

Professor Philip Lightfoot
Professor of Inorganic Chemistry

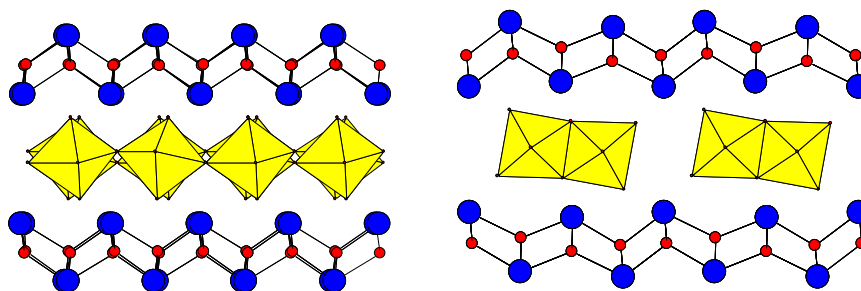
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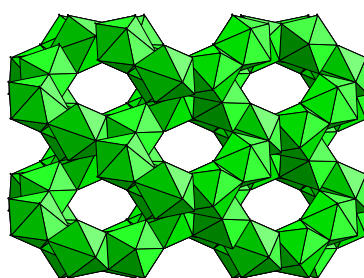
Research Interests: solid state chemistry, functional inorganic materials, crystallography, structure-property relationships, ferroelectrics, X-ray and neutron diffraction



Solid state chemistry is concerned with the design, synthesis and characterisation of advanced inorganic materials with novel physical and chemical properties, and the understanding of the interplay of structure, composition and properties. The type of functional materials being studied in our group is wide-ranging, and currently includes ferroelectrics, microporous materials, optical materials and magnetic materials. Synthetic efforts are focused on a range of mixed metal oxides, fluorides and also hybrid materials, the latter using organic 'templates'. Detailed structural characterisation is central to our philosophy, for which we use X-ray and neutron diffraction, both in-house and at central facilities in the UK and France. We have a variety of collaborations in order to measure the chosen functional properties, from which we can understand the key structure-property relationships and hence feedback in to the synthetic program to prepare 'better' materials.



Above: The ferroelectric (left) and paraelectric (right) phases of Bi₂WO₆



Above: A new luminescent lanthanide fluoride crystal

SELECTED RECENT PUBLICATIONS

1. Synthesis of hybrid framework materials under 'dry' hydrothermal conditions: crystal structure and magnetic properties of Mn₂(H₂PO₄)₂(C₂O₄), Z. A. D. Lethbridge, M. J. Smith, S. K. Tiwary, A. Harrison and P. Lightfoot, *Inorg. Chem.*, 2004, **43**, 11-13.
2. Investigation of structural and ferroelectric properties of pulsed-laser-ablated epitaxial Nd-doped bismuth titanate films, A. Garg, A. Snedden, P. Lightfoot, J. F. Scott, X. Hu and Z. H. Barber, *J. Appl. Phys.*, 2004, **96**, 3408-3412.
3. Two closely related lanthanum phosphonate frameworks formed by anion – directed linking of inorganic chains, J. A. Groves, P. A. Wright and P. Lightfoot, *Inorg. Chem.*, 2005, **44**, 1736-1739.
4. Polar ordering of polar octahedra in [C₂N₂H₁₀][VOF₄(H₂O)], N. F. Stephens, M. Buck and P. Lightfoot, *J. Mater. Chem.*, 2005, **15**, 4298-4300.
5. Unusual high-temperature structural behaviour in ferroelectric Bi₂WO₆, N. A. McDowell, K. S. Knight and P. Lightfoot, *Chem. Eur. J.*, 2006, **12**, 1493-1499.