rd UK colloids conference in 2017, so my goal will be to make that a success, both scientifically and financially.

REPORTS ON CONFERENCES

Rideal Meeting – SCI – 23 April 2015-06-14

The 2015 Rideal Medal was awarded to Prof. Paul Luckham, Imperial College London, and was given to him at the end of one-day meeting on his chosen theme of 'Polymers in Colloid Science'. The invited speakers were all former students of Paul or academics and industrialists he had collaborated with during his career. Jayne Lawrence (King's College London) kicked off the event with a pharmaceutical flavour with a talk on nanosuspensions (crystalline, polymer-stabilised drug nanoparticles which have been milled) and how small-angle neutron scattering (SANS) was used to show that the molecular weight of the stabilising polymer did not impact the stability of the formulations. Kostas Kostarelos (U. Manchester) described to the audience 'the good, the bad and the ugly' of nano-carbon based colloids for a variety of therapeutic and diagnostic applications, and how the surface and chemistry are key to controlling the biological profiles in cell cultures and in vivo. We were introduced to some exquisite structures formed by manipulating surfactant, lipid and peptide self-assembly by Patrick Hartley (CSIRO, Australia) and told about their behaviour in biological systems. Continuing the theme of colloid science medical application, Gavin Braithwaite (Cambridge Polymer Group, USA) reported on how the cross-linking process of poly(vinyl alcohol) hydrogels can play an important role in controlling their functionality. Cécile Dreiss (King's College London) retraced some of her PhD work with Paul on the flocculation of polymer-stabilised colloidal particles by impacting the solubility of the layers, and thus gradually switching the interactions from repulsive to attractive, and described the use of rheology, AFM and SANS to detect these changes and the structural modifications underlying them. The audience was introduced to yet a different application area of colloid science by Andrew Howe (Schlumberger), who showed some of his recent findings on the mechanisms of complex fluids for Chemical Enhanced Oil Recovery. Finally, Malcolm Faers (Bayer CropSCience) described his work on complex colloidal formulations used for crop protection. He gave some insights into the science of arrested gels, where apparently stable, structured suspensions (gels) suddenly collapse, and the use of a vane geometry with transparent tubes to allow non-intrusive rheological measurements.

This one day meeting also included a lively student poster session with a poster prize awarded to Ling He (U. of Leeds) for her work on long-term retention of small, volatile molecular species in metal-sehll microcapsules. Finally, a wine reception was held prior to the Rideal lecture at the end of the conference, where Paul gave an overview of years of his work on how polymers modify the properties of surfaces and particles and also revealed some of his scientific hobbies.

Prof. Paul Luckham receiving the Rideal Medal Prize from Malcolm Faers, our departing chair.

Arrested Gels – Gonville and Caius College Cambridge 23-25 March 2015

This three day meeting was a new type of event for the colloid groups. Many of our previous meetings have been one day events. Organising a multi-day meeting was an experiment to see whether the

REPORTS ON CONFERENCES

Report on the Arrested Gels meeting – cont'd

community would support it – the answer was an overwhelming yes!
The meeting comprised six invited *plenary* talks with 23 further contributed talks. There were also 13 posters presented at three sessions.

A highlight was the work of Roseanna Zia from Cornell University. She performed Brownian Dynamic Simulations with 750 thousand particles to demonstrate coarsening and rearrangement in particulate gels. The gel was observed to coarsen and the elastic modulus increase with age. The dynamics was scaled to give a master response where the time scale was set by relaxation over a growing network length scale.
On the experimental side, Erika Eiser from Cambridge University demonstrated her system where the interaction between different particle types can be precisely controlled using strands of DNA forming elaborate interconnected but separate particle networks. This allows experimentalists to rigorously test the predictions coming out of the various simulations.

There were two poster prizes chosen by the participants:

Most Innovative Science: Clara Weis (Karlsruhe Institute for Technology, Germany), Rheological behaviour of a highly concentrated colloidal dispersion on different length scales.

Best Student Poster: Breanndan Ó Conchúir (University of Cambridge), The role of the Hofmeister series in the gelation of colloidal silica.

This is what Clara said about the meeting:
"Colloid scientist from the UK and from overseas came in March to the meeting on "Arrested Gels: Dynamics, Structure and Application" to the venerable Gonville and Caius College in Cambridge. Aim of this colloquium was the understanding of the interplay between interparticle forces on the molecular level and mesoscopic as well as macroscopic phenomena of network formation.

Clara Weis (Karlsruhe Institute for Technology) receiving the "Most Innovative Science" poster award from Dr John Hone (Syngenta).

Invited speakers on the first day were Professor Peter Schurtenberger (Lund University) who gave an extensive overview of the effect of particle interactions on the phase diagram and their potential application for structure control, and Professor Daniel Bonn (University of Amsterdam) who investigated the glass transition and aging phenomena in view of the free energy. Professor Luca Cipelletti (CNRS & Université Montpellier 2) opened the second day with amazing results of colloidal gels under gravitational stress, followed by Dr. William Frith (Unilever) after lunch, who discussed the assembly of biopolymers and the corresponding arrested gels. Dr. Ludovic Berthier (CNRS & Université Montpellier 2) concluded the afternoon focussing on simulations of kinetically arrested phase separation. Professor Hajime Tanaka (University of Tokyo) held the last plenary lecture on the third day dealing with the effect of hydrodynamic interactions and mechanical stress during the dynamical arrest of colloidal gels.

REPORTS ON CONFERENCES

Report on the Arrested Gels meeting – cont'd

Besides of these keynote lectures, many excellent talks were given covering the wide range of theoretical work and simulations, the fundamental research of arrested gels as well as their applications.
I was pleased to be awarded the best poster for my research focused on the microrheological detection of heterogeneities induced by attractive interactions in highly concentrated colloidal dispersions.
Cambridge was the perfect place for this colloquium as it has this special atmosphere of learning and science. The fantastic organization gave plenty of possibilities for fruitful discussions and intellectual exchange."

Breanndan Ó Conchúir (University of Cambridge) receiving the "Best Student Poster" award from Dr Louise Bailey (Schlumberger).

This is what Breanndan said about the meeting:
"At the Arrested Gels conference, I presented a poster on a new approach to understand ion-specific effects in silica aggregation and gelation, and gave a talk on my study of the breakup and stability of colloidal aggregates in shear flows. I enjoyed discussing my work with a diverse set of scientists, while the many interesting presentations gave me a deeper insight into the exciting topics encompassed within the broad field of colloidal science. As an imminently graduating PhD student (under the supervision of Prof. A. Zaccone) seeking an industrial research position, I greatly appreciated the opportunity to interact with several industry-based participants."

The meeting was excellently hosted by Gonville and Caius College. The location was the Cavonius Centre of the Stephen Hawking building, which is a purpose built conference location. On the social side there was a tour of the college old courts, followed by a five course banquet in the college dining hall. The meeting was a large success with delegates overwhelmingly complimentary of both the scientific content and the meeting ambiance.

Conference banquet in Caius College.

Arrested Gels would not have been possible without the support of the sponsors and exhibitors and the generous support from: Schlumberger, Syngenta, RSC/SCI Colloids Group, RSC Industrial Physical Chemistry Group, RSC Publishing Soft Matter & Polymer Chemistry, Anton Paar, Formulaction, Malvern Instruments and TA Instruments is gratefully acknowledged.

UPCOMING MEETINGS

McBain meeting 8th December 2015

We are fortunate this year to be in a position to host a special McBain celebration, with two of our medal winners speaking at a joint event. We congratulate Prof. Rachel O'Reilly from the University of Warwick and Prof. Giuseppe Battaglia, from University College London for their awards in 2014 and 2015, respectively, and are delighted that they are able to join us on 8th December 2015 at the SCI in Belgrave Square in London to give their award lectures.

It promises to be an excellent programme of talks with other speakers including Dr Oscar Ces (Imperial), Prof. Steve Armes (Sheffield), Prof. Tony Ryan (Sheffield) and Prof. Stefan Bon (Warwick). Registration will open shortly and we look forward to seeing you there.

5th Annual MIBio Conference – 21st October 2015

21st October 2015, Cripps Court, Magdalene College, Cambridge, UK.

The MIBio conference series engages world leading experts from industry and academia in a discussion on how the latest molecular interaction based discoveries can be exploited in biopharmaceutical formulation to produce more effective, patient-friendly and safer therapeutic products. Seven key experts in the field will present during the day on this topic, and, as is traditional in the MIBio series, there will be opportunities for audience participation. We will be inviting abstracts for poster submissions and welcome applications for sponsor and exhibitor slots. We look forward to seeing you at MIBio 2015!

The conference website can be found here: www.mibio-conference.com

The MIBio 2015 organising committee is:

- Jan Jezek (Arecor)
- Nicholas J. Darton (Arecor)
- Tejash Shah (GSK)
- Stephen Harding (University of Nottingham)

OPPORTUNITY TO GET INVOLVED

Your committee needs you!

The Joint Colloid Group is an active and enthusiastic committee committed to helping support colloid and interface science (and scientists) in the UK. We support a variety of medals, awards and student bursaries along with organising a range of meetings. If you would like to provide input into the types of meetings we hold, we'd love to hear from you!

We're always keen for our members to get more involved with our activities as you are the community we serve. This doesn't have to mean a big time commitment; there are lots of ways to take part. Some ways in which you could get involved include:

- Suggest a topic for a future meeting
- Help advertise meetings by putting up flyers at your university/institution
- Write an article for the newsletter or website
- Help with a conference (e.g. manning the reception desk or helping with AV equipment)
- Join a conference organising committee; gain experience of managing projects, budgets and timescales.

Volunteering is a great way to gain skills and experience, make connections and increase your network. We're a friendly group and always happy to meet our members, so please say hello at one of our meetings or contact us via our website (http://www.colloidsgroup.org.uk/).

You can contact us using the following e-mail addresses:

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