

Prof. Colin Pulham



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Colin Pulham graduated with a DPhil. in Chemistry from the University of Oxford. He moved to the School of Chemistry at the University of Edinburgh in 1992 as a Royal Society University Research Fellow before being appointed as a lecturer in 1996, senior lecturer in 2001, and Personal Chair in High-Pressure Chemistry in 2008. Since 2008 he has been the Director of Teaching in the School of Chemistry. He is a member of the Centre for Science at Extreme Conditions (CSEC) at Edinburgh and has

research interests in the study of the effects of high pressure on molecular compounds such as pharmaceuticals, energetic materials (explosives, propellants), fuels, and lubricants. He works closely with colleagues at the ISIS Neutron Facility and at the Diamond Light Source. He has a longstanding interest in public engagement and was awarded the Royal Society Kohn Award for Excellence in Engaging the Public with Science in 2005 and the Tam Dalyell Prize in 2011.

Research Interests

Research is focused on the study of the effects of pressure on molecular compounds such as pharmaceuticals, energetic materials (explosives, propellants), fuels, and lubricants in order to identify structural changes when these materials are compressed. A parallel strand of research involves co-crystallisation of energetic materials with other compounds in order to produce safer compositions that are less sensitive to accidental initiation. An ongoing industrial collaboration is the development of a compact thermal store that will replace domestic boilers, hot water tanks and air conditioning units. This research exploits phase-change materials, which absorb heat on dissolution or melting and release heat on crystallisation or freezing.

Representative Publications

Crystal engineering of energetic materials: Co-crystals of CL-20. D.I.A. Millar, H.E. Maynard-Casely, D. R. Allan, A. S. Cumming A.R. Lennie, A. J. Mackay and I. D. H. Oswald, C. C. Tang, and C.R. Pulham, *CrystEngComm*, 2012, 14, 3742-3749.

Combined Experimental and Computational Hydrostatic Compression Study of Crystalline Ammonium Perchlorate. S. Hunter, A. J. Davidson, C. A. Morrison, C. R. Pulham, P. Richardson, M. J Farrow, W. G., Marshall, A. R. Lennie, and P. J. Gould, *J. Phys. Chem. C*, 2011, 115, 18782-18788.

Pressure-cooking of explosives - the crystal structure of ϵ -RDX as determined by X-ray and neutron diffraction. D. I. A. Millar, I. D. H. Oswald, C. Barry, D. J. Francis, W. G. Marshall, C. R. Pulham and A. S. Cumming, *Chem. Commun.*, 2010, 46, 5662-5664.

Putting the squeeze on energetic materials - structural characterisation of a high-pressure phase of CL-20. D. I. A. Millar, H. E. Maynard-Casely, A. K. Kleppe, W. G. Marshall, C. R. Pulham and A. S. Cumming, *CrystEngComm.*, 2010, 12, 2524-2527.

Co-crystallisation at high pressure - an additional tool for the preparation and study of co-crystals. I. D.H. Oswald and C. R. Pulham, *CrystEngComm.*, 2008, 10, 1114-1116.

Putting pressure on elusive polymorphs and solvates. I. D. H. Oswald, I. Chataigner, S. Elphick, F. P. A. Fabbiani, A. R. Lennie, J. Maddaluno, W. G. Marshall, C. R. Pulham, T. J. Prior, R. I. Smith, *CrystEngComm*, (2009), 11, 359-366.

The crystal structure of β -RDX – an elusive form of an explosive revealed. D.I.A. Millar, I.D.H. Oswald, D.J. Francis, W.G. Marshall, C.R. Pulham and A.S. Cumming, *Chem. Commun.*, 2009, 5, 562-564.

In-situ characterization of elusive salt hydrates - the crystal structures of the heptahydrate and octahydrate of sodium sulfate. I. D. H. Oswald, A. Hamilton, C. Hall, W. G. Marshall, T. J. Prior and C. R. Pulham, *J. Am. Chem. Soc.*, 2008, 130, 17795-17800.