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Dr Melanie Britton BSc, MA, PhD, MRSC

Senior Lecturer in Physical Chemistry

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About

Melanie's research is at the interface between chemistry, chemical engineering and physics. She has 15 years experience of developing magnetic resonance imaging (MRI) experiments to probe chemistry and flow in complex systems and has published over 30 papers and book chapters in this area.

Group web pages (/research/activity/chemistry/britton/index.aspx)

Qualifications

- MA Cambridge University, 2004
- PhD in Physical Chemistry, University of Surrey, 1995
- BSc (Hons) in Chemistry, RHC, London University, 1992
- Member of the Royal Society of Chemistry

Biography

Melanie Britton obtained a BSc in Chemistry from London University (RHC) in 1992 and a PhD from the University of Surrey in 1995, under the supervision of Prof Les Sutcliffe and Dr Duncan Gillies. Her thesis was on NMR spectroscopy of traction fluids.

Follwing her PhD, she was a postdoctoral research fellow with Prof Paul Callaghan FRS at Massey University in New Zealand, working on Magnetic Resonance Imaging of the rheology of wormlike micelles.

She then moved back to the UK to work with Prof Ken Packer FRS at Nottingham University, looking at 2D relaxation resolved propagators for flow in porous media. In 2000, she received an EPSRC Advanced Research Fellowship, where she worked with the group of Prof Lynn Gladden FRS at the Magnetic Resonance Research Centre in the University of Cambridge, where she developed MRI methods for visualising Chemical Waves and Patterns.

In 2004, she became a Lecturer in Physical Chemistry at Birmingham University and in 2011 became Senior Lecturer.

Teaching

Teaching Programmes

- Year 1-3 physical chemistry courses in all Chemistry BSc and MSci degree programmes.

PhD opportunities

Research

RESEARCH THEMES

- Magnetic Resonance Imaging (MRI)
- Flow visualisation and imaging
- MRI of electrochemical systems
- Non-linear/autocatalytic chemical reactions.
- Chemical pattern formation.
- MRI contrast agents.
- Chemical imaging.
- Reaction-diffusion and reaction-diffusion-advection phenomena .
- NMR studies of microemulsions.
- NMR spectroscopy/NMR relaxation..

- Rheology of complex fluids.
- Wormlike micelles/ Microemulsions.
- Chemical fingering.

RESEARCH ACTIVITY

Melanie's group specialise in the development of MRI flow visualisation techniques to probe the rheology and dynamics of complex fluids, such as ionic liquids and micelle solutions, leading to an understanding of the molecular dynamics that underpin their behaviour

Her group also work on methods for designing probes for the visualisation of chemical reactions/processes and disease biomarkers. Using these methods they have investigated how chemical reactions (typically autocatalytic reactions) can couple with diffusion and flow to produce chemical waves and patterns. Understanding the coupling of chemical reaction with transport processes is of importance in reactor engineering and understanding many biological processes

Other activities

- Member of the Scientific Steering committee for the Division of Magnetic Resonance in Porous Media - Groupement Ampere (2009 - 11 and 2014 -16)
- Treasurer for the Executive Board of the Division of Spatially Resolved Magnetic Resonance of the Ampere Society (2013 -)
- Committee Member of the RSC NMR Discussion Group (NMRDG) (2011 -)

Publications

Recent papers:

"NMR and Molecular Dynamics Study of the Size, Shape, and Composition of Reverse Micelles in a Cetyltrimethylammonium Bromide (CTAB)/n-Hexane/Pentanol/Water Microemulsion", A.J. Mills, J. Wilkie and M.M. Britton, ***J. Phys. Chem. B*, 118 (2014) 10767–10775. (http://pubs.acs.org/doi/abs/10.1021/jp504585k)**

"Magnetic Resonance Imaging of Electrochemical Cells Containing Bulk Metal", M.M. Britton, ***Chemphyschem*, 15 (2014) 1731–1736. (http://onlinelibrary.wiley.com/doi/10.1002/cphc.201400083/full)**

"De Novo Design of Ln(III) Coiled Coils for Imaging Applications", M.R. Berrick, D.J. Lewis, A.W. Jones, R.A. Parslow, T.R. Dafforn, H.J. Cooper, J. Wilkie, Z. Picramenou, M.M. Britton and A.F.A. Peacock, ***J. Am. Chem. Soc.*, 136 (2014) 1166-1169. (http://pubs.acs.org/doi/abs/10.1021/ja408741h)**

"Chemical patterns in translating vortices: inter- and intra-cellular mixing effects", A. Vallatos, R. Evans, B.W. Thompson, A.F. Taylor, M.M. Britton, ***Chaos*, 23 (2013) 023115 (http://dx.doi.org/10.1063/1.4807619)**.

"In Situ, Real-time Visualization of Electrochemistry using Magnetic Resonance Imaging", M.M. Britton, P.M. Bayley, P.C. Howlett, A.J. Davenport, M. Forsyth, ***J. Phys. Chem. Lett.*, 4 (2013) 3019–3023 (http://pubs.acs.org/doi/abs/10.1021/jz401415a)**.

For a full list of Melanie's papers, please click **here (/research/activity/chemistry/britton/Publications.aspx)**.

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