

# Matthew Cliffe

E-mail: [mjc222@cam.ac.uk](mailto:mjc222@cam.ac.uk)

Website: [mjc222.user.srcf.net](http://mjc222.user.srcf.net)

## Employment

**Junior Research Fellow, University of Cambridge** **2015 - 2018**  
Sidney Sussex College Research Fellow in Chemistry

## Education

**DPhil (Inorganic Chemistry), University of Oxford** **2015 (June)**  
Project: Disorder and defects in functional molecular frameworks.  
Supervisor: Prof Andrew Goodwin

**BA/MSci University of Cambridge, Natural Sciences (First Class)** **2011**  
MSc Project: Low energy synthesis of zinc-based coordination polymers  
Supervisor: Dr Tomislav Friščić

## Academic Honours

- 2015 British Zeolite Association Founders' Award  
*Awarded to the best/most promising postgraduate student of the year working in the area of micro- or mesoporous science*
- 2014 Diamond Light Source PhD Investigator Award, runner-up  
*Given to an early career scientist (PhD student or post-doctoral researcher) who has made an exceptional contribution to a research project using synchrotron light.*
- 2013 Merton College Oxford Prize Scholarship  
*Awarded to four research students across all disciplines "of the highest academic distinction" in the later years of their degrees*
- 2011 Norrish Prize for distinction in Physical Chemistry (University of Cambridge)  
*Single prize awarded for "excellence in the overall examination" in physical chemistry*
- 2011 Olive Ward Prize for Chemistry (Clare College, University of Cambridge)  
*Prize awarded for best in Part II or Part III.*
- 2009 Mineralogical Society of Great Britain Student Award
- 2008 AstraZeneca Bursary for distinguished academic performance (University of Cambridge)
- 2008 Scholarship (Clare College, University of Cambridge)
- 2007 Silver Medal, 39th International Chemistry Olympiad, placed in top 50 and highest in UK

## Journal Publications

Structural Simplicity as a Constraint on the Structure of Amorphous Silicon ,  
**M. J. Cliffe\***, A. P. Bartók, R. N. Kerber, C. P. Grey, G. Csanyi and A. L. Goodwin,  
*Phys. Rev. B*, accepted (2017).

Metal–organic nanosheets formed via defect–mediated transformation of a hafnium metal–organic framework,

**M. J. Cliffe**, E. Castillo-Martínez, Y. Wu, J. Lee, A. C. Forse, F. C. N. Firth, P. Z. Moghadam, D. Fairen-Jimenez, M. W. Gaultois, J. A. Hill, O. V. Magdysyuk, B. Slater, A. L. Goodwin and C. P. Grey,  
*J. Am. Chem. Soc.*, doi: [10.1021/jacs.7b00106](https://doi.org/10.1021/jacs.7b00106) (2017).

Encoding Complexity within Supramolecular Analogues of Frustrated Magnets,  
A. B. Cairns, **M. J. Cliffe**, J. A. M. Paddison, D. Daisenberger, M. G. Tucker, F.-X. Coudert and A. L. Goodwin,  
*Nat. Chem.*, **8**, 442-447 (2016).

*Featured as a highlight article "News and Views" in Nature Chemistry* **8**, 402-404 (2016).

Design of crystal-like aperiodic solids with selective disorder-phonon coupling,  
A. R. Overy, A. B. Cairns, **M. J. Cliffe**, A. Simonov, M. G. Tucker and A. L. Goodwin,  
*Nat. Commun.*, **7**, 10445 (2016).

A Breathing Zirconium Metal-Organic Framework with Reversible Loss of Crystallinity by Correlated Nanodomain Formation,  
B. Bueken, F. Vermoortele, **M. J. Cliffe**, M. T. Wharmby, D. Foucher, J. Wieme, L. Vanduyfhuys, C. Martineau, N. Stock, F. Taulelle, V. Van Speybroeck, A. L. Goodwin, D. De Vos,  
*Chem. Eur. J.*, **22**, 3264-3267 (2016).

Glass formation via structural fragmentation of a 2D coordination network,  
D. Umeyama, N. P. Funnell, **M. J. Cliffe**, J. A. Hill, A. L. Goodwin, Y. Hijikata, T. Itakura, T. Okubo, S. Horike, S. Kitagawa,  
*Chem. Commun.*, **51**, 12728 (2015).

Defect-dependent colossal negative thermal expansion in UiO-66(Hf) metal-organic framework,  
**M. J. Cliffe**, J. A. Hill, C. A. Murray, F-X Coudert and A. L. Goodwin,  
*Phys. Chem. Chem. Phys.*, **17**, 11586-11592 (2015).  
*Highlighted in Chemistry World* <http://www.rsc.org/chemistryworld/2015/04/mof-defective-design-negative-thermal-expansion>

Flexibility transition and guest-driven reconstruction in a ferroelastic metal-organic framework,  
S. J. Hunt, **M. J. Cliffe**, J. A. Hill, A. B. Cairns, N. P. Funnell and A. L. Goodwin,  
*CrystEngComm*, **17**, 361 (2015).

Correlated defect nano-regions in a metal-organic framework,  
**M. J. Cliffe**, W. Wan, X. Zou, P. A. Chater, A. K. Kleppe, M. G. Tucker, H. Wilhelm, N. P. Funnell, F.-X. Coudert and A. L. Goodwin,  
*Nat. Commun.*, **5**, 4176 (2014)  
*Featured as a highlight in the Diamond Light Source Annual Review:* <http://www.diamond.ac.uk/Home/Corporate-Literature/Annual-Review/Review2015/Villages/Engineering-and-Environment-Village/Controlling-defects-in-metal-organic-frameworks.html>

Negative area compressibility in silver(I) tricyanomethanide,  
S. A. Hodgson, J. Adamson, S. J. Hunt, **M. J. Cliffe**, A. B. Cairns, A. L. Thompson, M. G. Tucker, N. P. Funnell and A. L. Goodwin,  
*Chem. Commun.* **50**, 5264 (2014)

Nanostructure determination from the pair distribution function: A parametric study of the INVERT approach,  
**M. J. Cliffe** and A. L. Goodwin,  
*J. Phys.: Condens Matt.* **25**, 454218 (2013)

Quantification of local geometry and local symmetry in models of disordered materials,  
**M. J. Cliffe** and A. L. Goodwin,  
*Phys. Status Solidi B*, **250**, 949 (2013)  
*Editor's Choice, selected as a cover, featured as highlight article in Materials Views, "Top 10 most accessed article", featured by parent journal Phys. Status Solidi in their "Best of 2013-4" issue.*

Mineral neogenesis as an inspiration for mild, solvent-free synthesis of bulk microporous metal-organic frameworks from metal (Zn,Co) oxides,  
C. L. Motillo, Y. N. Lu, M.-H. Pham, **M. J. Cliffe**, T. O. Do and T. Friščić,  
*Green Chem.*, **15**, 2121 (2013).  
*Selected as cover article.*

PASCal: a principal axis strain calculator for thermal expansion and compressibility determination,  
**M. J. Cliffe** and A. L. Goodwin,  
*J. Appl. Cryst.*, **45**, 1321 (2012).  
*Website: <http://PASCal.chem.ox.ac.uk>*

Accelerated aging: a low energy, solvent-free alternative to solvothermal and mechanochemical synthesis of metal-organic materials,  
**M. J. Cliffe**, C. L. Motillo, R. S. Stein, D.-K. Bučar and T. Friščić,  
*Chem. Sci.*, **3**, 2495 (2012).  
*Top 10 most accessed article, June 2012; featured as highlight article at both [www.ChemEurope.com](http://www.ChemEurope.com) and the RSC Chemical Science Blog.*

Structure determination of disordered materials from diffraction data,  
**M. J. Cliffe**, M. T. Dove, D. A. Drabold and A. L. Goodwin,  
*Phys. Rev. Lett.*, **104**, 125501 (2010)  
*Selected as Editors' Suggestion; highlighted by APS in their feature magazine Physics **3**, 25 (2010).*

## Invited Oral Presentations

- Feb 2017 DEFNet workshop (University of Oxford)  
"Defects, order and disorder in Group 4 MOFs"
- Nov 2015 DEFNet workshop (KU Leuven)  
"Defects, order and disorder in MOFs"
- Jul 2015 British Zeolite Association  
"Correlated defects in MOFs"

## International Oral Presentations

- Feb 2017 IWAM (Ras Al-Khaimah, UAE) Dept. of Chemistry UC Berkeley  
"Defect ordering and disordering in Group 4 MOFs"
- Sept 2016 Informal seminar, Dept. of Chemistry UC Berkeley  
"Defect ordering and disordering in Group 4 MOFs"
- Sept 2016 Informal seminar, Dept. of Chemistry UC San Diego  
"Defect ordering and disordering in Group 4 MOFs"
- Sept 2016 Informal seminar, Dept. of Chemistry UC Santa Barbara

- “Defect ordering and disordering in Group 4 MOFs”
- Sept 2016 SMARTER (Bayreuth, Germany)
  - “Defect ordering and disordering in Group 4 MOFs”
- Jun 2016 European Powder Diffraction Conference (Bari, Italy)
  - “Correlated defects in Group 4 MOFs”
- Aug 2014 IUCr Congress (Montreal)
  - “Correlated defects in Group 4 MOFs”
- Jul 2014 European Powder Diffraction Conference (Aarhus, Denmark)
  - “Frustration and disorder in simple molecular frameworks”
- Sept 2013 EUROMat 2013 (Seville, Spain)
  - “Structural complexity in Group 4 MOFs”
- Aug 2013 European Crystallography Meeting 28 (Warwick)
  - “Correlated disorder and structured nanodomains in Group 4 MOFs”
- Jul 2013 Noncrystalline Materials 12 (Trento, Italy)
  - “Structural simplicity as a constraint for refinement of diffraction data”
- Sept 2012 Reverse Monte Carlo 5 (Budapest, Hungary)
  - “Structure determination of disordered materials from diffraction data”

## **National Oral Presentations**

- Jul 2016 Mineralomimesis (Queen Mary, University of London)
  - “Defect ordering and disordering in Group 4 MOFs”
- Apr 2016 British Crystallographic Association
  - “Correlated defects in group 4 MOFs”
- Apr 2014 British Crystallographic Association
  - “Frustration and disorder in simple molecular frameworks”
- Dec 2011 ISIS Disordered Materials Meeting
  - “Structure determination of disordered materials from diffraction data”

In addition to the above presentations I have given poster presentations at twelve national and international conferences.

## Research Experience

### Visiting project student, University of California, San Diego

2010 Jul-Sept

Project: Post-synthetic modification of metal-organic frameworks using the Diels-Alder reaction  
Supervisor: Prof Seth Cohen

### Project student, University of Cambridge

2009 Jul-Aug

Project: Structure determination of disordered materials from diffraction data  
Supervisor: Dr Andrew Goodwin

## Teaching Experience

- 2016-18      **Supervisor of Part III (final year) project student**, University of Cambridge  
Designed project and acted as day-to-day supervisor
- 2015-        **Supervisor**, Sidney Sussex College, University of Cambridge  
Electronic structure of solids (2nd year), Inorganic chemistry (1st year)
- 2013-2014   **Retained Lecturer** (Inorganic Chemistry), Exeter College, University of Oxford  
Tutor for first year undergraduate inorganic chemistry
- 2012-2014   **Junior Demonstrator**, Inorganic Chemistry Laboratory, University of Oxford

## Professional Activities

Reviewer: Journal of the American Chemical Society, Advanced Materials, Crystal Growth and Design, Dalton Transactions, The Journal of Physical Chemistry C, Journal of Physics D: Applied Physics, Crystals.

Member, Royal Society of Chemistry

Member, British Crystallographic Association