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Professor

Area of research

Photochemistry, Spectroscopy and Reaction Dynamics

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Summary

The research in my group uses several different types of lasers (including nanosecond and femtosecond pulsed lasers, and mid infra-red cw lasers) to study chemical reactivity, atmospheric chemistry, methods of trace gas detection, optical properties of aerosol particles, and molecular spectroscopy and photochemistry. We use ultrafast transient absorption spectroscopy to study chemical reaction dynamics in liquids, velocity map imaging to explore quantum-state resolved reactive scattering in the gas phase, and cavity enhanced spectroscopy methods for a variety of applications in atmospheric chemistry and aerosol science. In addition, we use computational methods such as ab initio electronic structure theory and molecular dynamics to aid the interpretation of experimental measurements. I was the lead investigator on the ERC Advanced Grant CAPRI (Chemical and Photochemical Dynamics of Reactions in Solution, 2012-2017) and my group is part of the EPSRC-funded Bristol - Oxford Programme Grant *Chemical Applications of Velocity and Spatial Imaging*. We also collaborate with Bristol colleagues Prof Mike Ashfold, Prof Jonathan Reid, Prof Dudley Shallcross, Prof Fred Manby and Dr David Glowacki on various of the above research projects.

Further details of my group's research activities can be found at the homepage of the [Laser Chemistry, Spectroscopy and Dynamics Group](#) and a full list of my publications is available [here](#).

Our recent studies of reaction dynamics on ultrafast timescales in liquid solutions were published in [Science](#) in 2011. The cover picture shows reaction of CN radicals with cyclohexane in solution in dichloromethane. Theoretical insights from this work were published in 2011 in [Nature Chemistry](#) and also featured on the cover. A paper on F-atom reactions in solution appeared in [Science](#) in 2015.

Professor Orr-Ewing is a supervisor in the [EPSRC Centre for Doctoral Training in Chemical Synthesis](#)

Biography

I am a Professor of Physical Chemistry and was Head of Physical and Theoretical Chemistry from 2011-2014. I joined the School of Chemistry in 1994 as the Eliz. Challenor Royal Society University Research Fellow. Previously, I obtained my D.Phil. in Physical Chemistry from the University of Oxford (supervisor, Prof Gus Hancock), and spent two years as a post-doctoral research associate in the group of Prof Richard Zare at Stanford University. Prizes and Awards include the RSC Chemical Dynamics Award (2014), Tilden Prize (2009), Award in Optical Spectroscopy (2002), Marlow Medal (1999), and Harrison Memorial Prize (1994), a Royal Society - Wolfson Research Merit Award (2006-11), and the 2007 Broida Prize of the International Symposium on Free Radicals. I was elected as a Fellow of the Royal Society in 2017.

Keywords

- ultrafast lasers
- velocity map imaging
- chemical reactivity
- atmospheric chemistry

- trace gas detection
- cw diode lasers
- quantum cascade lasers
- aerosol particles
- photochemistry
- molecular spectroscopy

Memberships

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Selected publications

- Dunning, GT, Glowacki, DR, Preston, TJ, Greaves, SJ, Greetham, GM, Clark, IP, Towrie, M, Harvey, JN & Orr-Ewing, AJ, 2015, '[Reaction dynamics. Vibrational relaxation and microsolvation of DF after F-atom reactions in polar solvents](#)'. *Science*, vol 347., pp. 530-3
- Greaves, S, Rose, R, Oliver, TA, Glowacki, D, Ashfold, M, Harvey, J, Clarke, I, Greetham, G, Parker, A, Towrie, M & Orr-Ewing, A, 2011, '[Vibrationally quantum-state-specific reaction dynamics of H atom abstraction by CN radical in solution](#)'. *Science*, vol 331., pp. 1423 - 1426
- Glowacki, D, Rose, R, Greaves, S, Orr-Ewing, A & Harvey, J, 2011, '[Ultrafast energy flow in the wake of solution phase bimolecular reactions](#)'. *Nature Chemistry*, vol 3., pp. 850 - 855
- Orr-Ewing, AJ, 2014, '[Perspective: Bimolecular chemical reaction dynamics in liquids](#)'. *Journal of Chemical Physics*, vol 140.
- Mason, BJ, Walker, JS, Reid, JP & Orr-Ewing, AJ, 2014, '[Deviations from plane-wave mie scattering and precise retrieval of refractive index for a single spherical particle in an optical cavity](#)'. *Journal of Physical Chemistry A*, vol 118., pp. 2083-2088
- Greaves, S, Rose, R & Orr-Ewing, A, 2010, '[Velocity map imaging of the dynamics of bimolecular chemical reactions](#)'. *Physical Chemistry Chemical Physics*, vol 12., pp. 9129 - 9143

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Recent publications

- Wang, X-D, Robertson, P, Cascarini, FJJ, Quinn, MS, McManus, J & Orr-Ewing, AJ, 2019, '[Observation of Rainbows in the Rotationally Inelastic Scattering of NO with CH4](#)'. *Journal of Physical Chemistry A*, vol 123., pp. 7758-7767
- Venkatraman, RK & Orr-Ewing, AJ, 2019, '[Photochemistry of Benzophenone in Solution: A Tale of Two Different Solvent Environments](#)'. *Journal of the American Chemical Society*.
- Orr-Ewing, A, 2019, '[Perspective: How can ultrafast laser spectroscopy inform the design of new organic photoredox catalysts for chemical and materials synthesis?](#)'. *Structural Dynamics*, vol 6.
- Pun, RC, Khan, MAH, Martin, R, Zachhuber, N, Buras, Z, Percival, C, Shallcross, DE & Orr-Ewing, AJ, 2019, '[Direct Kinetic and Atmospheric Modelling Studies of Criegee Intermediate Reactions with Acetone](#)'. *ACS Earth and Space Chemistry*.
- Böhnke, H, Roettger, K, Ingle, R, Marroux, H, Bohnsack, M, Schwalb, N, Orr-Ewing, A & Temps, F, 2019, '[Electronic Relaxation Dynamics of UV-Photoexcited 2-Aminopurine–Thymine Base Pairs in Watson-Crick and Hoogsteen Conformations](#)'. *Journal of Physical Chemistry B*, vol 123., pp. 2904-2914
- Cascarini, F, Hornung, B, Quinn, MS, Robertson, P & Orr-Ewing, A, 2019, '[Collision Energy Dependence of the Competing Mechanisms of Reaction of Chlorine Atoms with Propene](#)'. *Journal of Physical Chemistry A*, vol 123., pp. 2679-2686

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