

Christopher Patrick (Paddy) Royall

School of Chemistry, University of Bristol, Crantock Close, Bristol, BS8 1TS, UK

Nationality: British

Age: 34

email: paddy.royall@bristol.ac.uk

www.padrus.com

telephone +44-117-928-7668

Employment

2007-	University of Bristol, UK	Royal Society University Research Fellow , (independent research staff position)
2004- 2006	University of Tokyo, Japan	JSPS fellow , with Prof Hajime Tanaka. 'Real space analysis of colloidal phase separation'.
2002- 2004	University of Utrecht, Netherlands	Postdoctoral fellow , with Prof Alfons van Blaaderen. Phase behaviour and dynamics of colloidal suspensions.
2001-2	UBS Warburg, London	Investment Banking , in financial multinational. Marketing/developmental role in leading quantitative derivative and bond analysis group CreditDelta.

Education

1997- 2001	University of Cambridge, (St Catharine's College)	PhD in Physics , with Prof Athene Donald, Polymers and Colloids Group. Subject: Disordered structures in polymer films, supported by EPSRC and CASE award from ICI. Graduated 12th May 2001.
1996-7	Gap Year	Long-distance sailing trip, England to the Caribbean.
1992-6	University of Edinburgh	BSc in Physics , 1 st class honours, graduated 10 th July 1996.

Awards

2004	Japan Society for the Promotion of Science, Postdoctoral Fellowship 'Real space analysis of colloidal phase separation'.
1997	CASE studentship in partnership with ICI-Crosfield.

Research Interests

- Key everyday physical phenomena which remain poorly understood. In particular, the glass transition, and melting and freezing.
- Complex fluids, colloidal model systems, from synthesis, through experiment to quantitative analysis and simulation.
- Quantitative control measurement and understanding of colloidal interactions, dynamics, self-assembly and novel phase behaviour. Particular emphasis on the novel use of temperature in colloid-polymer mixtures.

Partnerships with Industry

Collaboration with Kodak UK in Cambridge, developing principles underlying novel display technologies (2007-).

Industrial collaboration with research leaders in ICI-Crosfield Group, Warrington, UK (1997-2000).

Teaching and Supervision Experience

Currently supervising Masters' and final year undergraduate students' research projects, which have frequently led to high-impact research.

Second year advanced mathematical physics problems classes (demonstrating).

Thermal physics lecture course, second year. (supervising).

Languages

Japanese Language Proficiency Test, Levels 3 and 4, 2005. Currently studying for level 2.

University of Cambridge Certificate in Italian, passed with merit, 1999.

Publications

Wysocki A, **Royall CP**, Winkler R, Gompper G, Tanaka H, van Blaaderen A and Loewen H, 'Direct observation of hydrodynamic instabilities in driven non-uniform colloidal dispersions', *submitted to Physical Review Letters*, (2008), CondMat:ArXiv:0810.1258v1.

Ohtsuka T, **Royall CP** and Tanaka H, 'Local structure and dynamics in colloidal fluids and gels', *accepted by Europhysics Letters*, (2008).

Schmidt M, **Royall CP**, van Blaaderen, A. and Dzubiella J., 'Non-equilibrium sedimentation of colloids: Confocal microscopy and Brownian dynamics simulations', *accepted by J. Phys:Cond. Matter*. (2008).

Royall CP, Vermolen, ECM, van Blaaderen, A. and Tanaka H, 'Controlling competition between crystallisation and glass formation in binary colloids with an external field', *J. Phys:Cond. Matter*. **20**, 404225, (2008).

Royall CP, Williams SR, Ohtsuka, T and Tanaka H, 'Direct observation of a local structural mechanism for dynamic arrest', *Nature Materials*, **7**, 556-561, (2008).

Williams SR, **Royall CP**, and Bryant G, 'Crystallisation of Dense Binary Hard-Sphere Mixtures with Marginal Size Ratio', *Physical Review Letters*, **100**, 225502 (2008).

Royall CP, Williams SR, Ohtsuka, T and Tanaka H, 'Direct observation low-energy clusters in a colloidal gel', *American Institute of Physics Conference Proceedings*, **982** 97 (2008).

Royall CP, Aarts DGAL, and Tanaka H 'Bridging length scales in colloidal liquids and interfaces from near-critical divergence to single particles', *Nature Physics*, **3**, 636-640, (2007).

Royall CP, Louis, AA and Tanaka H, 'Measuring colloidal interactions with confocal microscopy', *J. Chem. Phys.* **127**, 044507 (2007).

Publications (continued)

Royall CP, Dzubiella J, Schmidt M and van Blaaderen A, 'Nonequilibrium Sedimentation of Colloids on the Particle Scale', *Physical Review Letters*, **98**, 188304 (2007).

Royall CP, Leunissen ME, Hyninen A-P, Dijkstra M and van Blaaderen A 'Re-entrant melting and freezing in a model system of charged colloids', *J. Chem. Phys.* **124**, 244706 (2006).

Leunissen ME, Christova CG, Hyninen A-P, **Royall CP**, Campbell AI, Imhof A, Dijkstra M, van Roij R and van Blaaderen A, 'Ionic colloidal crystals of oppositely charged particles', *Nature* **437**, 235 (2005).

Royall CP, Aarts DGAL, Tanaka H 'Fluid structure in colloid-polymer mixtures: the competition between electrostatics and depletion', *J. Phys. Cond. Matter.* **17**, S3401 (2005).

Royall CP, van Roij RHJ, van Blaaderen A, 'Extended sedimentation profiles in charged colloids: the gravitational length, entropy and electrostatics', *J. Phys. Condens. Matter.* **17**, 2315 (2005).

Royall CP, Leunissen ME, van Blaaderen A, 'A new colloidal model system to study long range interactions quantitatively in real space', *J. Phys Condens. Matter*, **15**, S2583 (2003).

Royall CP, Donald AM, 'Surface properties and structural collapse of silica in matte water based lacquers' *Langmuir*, **18** (24) 9519-9526 (2002).

Royall CP, Donald AM, 'Structure of silica in matt water-based lacquer' *Phys. Rev. E.* **66** (2): art. no. 021406 Part 1 (2002).

Royall CP, Donald AM, 'Optimisation of environmental SEM for observation of drying in matt water based lacquers' *Scanning*, **24** (6): 301-313 (2002).

Royall CP, Thiel BL, Donald AM, 'Radiation damage of water in environmental scanning electron microscopy' *J Microscopy-Oxford* **204**: 185-195 Part 3 (2001).

Royall CP, 'The behaviour of silica in matt water-based lacquers', Phd thesis, University of Cambridge, 2000.

Donald AM, He CB, **Royall CP**, *et al.*, 'Applications of environmental scanning electron microscopy to colloidal aggregation and film formation' *Colloid Surface A* **174** (1-2): 37-53 (2000).

Royall CP, Donald AM 'Confocal laser scanning microscopy and environmental SEM applied to matting water-based lacquers' *Abstr Pap Am Chem S* **218**: 17-PMSE Part 2 (1999) and ACS symposium series, 790, Chapter 11, (2001).

Presentations: selected talks and posters

'Colloidal matter: new perspectives and new states', Invited seminar, 4th November 2008, University of Bayreuth, Germany .

'A close look at states of matter: from the familiar to the novel', Invited presentation to the Cambridge Chemical Society, University of Cambridge, 12th October, 2008, Cambridge, UK.

'States of matter: seeing the wood and the trees', Invited seminar, 12th October, 2008, University of Bristol, UK.

'A walk through states of matter', Invited seminar, 29th September, 2008, Kyoto university, Japan.

'A new perspective on colloidal gels and glasses', Oral Presentation, 10th July 2008, M4 Colloids, University of Bath, UK.

'Understanding Kinetic Pathways: Gels and Glasses in Colloidal Systems', Invited seminar, 17th June 2008, Johannes Gutenberg-Universitat, Mainz, Germany.

'Colloidal gels and glasses : a real space analysis', Invited seminar, University of Oxford, 4th March, 2008.

'A structural route for dynamical arrest', 72nd annual DPG meeting, Berlin, Germany, 25th-29th February 2008

'A structural route for dynamical arrest: locally favoured structures in colloidal gels and glasses', Invited Seminar, University of Edinburgh, 28th January 2008.

'Colloidal fluids at the single-particle level : from flow to arrest', Invited Seminar, University of Bristol, School of Mathematics, 24th January 2008.

'Observation of low-energy clusters in a colloidal gels and glasses', Joint project discussion meeting, Duesseldorf, Germany, November 21st, 2007.

'Direct observation of low-energy clusters in a colloidal gel', 5th workshop on complex systems, Sendai, Japan, September 25-28th, 2007

Invited seminar Nagoya University, 'Life at the single particle level': colloids, model atoms and beyond, 22nd August, 2007.

'Critical behaviour of colloidal fluids and interfaces: connecting micro- and mesoscopic lengthscales', *Julich Soft Matter Days*, Bonn, Germany, 14-17th November 2006, (talk).

'Direct observation of critical and interfacial behaviour in a model colloid-polymer mixture', 12th *International Conference on Surface and Colloid Science*, Beijing, China, 15th-20th October 2006, (talk).

'Five-fold symmetry in colloidal liquids?', *Physical Society of Japan*, Chiba, Japan, September 2006, (talk).

'Interactions and fluctuations in colloidal dispersions', *University of Cambridge*, June 2006, (invited seminar).

'Falling and fluctuations in colloidal dispersions', *Heinrich Heine University*, Duesseldorf, Germany, June 2006, (invited seminar).

'Colloids, polymers and temperature: new answers to old questions', *Physical Society of Japan*, Matsuyama, Japan, March 2006, (talk).

'Bridging lengthscales in colloidal liquid-vapour interfaces: from critical divergence to single particles', *University of Bristol*, February 2006, (seminar).

'Quenching by heating: colloidal liquid gas critical phenomena at the single-particle level', *International workshop: Soft matter as structured materials*, Kyoto, Japan, August 2005 (talk).

Presentations: selected talks and posters (continued)

'Controlling glass formation with binary hard spheres, a real space analysis', *5th International Meeting on Relaxation in Complex Systems*, Lille, France, July 2005 (poster).

'Quenching by heating: colloidal liquid gas critical phenomena at the single-particle level', *Liquid Matter Conference*, Utrecht, the Netherlands, July 2005 (talk).

'Sedimentation of Colloidal Dispersions in Confined Geometry', *Physical Society of Japan*, Tokyo, Japan, March 2005 (talk).

'Real Space Analysis of Sedimenting Colloidal Dispersions', *Julich Soft Matter Days*, Julich, Germany, November 2004 (poster).

'Unusual Phase Behaviour in Charged Colloids: re-entrant melting and freezing', *Graz University*, Austria, July 2004 (invited seminar).

'Unusual Phase Behaviour in Charged Colloids: re-entrant melting and freezing', *European Colloid and Interface Society Meeting*, Almeria, Spain, September 2004 (talk).

'Unusual Phase Behaviour in Charged Colloids: re-entrant melting and freezing', *FOM Statistical Physics Meeting*, Netherlands, February 2004 (talk).

'The radial distribution function in colloidal dispersions with long-ranged interactions via confocal microscopy', *European Colloid and Interface Society Meeting*, Florence, Italy, September 2003 (poster).

'Confocal laser scanning microscopy and environmental SEM applied to matting water-based lacquers', *American Chemical Society Fall Meeting*, New Orleans, Louisiana, August 1999 (talk).

'Film formation in matt water based lacquers'. *Royal Mineralogical Society*, Bath University, England, September 1998 (talk).

'Optimisation of Environmental SEM for Film formation in matt water based lacquers', *Micro 98*, *Royal Microscopy Society*, London, July, 1998 (talk).

