

Dr. Alex P. S. Brogan

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Curriculum Vitae

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Summary

My research generally covers a broad range of subjects such as proteins in non-aqueous environments, protein engineering, biomaterials, biophysical chemistry, chemical and synthetic biology, and biocatalysis. As a result I have published 9 papers (6 first author) in high impact journals including *Nature Chemistry*, *Nature Communications*, *JACS*, and *Chemical Science*. I am an expert in a vast range of analytical techniques and have published results from experiments performed on synchrotron light sources (SAXS, SRCD), neutron sources (SANS, EINS), and high performance computing (MD simulations). I have been instrumental in acquiring >£1M worth of beam time at Diamond Light Source, and my work has been covered by popular media including *New Scientist*.

Research Interests

I am motivated by a broad interest in research at the interface of materials science with biology including; nanobiotechnology, protein engineering, and biophysics of proteins in unnatural environments (with an emphasis on ionic liquid based systems).

Particularly:

- Functional hybrid materials (especially made from renewable components)
- Protein-rich solvent-free biofluids.
- Protein engineering.
- Non-aqueous proteins and enzymes.
- Biocatalysis of platform chemicals and fuels in ionic liquids.

Research Experience

Date	Position	Institute
2014 – Present	Research Associate	Imperial College London <i>Department of Chemical Engineering</i>
2017 - 2018	Visiting Scientist	Massachusetts Institute of Technology <i>Koch Institute for Integrative Cancer Research</i>
2012 – 2014	Research Assistant	University of Bristol <i>School of Chemistry</i>

Qualifications

Date	Qualification	Institute
2008 – 2012	Ph.D. (Chemistry) Supervisor: Prof. S. Mann FRS Thesis title: "Solvent-free liquid proteins" Award date: 25/09/2012	University of Bristol
2004 – 2008	M.Sci. (Chemistry) Graduated with First Class Honours	University of Bristol

Funding and Awards

Date	Funding/Award	Value
2010 – Ongoing	<i>Diamond Light Source</i> 936 hours of beam time	£1,170,000 (accepted rate of £10,000 per 8 hour shift)
2017 – 2018	<i>MISTI</i> MIT-Imperial Seed Fund (funding for collaborative research/exchange with Angela Belchers group at MIT)	£24,838
2004 – 2008	Millhayes Science Scholarship (Undergraduate award renewed on a yearly basis with requirement for first class grade)	£4,000

Publications

*Joint first author

10. [A. P. S. Brogan](#), L. Bui-Le, and J. P. Hallett. "Non-aqueous homogenous biocatalytic conversion of polysaccharides in ionic liquids using chemically modified glucosidase". *Nat. Chem.*, 2018, *In Revision*.
9. [A. P. S. Brogan](#), and J. P. Hallett. "Solubilizing and Stabilizing Proteins in Anhydrous Ionic Liquids through Formation of Protein–Polymer Surfactant Nanoconstructs". *J. Am. Chem. Soc.*, 2016, **138**, 4494-4501.
8. [A. P. S. Brogan](#), R. B. Sessions, A. W. Perriman, and S. Mann. "Molecular Dynamics Simulations Reveal a Dielectric-Responsive Coronal Structure in Protein–Polymer Surfactant Hybrid Nanoconstructs". *J. Am. Chem. Soc.*, 2014, **136**, 16824-16831.
7. [A. P. S. Brogan](#), K. P. Sharma, A. W. Perriman, and S. Mann. "Enzyme activity in liquid lipase melts as a step towards solvent-free biology at 150 °C". *Nat. Commun.*, 2014, **5**, 5058.
6. K. P. Sharma, Y. Zhang, M. R. Thomas, [A. P. S. Brogan](#), A. W. Perriman, and S. Mann. "Self-Organization of Glucose Oxidase–Polymer Surfactant Nanoconstructs in Solvent-Free Soft Solids and Liquids". *J. Phys. Chem. B*, 2014, **118**, 11573-11580.
5. K. P. Sharma, K. Bradley, [A. P. S. Brogan](#), S. Mann, A. W. Perriman, and D. J. Fermin. "Redox Transitions in an Electrolyte-Free Myoglobin Fluid". *J. Am. Chem. Soc.*, 2013, **135**, 18311-18314.
4. [A. P. S. Brogan](#), K. P. Sharma, A. W. Perriman, and S. Mann. "Isolation of a Highly Reactive β -Sheet-Rich Intermediate of Lysozyme in a Solvent-Free Liquid Phase". *J. Phys. Chem. B*, 2013, **117**, 8400-8407.
3. F.-X. Gallat, [A. P. S. Brogan](#)*, Y. Fichou, N. McGrath, M. Moulin, M. Härtlein, J. Combet, J. Wuttke, S. Mann, G. Zaccai, C. J. Jackson, A. W. Perriman, and M. Weik. "A Polymer Surfactant Corona Dynamically Replaces Water in Solvent-Free Protein Liquids and Ensures Macromolecular Flexibility and Activity". *J. Am. Chem. Soc.*, 2012, **132**, 13168–13171.
2. [A. P. S. Brogan](#), G. Siligardi, R. Hussein, A. W. Perriman & S. Mann. "Hyper-thermal stability and unprecedented re-folding of solvent-free liquid myoglobin", *Chem. Sci.*, 2012, **3**, 1839-1846.
1. A. W. Perriman, [A. P. S. Brogan](#), H. Cölfen, N. Tsoreas, G. R. Owen & S. Mann. "Reversible dioxygen binding in solvent-free liquid myoglobin", *Nat. Chem.*, 2010, **2**, 622-626.

Media Coverage

My work has been covered in the popular press by:

- *New Scientist* (August 2012).
- *BBC Radio 4* (Program: *Material World*, 5th of August 2010)
- *Chemistry World* (June 2010).

Select Conference Presentations

"Solvent-free enzyme biofluids for anhydrous biocatalysis" (Oral). *MRS Spring Meeting*, Phoenix (USA), 2018.

"Solvent-free Functional Biofluids as a Route for Retained Structure and Improved Protein Stability in Non-aqueous Environments" (Oral). *ACS Spring Meeting*, San Diego (USA), 2016.

"Chemically Modifying Enzymes for the Development of Non-aqueous Biocatalysts with Greatly Improved Stability" (Poster). *SET for Britain Finalists*, London (UK), 2016.

"Solvent-free enzymatic biofluids as a route to ionic liquid stable biocatalysts for biomass processing" (Oral). *6th International Congress on Ionic Liquids (COIL-6)*, Jeju (South Korea), 2015.

"Non-aqueous enzymatic biofluids" (Poster). *Translational Biocatalysis*, London (UK), 2014.

"Rational design of functional biomolecular solvent-free fluids" (Oral). *MRS Spring Meeting*, San Francisco (USA), 2014.

"Structure and function of solvent-free liquid myoglobin" (Poster). *Challenges in Chemical Biology (ISACS5)*, Manchester (UK), 2011.

"Structure and function of solvent-free liquid myoglobin" (Oral). *RSC Summer Research Symposium*, Bristol (UK), 2010.

Teaching Experience

Date	Course	Institute
2017	"Introduction to Spectroscopy" Lecture material	Imperial College London <i>Department of Chemical Engineering</i>
2015 – 2016	Chemistry for Chemical Engineers Tutorials	Imperial College London <i>Department of Chemical Engineering</i>
2013 – 2014	Introduction to Chemistry Tutorials <i>Chemistry 1X</i>	University of Bristol <i>School of Chemistry</i>
2010 – 2011	Maths for Level 1 Chemists Tutorials <i>Chemistry 1SM</i>	University of Bristol <i>School of Chemistry</i>
2009 - 2010	Level 1 Chemistry Tutorials <i>Chemistry 1E</i>	University of Bristol <i>School of Chemistry</i>

Supervision

2016 – 2017

- 2 final year undergraduates (MEng) from the Department of Chemical Engineering, Imperial College London.
- 2 MSc postgraduate students from the Department of Chemical Engineering, Imperial College London.
- 1 UROP summer student from Department of Chemical Engineering, Imperial College London.
- Assistant supervisor to 1 PhD student who started in 2016.

2015 - 2016

- 1 final year Chemistry undergraduate (MSci) from the Department of Chemistry, Imperial College London.
- 1 UROP summer student from Department of Chemical Engineering, Imperial College London (2015), and 1 UROP summer student from the Department of Chemistry, Imperial College London (2016).

2012 - 2014

- Supervised 2 final year Chemistry undergraduates (MSci) in the School of Chemistry, University of Bristol (academic years 2012-13, 2013-14).

Other

Professional Activities

- I am currently (since 2015) a postdoc representative for the Department of Chemical Engineering at Imperial College. Duties include: liaising between postdoc community and faculty, organizing networking events, and organizing the yearly postdoc symposium and prize giving event.
- Currently member of 2 committees within the Department of Chemical Engineering, Imperial College; Postdoc Representative on the Research Committee, and Postdoc Representative on the Unity Committee (committee comprising members of academic staff, research staff (postdocs), administrative staff, and technical staff – tasked with maintaining unity within the department).
- I was part of the selection committee for the Faculty of Engineering (Imperial College London) Dame Julia Higgins Engineering Postdoc Collaborative Research Fund (2017). This was tasked with allocating £19,200 of funds available to postdoctoral researchers to engage in cross-departmental collaborations.

Administrative Duties

- Currently one of two lab managers for Dr. Jason Hallett's research group.
- Part of the Hallett Group "Executive Committee" – day to day running and administration of Dr. Jason Hallett's research group.
- Appointed lab administrator (2011 - 2014), duties included organising meeting schedules, lab inductions, safety training, and various equipment maintenance schedules.

Peer Review

- 1 review article for *ACS Chemical Reviews* (Current Impact factor 37.369)
- 1 article for *ACS Applied Materials and Interfaces* (Current Impact factor 6.723)
- 1 article for *Journal of Visual Experiments* (Current Impact factor 1.325)

Outreach

- "Llama Outbreak" at *Courtyard Festival 2017*, London, UK. Infectious disease simulation to teach festival goers about new biosensing platforms and the important of data tracking for monitoring and controlling outbreaks.

Professional Bodies

- I am currently a member of the Royal Society of Chemistry (MRSC) and the American Chemical Society.

Personal Development

I have attended a number of personal development courses, mostly organized by the Imperial College Postdoc and Fellows Development Centre (PFDC). Of note are:

- How to Peer Review Papers
- Science Communication (with a particular slant towards lay audiences)
- Introduction to News Media (hosted by the Science Media Centre)
- Introduction to Science Policy
- How to Supervise PhD students
- Active Bystander Training
- Unconscious Bias Training

Referees

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