THE UNIVERSITY of EDINBURGH
School of Chemistry

Project Title
Experimental discovery of new mixed-anion materials

Project Summary
A project combining synthetic solid-state chemistry, atomic structure analysis and physical property measurements to understand how multiple anion materials can be harnessed for future technologies.

Metal oxides enable a range of current technologies from batteries, through capacitors and piezoelectrics, to heterogeneous catalysts. Replacing some of the oxide ions with fluoride (oxyfluorides) during synthesis provides a mechanism to tune and improve the underlying physical properties such as magnetism, electronic or ionic conductivity, and structural rigidity. However, the way in which oxide and fluoride anions interact to influence these properties is poorly understood. This project will discover new oxyfluoride materials and characterise their properties, with the broader aim of understanding, and ultimately controlling, how multiple anions can lead to improved functional materials.

This PhD will develop skills in a range of areas, from inorganic materials synthesis, through crystallographic analysis of X-ray and neutron scattering, to measurement and analysis of physical properties such as electronic conductivity or magnetic susceptibility. As well as these interdisciplinary techniques, you will develop broader skills in teamwork and scientific communication, in particular explaining your work to researchers from a range of scientific backgrounds. There will be opportunities to use synchrotron and neutron scattering facilities.

References
E. K. Dempsey and J. Cumby, Chem. Commun. 2024, 60, 2548, https://doi.org/10.1039/D3CC06129A

E. K. Dempsey and J. Cumby, J. Mater. Chem. C, 2023, 11, 1791, https://doi.org/10.1039/D2TC01563C

Funding Notes
A PhD studentship is available in the group of Dr James Cumby, University of Edinburgh, School of Chemistry, www.cumby.chem.ed.ac.uk.

The studentship is fully funded for 42 months by the University of Edinburgh and covers tuition fees and an annual stipend at the UKRI rate, for 2024-25 this is £19,237 per annum, for a candidate satisfying EPSRC eligibility criteria, see link below.

The UKRI will normally limit the proportion of international students appointed each year.

https://www.ukri.org/wp-content/uploads/2024/04/UKRI-020424-TrainingGrantTermsConditionsApril2024.pdf

How to apply
Applications are welcomed from students with, or expecting, a 2:1 or higher Bachelor's degree plus a Master's degree or equivalent in Chemistry, Physics, or Materials Science.

Informal enquiries or an initial application of cover letter and CV should be directed to:

Dr James Cumby, School of Chemistry and Centre for Science at Extreme Conditions,
University of Edinburgh, David Brewster Road, Edinburgh EH9 3FJ, UK.

Email: james.cumby@ed.ac.uk

The closing date is Friday 21 February 2025, 11.59 pm GMT.

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IMPORTANT
Before Submitting your cover letter and CV, please complete the online School of Chemistry Equality, Diversity and Inclusion Form, entry 2025-26.

The form will automatically generate a unique 'Response ID number' that you must include in your cover letter.

Equality and Diversity
The School of Chemistry holds a Silver Athena SWAN award in recognition of our commitment to advance gender equality in higher education. The University is a member of the Race Equality Charter and is a Stonewall Scotland Diversity Champion, actively promoting LGBT equality.

The University has a range of initiatives to support a family friendly working environment.
For further information, please see our University Initiatives website:
https://equality-diversity.ed.ac.uk/inclusion/family-and-carer