Paul Anthony Dalby, FRSC, AMIChemE

Dept. Biochemical Engineering, University College London, Gower Street, London WC1E 6BT

EDUCATION AND CAREER

- 2016 - present **Deputy Head, Department of Biochemical Engineering (Research)**, UCL.
- 2016 - present **Co-Director** of EPSRC Future Targeted Healthcare Manufacturing Hub, UCL.
- 2013 - present **Professor at University College London,** Dept. Biochemical Engineering
- 2012 - 2022 **Director** of EPSRC Centre for Doctoral Training in Innovative Manufacturing, UCL.
- 2011 - 2016 **Co-Director** of EPSRC Centre for Innovative Manufacturing, UCL.
- 2009 - 2013 **Reader at University College London,** Dept. Biochemical Engineering
- 2007 - 2009 **Senior Lecturer at University College London,** Dept. Biochemical Engineering
- 2000 - 2007 **Lecturer at University College London,** Dept. Biochemical Engineering
- 1998 - 2000 **Postdoctoral fellowship at University of Pennsylvania,** School of Medicine
  Protein design and evolution with Prof. W. F. DeGrado (member of the National Academy)
  Projects: *Development of novel binding proteins*
  In vitro evolution of new catalytic function
  Collaboration with Ronald H. Hoess (Dupont)
  Carried out phage display, protein engineering, purification, formulation and characterisation by CD, fluorescence, enzymology, computer modeling and bioinformatics
- 1994 - 1998 **Ph.D. Cambridge University,** MRC Centre for Protein Engineering
  Protein folding and engineering with Prof. Sir A. R. Fersht, FRS
  Projects: *Folding pathway of Barnase*
  My work involved molecular biology, PCR, mutagenesis, expression and purification, organic synthesis, circular-dichroism, fluorescence and UV-Visible spectroscopy, calorimetry, stopped-flow kinetics, temperature-jump, pulsed quench-flow and NMR.
- 1991 - 1994 **B.A. (Hons)/ M.A. Natural Sciences (First class)**
  Gonville & Caius College, Cambridge University
  Studied Chemistry, Biochemistry, Physics, and Mathematics
  Project: *Synthesis of short antimicrobial peptides* (organic chemistry)

AWARDS

- 2010 **IChemE Innovation and Excellence Award in Bioprocessing** (for the BiCE team)
- 2010 **Royal Society of Chemistry Rita and John Cornforth Award** (for the BiCE team)
- 2008-2010 **Evonik European Science-to-Business Award for Industrial Biotechnology**
- 2001 **Second prize for young researcher at SCI: London's Chemistry meeting**
- 1994-1997 **Gonville & Caius College Dunlop Scholarship**
- 1993-1994 **Gonville & Caius College Senior Scholarship**
- 1993 **James Arthur Ramsay Prize in Chemistry & Biology**

PROFESSIONAL AFFILIATIONS

- 2022- **Scientific Advisory Board for UMabs, USA/China**.
- 2020- **EPSRC Strategic Advisory Team for Manufacturing the Future**.
- 2020- **EPSRC Healthcare Council-SAN-SAT Working Group**.
- 2020- **Scientific Advisory Board for Leukocare, Germany**.
- 2020- **Co-Founder of Roxijen Ltd**.
- 2018 **UKRI FLF Peer Review College Member**
- 2017- 2020 **External examiner** MSc Biological Engineering, University of Sheffield
- 2016- **EPSRC College member**
- 2015- **Elected Management Board Member** of BBSRC BioProNet
- 2015- **Editorial Board Member** of Scientific Reports (a Nature Journal)
- 2014-2016 **Committee Member** of the RSC Chemistry Biology Interface Division

- 2014-2016 **Panel Member** of the Innovate UK IB Catalyst.
- 2013- **Fellow of the Royal Society of Chemistry** (Member since 2005)
- 2013- 2016 Steering Group Member of the BBSRC Bioprocess Research Industry Club (BRIC)
- 2011- 2014 **Editor-in-Chief** of 'Current Biotechnology', since its launch (issue 1: Feb 2012)
- 2010- 2014 **Editor-in-Chief** of the 'Open Biotechnology Journal' (Editorial board member since 2007)
- 2011- 2014 BBSRC Research Grant Panel Committee D as core member
- 2010- 2011 BBSRC Research Grant Panel Committee C as pool member
- 2008- **Chair** Royal Society of Chemistry - Biotechnology Group (Member since 2003)
- 2011- 2013 Editorial Board Member of 'Enzyme Engineering'
- 2006- 2008 Editorial Advisory Board for 'Recent Patents in Biotechnology'
- 2006- 2013 Member of the Protein Society
- 2003- Associate Member of the Institute of Chemical Engineers
- 2001- 2005 Member of the American Chemical Society

FACULTY, UCL, MULTI-INSTITUTIONAL ROLES

- 2017 - 2021 Faculty REF Impact lead
- 2017 - 2021 Dept Biochemical Engineering REF lead
- 2016 - Chair of the UCL SLMS Technology Innovation Network for Biologics
- 2016 - Member of Faculty of Engineering Sciences Research Directors Committee
- 2015 - 2022 Member of UCL CDT Directors Committee
- 2012 - 2022 Director of EPSRC Multi-Institutional Centre for Doctoral Training
- 2008 - Genetic Modification Safety Committee
- 2016 - 2017 Member of Faculty of Engineering Sciences Research Degrees Committee
- 2012 - 2014 Chair of BBSRC Multi-Institutional Doctoral Training Programme Recruitment Panel
- 2012 - 2014 BBSRC Multi-Institutional Doctoral Training Programme Management Board
- 2005 - 2008 Engineering Faculty Undergraduate Degree Committee

TEACHING ROLES

- 2017 - **Course coordinator** MBI® in Antibody Targeted Therapy
- 2016 - **Course coordinator** (Yr3), BENG0031. Chemistry for Biochemical Engineers
- 2014 - BENG101P. Lectures (formulation, vaccines) Introduction to Biochemical Engineering
- 2013 - **Course coordinator** (Yr2), BENG0013. Biochemistry for Biochemical Engineers
- 2007 - MBI® in Design of Experiments for Bioprocess Optimisation. Case study lecture.
- 2000 - G004/M002 Advanced Bioreactor Engineering - Lectures (MSc & Yr4)
- 2000 - Research project supervision (Yr4, MSc, MRes & Biotechnology BSc)
- 2012 - 2018 BBSRC LIDO Doctoral Training Programme. Lecture- Biological design and engineering.
- 2003 - 2017 **Course coordinator** (Yr 4), BENGM005/6, 3010 Undergraduate research projects
- 2005 - 2017 **Course coordinator** and lecturer, MBI® in biocatalysis
- 2001 - 2014 BENG2006 Biocatalyst design lectures (Yr3 Biotechnology)
- 2005 - 2014 **Course coordinator** (Yr1), BENG1001 Introduction to Biochemical Engineering
- 2000 - 2013 G17 & BIOC2007 Biochemistry for Biochemical Engineers - Workshops (MSc & Yr2)
- 2006 - 2009 BIOC2008 Biochemistry for Biochemical Engineers - Workshops (Yr3)
- 2003 - 2008 BIOC1001 Biochemistry for Engineers - Industrial biocatalysis lectures (Yr1)
- 2000 - 2008 PhD/EngD training day coordinator
- 2002 - 2004 E129/E105/G23 - Affinity Chromatography for undergraduate and MSc
- 2001 - 2005 Biochemical Engineering in the 21st Century - **Coordinator** (Yr1)
- 2000 - 2005 MBI® in biocatalysis - Enzyme design lecture

TUTORING ROLES AT DEPT BIOCHEMICAL ENGINEERING, UCL

- 2016 - **Chair of Departmental Research Committee**
- 2016 - **Member of Departmental Finance Committee**
- 2008 - 2016 **Departmental Tutor for Admissions to Doctoral Research**

- 2010 - 2012 **Mentor to Darren Nesbeth, a new probationary lecturer in the Department**
- 2007 - 2009 **Mentor to Martina Micheletti, a new probationary lecturer in the Department**
- 2005 - 2014 **Chair of undergraduate departmental staff student consultative committee**
- 2005 - 2008 **Crook (UG) and Beaker (PG) Society Liaison**
- 2005 - 2008 **Departmental Tutor to Undergraduates**
- 2000 - 2007 **Tutor to 1st year undergraduates**
  Organised BE in 21st century seminars to help students see broader picture.
  Incorporated BE in 21st century seminars into E100 course to make examinable.
- 2000 - 2005 **Undergraduate Admissions tutor**
  Developed recruiting strategies, including Video/CD, mailshot via UCAS
  Increased total number of applications from 80 to 160 per year
- 2003 - 2005 **Convenor of undergraduate departmental staff student consultative committee**
- 2002 - 2005 **Undergraduate recruitment coordinator**

PUBLICATIONS: H-index 30 (WoK), 35 (Google Scholar)

Published (114) including 4 book chapters, and one book

1. Zhang C, Berg A, Joe CCD, Dalby PA, Douglas AD (2023) Lyophilization to enable distribution of simian adenovirus-vectored vaccines without refrigeration. *Nature Vaccines.* in press.

2. Zhang, H., Dalby, P.A. (2022) Stability convergence in antibody coformulations. *Molecular Pharmaceutics* 19 (11) 4098-4110.

3. Lee, W., Pradhan, S., Zhang, C., Venanzi, N., Li, W., Goldrick, S., Dalby, P.A. (2022) Directed evolution for soluble and active periplasmic expression of bovine enterokinase in Escherichia coli. *Scientific Reports*

4. Lee, W., Pradhan, S., Zhang, C., Venanzi, N., Li, W., Goldrick, S., Dalby, P.A. (2022) Directed evolution for soluble and active periplasmic expression of bovine enterokinase in Escherichia coli. *Research Square* (pre-print): doi.org/10.21203/rs.3.rs-1522473/v1

5. Xiaochen Lyu, Qichao Zhao, Julia Hui, Tiffany Wang, Mengyi Lin, Keying Wang, Jialing Zhang, Jiaqian Shentu, Paul A Dalby, Hongyu Zhang, Bo Liu (2022). The Global Landscape of Approved Antibody Therapies. *Antibody Therapeutics* 5(4) 233-257.

6. Li Y, Dalby PA (2022) Engineering of enzymes using non-natural amino acids. *Bioscience Reports* 42(8) BSR20220168.

7. Kellerman MAW, Almeida T, Rudd TR, Matejtschuk P, Dalby PA (2022) NMR Reveals Functionally Relevant Thermally-induced Structural Changes within the Native Ensemble of G-CSF. *Molecular Pharmaceutics* 19(9) 3242-3255.

8. Lalaurie CJ, Splevins A, Barata TS, Bunting KA, Higazi DR, Zloh M, Spiteri VA, Perkins SJ, Dalby PA (2022) Elucidation of critical pH-dependent structural changes in Botulinum Neurotoxin E. *Journal of Structural Biology* 214(3) 107876.

9. Yu HR, Ma S, Li YW, Dalby PA (2022) Hotspots making directed evolution easier. *Biotechnol. Adv.* 56, 107926.

10. Wood VE, Groves K, Wong LM, Kong L, Bird C, Wadhwa M, Quaglia M, Matejtschuk P, Dalby PA (2022) Protein engineering and HDX identifies structural regions of G-CSF critical to its stability and aggregation. *Molecular Pharmaceutics* 19(2), 616-629.

11. Phattaraporn Morris, Ribia García-Arrazola, Leonardo Rios-Solis, Paul A. Dalby. (2021) Biophysical characterization of the inactivation of E. coli transketolase by aqueous co-solvents. *Scientific Reports.* 11(1), 23584.

12. Vaud, S, Pearcy, N, Hanzevacki, M, Van Hagen, AMW, Abdelrazig, S, Safo, L, Ehsaan, M, Jonczyk, M, Millat, T, Craig, S, Spence, E, Fothergill, J, Bommareddy, RR, Colin, PY, Twycross, J, Dalby, PA, Minton, NP, Jager, CM, Kim, DH, Yu, JP, Maness, PC, Lynch, S, Eckert, CA, Conradie, A (Conradie, Alex) 2 Bryan, SJ (Bryan, Samantha J (2021) Engineering improved ethylene production: Leveraging systems biology and adaptive laboratory evolution. *Metabolic Engineering*. 67, 308-320.

13. Groves, Kate; Ashcroft, Alison; Cryar, Adam; Sula, Altin; Wallace, Bonnie Ann; Stocks, Bradley; Burns, Christopher; Cooper-Shepherd, Dale; De Lorenzi, Ersilia; Rodriguez, Elizabeth ; Zhang, Hongyu; Ault, James; Ferguson, Jackie; Phillips, Jonathan; Pacholarz, Kamila; Thalassinos, Konstantinos; Luckau, Luise; Ashton, Lorna; Durrant, Oliver; Barran, Perdita; Dalby, Paul; Vicedo, Pau; Colombo, Raffaella; Davis, Rachel; Parakra, Rinky; Upton, Rosie; Hill, Sarah; Wood, Victoria; Soloviev, Zoja; Quaglia, Milena (2021) A reference protocol to assess analytical performance of higher order structural analysis measurements: results from an inter-laboratory comparison. *Analytical Chem*. 93 (26), 9041-9048. doi.org/10.1021/acs.analchem.0c04625

14. Zhang H, Yang Y, Zhang C, Farid SS, Dalby PA (2021) Machine learning reveals hidden stability code in protein native fluorescence. *Computational and Structural Biotechnology Journal.* 19, 2750-2760.

15. Cheng Zhang, Nuria Codina, Jiazhi Tang, Haoran Yu, Nesrine Chakroun, Frank Kozielski, Paul A. Dalby. (2021) Comparison of the pH- and thermally-induced fluctuations of a therapeutic antibody Fab fragment by molecular dynamics simulation. *Computational and Structural Biotechnology Journal.* 19, 2726-2741.

16. Spiteri V, Doutch J, Rambo RP, Gor J, Dalby PA, Perkins SJ (2021) Solution structure of deglycosylated human IgG1 shows the role of C_H2 glycans in its conformation. *Biophysical Journal* 200, 1814-1834. doi.org/10.1016/j.bpj.2021.02.038

17. Hales JE, Aoudjane S, Aeppli G, Dalby PA (2021). Proof-of-concept analytical instrument for label-free optical deconvolution of protein species in a mixture. *Journal of Chromatography A* 1641, 461968.

18. Colin PY, Dalby PA (2020) Functional and computational identification of a rescue mutation near the active site of an mRNA methyltransferase**.** *Scientific Reports* 10, (1) 21841

19. Zhang H, Dalby PA (2020) Stability enhancement in a mAB:Fab protein coformulation. *Scientific Reports* 10, 1-11. Doi.org/10.1038/s41598-020-77989-w

20. Wood VE, Groves K, Cryar A, Quaglia M, Matejtschuk P, Dalby PA (2020) HDX and in-silico docking reveal that excipients stabilise G-CSF via a combination of preferential exclusion and specific hotspot interactions. *Molecular Pharmaceutics* 17 (12) 4637-4651. doi.org/10.1021/acs.molpharmaceut.0c00877

21. Chauhan VM, Zhang H, Dalby PA, Aylott JW (2020) Advancements in the co-formulation of biologic therapeutics. *J Controlled Release* 327, 397-405.

22. Wilkinson HC, Dalby PA (2020) Fine-tuning the activity and stability of an evolved enzyme active-site through non-canonical amino-acids. *FEBS J* 288, 1935-1955. DOI: 10.1111/febs.15560

23. Yu H, Dalby PA (2020) A beginner's guide to molecular dynamics simulations and the identification of cross-correlation networks for enzyme engineering. *Methods Enzymology.* 643, 15-49.

24. Wilkinson HC, Dalby PA (2020) The Two-Species Model of transketolase explains donor substrate-binding, inhibition and heat-activation. *Scientific Reports* 10, 4148.

25. Yu H, Hernandez-Lopez RI, Steadman D, Mendez-Sanchez D, Higson S, Cazares-Korner A, Sheppard TD, Ward JM, Hailes HC, Dalby PA (2020) Engineering transketolase to accept both unnatural donor and acceptor substrates and produce α-hydroxyketones. *Febs J.* 287, 1758-1776. DOI: 10.1111/febs.15108

26. Wilkinson HC, Dalby PA (2019) Novel insights into transketolase activation by cofactor binding identifies two native species subpopulations. *Scientific Reports* 9, 16116.

27. Hales JE, Matmon G, Dalby PA, Ward JM, Aeppli G. (2019) Virus lasers for biological detection. *Nature Communications* 10:3594. DOI: 10.1038/s41467-019-11604-z

28. Nuria Codina, Cheng Zhang, Nesrine Chakroun, and Paul A. Dalby. (2019) Insights into the stability of a therapeutic antibody Fab fragment by molecular dynamics and its stabilization by computational design. *BioArXiv*.

29. Nuria Codina, David Hilton, Cheng Zhang, Nesrine Chakroun, Shahina S Ahmad, Stephen J Perkins, Paul A Dalby. (2019) An expanded conformation of an antibody Fab region by X-ray scattering, molecular dynamics and smFRET identifies an aggregation mechanism. *Journal of Molecular Biology* 431(7):1409-1425. doi: 10.1016/j.jmb.2019.02.009

30. Mathew J. Robinson, Paul Matejtschuk, Colin Longstaff, Paul A. Dalby. (2019) Selective stabilisation and destabilisation of protein domains in tissue-type plasminogen activator using formulation excipients. *Molecular Pharmaceutics.* 16(2): 744-755. DOI: 10.1021/acs.molpharmaceut.8b01024

31. Yu, H, Dalby, PA. (2018) Exploiting correlated molecular-dynamics networks to counteract enzyme activity-stability trade-off. *Proc. Natl. Acad. Sci. USA* 115 (52) E12192-E12200.

32. Yu, H, Dalby, PA. (2018) Coupled molecular dynamics mediate long and short-range epistasis between mutations that affect stability and aggregation kinetics. *Proc. Natl. Acad. Sci. USA* 115 (47) E11043-E11052.

33. Pandya A, Howard MJ, Zloh M, Dalby PA. (2018) An evaluation of the potential of NMR spectroscopy and computational modelling methods to inform biopharmaceutical formulations. *Pharmaceutics* 10 (4), 165. DOI: 10.3390/pharmaceutics10040165

34. Zhang C, Samad M, Yu H, Chakroun N, Hilton D, Dalby PA. (2018) Computational-design to reduce conformational flexibility and aggregation rates of an antibody Fab fragment. *Molecular Pharmaceutics.* 15 (8), 3079-3092. DOI: 10.1021/acs.molpharmaceut.8b00186

35. Robinson MJ, Matejtschuk P, Bristow AF, Dalby PA. (2018) T_m-values and unfolded fraction can predict aggregation rates for GCSF variant formulations, but not under predominantly native conditions. *Molecular Pharmaceutics.* 15 (1), 256-267. DOI: 10.1021/acs.molpharmaceut.7b00876

36. Cardenas-Fernandez M, Bawn M, Hamley-Bennett C, Bharat PKV, Subrizi F, Suhaili N, Ward D, Bourdin S, Dalby PA, Hailes HC, Hewitson P, Ignatova S, Kontoravdi C, Leak D, Shah N, Sheppard TD, Ward JM,

Lye GJ. (2017) An integrated biorefinery concept for conversion of sugar beet pulp into value-added chemicals and pharmaceutical intermediates. *Faraday Discussions*, 202, 415-431.

37. Haoran Yu, Yihan Yan, Cheng Zhang, Paul A. Dalby (2017) Two strategies to engineer flexible loops for improved enzyme thermostability. *Scientific Reports*, 7, 41212.

38. Affaticati PE, Dai SB, Payongsri D, Hailes HC, Tittmann K, Dalby PA. (2016) Structural analysis of an evolved transketolase reveals divergent binding modes. *Scientific Reports*, 6, 35716

39. Barata T.S., Zhang C., Dalby P.A., Brocchini S., Zloh M. (2016) *Int J. Mol. Sci.* 17(6):853. Identification of Protein−Excipient Interaction Hotspots Using Computational Approaches. doi:10.3390/ijms17060853

40. P. Morris, L. Rios-Solis, R. García-Arrazola, G. J. Lye, P. A. Dalby. (2016) *Enzyme and Microbial Technology* 89:85-91. Impact of cofactor-binding loop mutations on thermotolerance and activity of E. coli transketolase. doi:10.1016/j.enzmictec.2016.04.003

41. F. Subrizi, M. Cardenas-Fernandez, G. J. Lye, J. M. Ward, P. A. Dalby, T. D. Sheppard, H. C. Hailes (2016) *Green Chemistry*. 18:3158-3165. Transketolase catalysed upgrading of L-arabinose: the one-step stereoselective synthesis of L-gluco-heptulose. DOI: 10.1039/C5GC02660A

42. Chakroun N, Hilton D, Ahmad S, Platt G, Dalby PA. (2016) *Molecular Pharmaceutics*. 13(2):307-319. Mapping the Aggregation Kinetics of a Therapeutic Antibody Fragment. DOI: 10.1021/acs.molpharmaceut.5b00387

43. Dawid Deszcz, Pierre Affaticati, Nadine Ladkau, Alex Gegel, John M. Ward, Helen C. Hailes, Paul A. Dalby. (2015) *FEBS J.* 13:2512-2526. Single active-site mutants are sufficient to enhance serine:pyruvate α-transaminase activity in an ω-transaminase. DOI: 10.1111/febs.13293

44. Payongsri P, Steadman D, Hailes HC, Dalby PA. (2015) *Enzyme Microb Technol* **71**:45-52. Second generation engineering of transketolase for polar aromatic aldehyde substrates. *10.1016/j.enzmictec.2015.01.008*

45. Lucy E. Rayner, Gar Kay Hui, Jayesh Gor, Richard K. Heenan, Paul A. Dalby, Stephen J. Perkins (2015) *J Biol Chem* **290**: 8420-8438. The solution structures of two human IgG1 antibodies show conformational stability and accommodate their C1q and FCγR ligands.

46. Rios-Solis L, Morris P, Grant C, Odeleye A, Hailes HC, Ward JM, Dalby PA, Baganz F, Lye GJ (2015) *Chem Eng Sci* **122**:360-372. Modelling and optimisation of the one-pot, multi-enzymatic synthesis of chiral amino-alcohols based on microscale kinetic parameter determination

47. Du CJ, Rios-Solis L, Ward JM, Dalby PA, Lye GJ (2014) *Biocatalysis and Biotransformation* **32**, 302-313. Evaluation of CV2025 w-transaminase for the bioconversion of lignin breakdown products into value-added chemicals: synthesis of vanillylamine from vanillin

48. Chris Grant, Dawid Deszcz, Yu-Chia Wei, Rubéns Julio Martínez-Torres, Phattaraporn Morris, Thomas Folliard, Rakesh Sreenivasan, John Ward, Paul Dalby, John M. Woodley & Frank Baganz (2014) *Scientific Reports* **4**, 5844. Identification and use of an alkane transporter plug-in for applications in biocatalysis and whole-cell biosensing of alkanes. Doi:10.1038/srep05844

49. Lucy E. Rayner, Gar Kay Hui, Jayesh Gor, Richard K. Heenan, Paul A. Dalby and Stephen J. Perkins (2014) *Journal of Biological Chemistry*. **289**(30):20740-20756. The Fab Conformations in the Solution

Structure of Human IgG4 restricts Access to its Fc Region: Implications for Functional Activity. doi: 10.1074/jbc.M114.572404

50. Dalby PA (2014). The role of directed protein evolution in synthetic biology. In *Synthetic Biology*, Volume 1. pp 79-105. RSC Books. 10.1039/9781849737845-00079

51. Sagar, D.M., Aoudjane, S., Gaudet, M., Aeppli, G., Dalby, P.A. (2013) *Scientific Reports* **3**:2130. Optically Induced Thermal Gradients for Protein Characterization in Nanolitre-scale Samples In Microfluidic Devices. DOI:10.1038/srep02130

52. Lucy E. Rayner, Nilufar Kadkhodayi-Kholghi, Jayesh Gor, Paul A. Dalby, Stephen J. Perkins, (2013) *J. Mol. Biol.* **425**:506-523. The solution structure of rabbit IgG accounts for its interactions with the Fc receptor and complement C1q and its conformational stability.

53. Polykarpou, E.M., Dalby, P.A., Papageorgiou, L.G. (2012) *Biochemical Engineering Journal* **67**:186-193. Novel efficient optimisation systems for purification process synthesis.

54. Polykarpou, E.M., Dalby, P.A., Papageorgiou, L.G. (2012) *Chemical Engineering Research and Design*. **90**(9):1262-1270. An MILP formulation for the synthesis of protein purification processes. DOI: 10.1016/j.cherd.2011.11.021.

55. Grant, Y., Dalby, P.A., Matejtschuk, P. (2012) *American Pharmaceutical Review*. **15**(2):75-80. Use of design of experiment and micro-scale down strategies in formulation and cycle development for lyophilization.

56. Panwajee Payongsri, David Steadman, John Strafford, Andrew MacMurray, Helen C. Hailes, Paul A. Dalby (2012) *Org. Biomol. Chem.* **10**(45):9021-9029. Rational substrate and enzyme engineering of transketolase for aromatics. DOI: 10.1039/c2ob25751c.

57. Ordidge G.C., Mannall, G., Liddell, J., Dalby, P.A., Micheletti, M. (2012) *Biotechnology Progress* **28**(2):435-444. A generic hierarchical screening method for the analysis of microscale refolds using an automated robotic platform. DOI: 10.1002/btpr.1502

58. Robert Patterson, Jessica Nerren, Michael Kogut, Pinar Court, Bernardo Villarreal-Ramos, Hans-Martin Seyfert, Paul A. Dalby, Dirk Werling (2012) *Developmental & Comparative Immunology* **37**(1):107-114. Yeast-surface expressed BVDV E2 protein induces a Th1/Th2 response in naïve T cells. DOI: 10.1016/j.dci.2011.10.009

59. Grant, Y., Matejtschuk, P., Bird, C., Wadhwa, M., Dalby, P.A. (2012) *Biotechnol. Letts.* **34**(4):641-648. Rapid identification and optimisation of freeze drying formulation using microscale and design of experiment approaches: A case study using granulocyte colony stimulating factor (G-CSF). DOI: 10.1007/s10529-011-0822-2

60. John Strafford, Panwajee Payongsri, Edward G. Hibbert, Phattaraporn Morris, Sukhjeet S. Batth, David Steadman, Mark E. B. Smith, John Ward, Helen C. Hailes, Paul A. Dalby (2012) *J. Biotechnol.* **157**(1): 237-245. Directed evolution to re-adapt a co-evolved network within an enzyme. DOI: 10.1016/j.jbiotec.2011.11.017

61. Polykarpou, E.M., Dalby, P.A., Papageorgiou, L.G. (2012) *Biotechnology Progress*. **27**(6): 1653-1660. Optimal synthesis of chromatographic trains for downstream protein processing. DOI: 10.1002/btpr.670

62. Dalby PA, Ward JM, and Hailes HC (2011). C-C Bond Formation Using TDP Dependent Enzymes. In Comprehensive Chirality, Ed, Hisashi Yamamoto and Erick Carreira. Elsevier, Oxford, UK.

63. L. Rios-Solis, M. Halim, A. Cázares, P. Morris, J. M. Ward, H.C. Hailes, P.A. Dalby, F. Baganz, G. J. Lye (2011) *Biocatalysis and Biotransformation.* **29**(5):192-203. A toolbox approach for the rapid evaluation of multi-step enzymatic syntheses comprising a "mix and match" *E. coli* expression system with microscale experimentation. DOI: 10.3109/10242422.2011.609589

64. Parker, B.M., Taylor, I., Woodley, J.M., Ward, J.M., Dalby, P.A. (2011) *J. Biotechnol.* **155**(4):396-405. Directed evolution of a thermostable L-aminoacylase biocatalyst. DOI:10.1016/j.jbiotec.2011.07.029

65. Jahromi, R.R.F., Morris, P., Martinez-Torres, R.J., Dalby, P.A. (2011) *J. Biotechnol.***155**(2):209-216. Structural stability of *E. coli* transketolase to temperature and pH denaturation. DOI 10.1016/j.jbiotec.2011.06.023

66. Dalby, P. and DeGrado B. (2011) *Current Opinion in Structural Biology* **21**:450-451. Engineering and Design. DOI: 10.1016/j.sbi.2011.06.003

67. Dalby, P.A. (2011) *Current Opinion in Structural Biology* **21**:473-480. Strategy and success for the directed evolution of enzymes. DOI 10.1016/j.sbi.2011.05.003

68. Lye, G.J., Dalby, P.A., Baganz, F., Ward, J.M and Hailes, H.C. (2011). Biocatalysis is the future… the future is now! The Chemical Engineer, issue 839 (May), 36-38.

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71. Hailes, H.C, Dalby, P.A., Lye, G. J., Baganz, F., Micheletti, M., Szita, N., Ward, J.M. (2010) *Current Organic Chemistry*. **14**(17):1883-1893. α,α'-Dihydroxy Ketones and 2-Amino-1,3-diols: Synthetic and Process Strategies using Biocatalysts.

72. James L. Galman, David Steadman, Sarah Bacon, Phattaraporn Morris, Lydia G. Crago, Mark E.B. Smith, John Ward, Paul A. Dalby and Helen C. Hailes (2010) *ChemComm* **46**(40):7608-7610. α,α'-Dihydroxyketone formation using aromatic and heteroaromatic aldehydes with evolved transketolase enzymes.

73. Abe, Y., Gor, J., Bracewell, D.G., Perkins, S.J., Dalby, P.A. (2010) *Biochem. J.* **432**(1):101-111. Masking of the Fc region in human IgG4 by constrained X-ray scattering modelling: implications for antibody function and therapy. (DOI: 10.1042/BJ20100641)

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79. Hailes, H.C., Dalby. P.A., Lye, G.J., Ward, J.M. (2009) *Chim Oggi.* **27**(4), 28-31. Biocatalytic Approaches to Ketodiols and Aminodiols.

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81. Dalby, P. (2009) *J. Biomolecular Screening* **14**(7), 900-900. High-Throughput Characterization of Proteins From Microtiter Plates to Microfluidics. 15th Annual Conference and Exhibition of the Society-of-Biomolecular-Sciences, APR 26-30, 2009 Lille, France.

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83. Mannall, G.J, Myers, J.P., Liddell J., Titchener-Hooker, N.J., Dalby, P.A. (2009) *Biotech. Bioeng.* **103**(2), 329-340. Ultra scale-down of protein refold screening in microwells: Challenges, solutions and application. (DOI 10.1002/bit.22245)

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85. Smith, M.E.B., Hibbert, E.G., Jones, A.B., Dalby, P.A, and Hailes, H.C. (2008) *Adv Syn Catal* **350**, 2631-2638. Enhancing and reversing the enantioselectivity of *E. coli* transketolase via single point mutations. (DOI 10.1002/adsc.200800489)

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98. Dimitriadou, E.K., Lye, G.J., Dalby, P.A. (2007) Redesign and altered ion-binding of a natural calcium regulated biosensor, photoprotein aequorin. *Amino Acids* 33 (3): XLVI-XLVI.

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100. Chen, B. H., Sayar, A., Kaulmann, U., Dalby, P. A., Ward, J. M. and Woodley, J. M. (2006) *Biocatal. Biotrans.* **24**, 449-457. Reaction modelling and simulation to assess the integrated use of transketolase and ω-transaminase for the synthesis of an aminotriol. (DOI: 10.1080/10242420601068668)

101. Mannall, G. J., Titchener-Hooker, N. J., Chase, H. A. and Dalby, P. A. (2006) *Biotech. Bioeng.* **93**, 955-963. A critical assessment of the impact of mixing on dilution refolding. (DOI 10.1002/bit.20796)

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103. Hibbert, E. G. and Dalby, P. A. (2005) *Microbial cell factories*. **4**, 29. Directed evolution strategies for improved enzymatic performance.

104. Hibbert, E. G., Baganz, F., Hailes, H. C., Ward, J. M., Lye, G. J., Woodley, J. M. and Dalby, P. A. (2005) *Biomolecular Engineering* **22** (1-3), 11-19. Directed evolution of biocatalytic processes.

105. Aucamp, J. P., Cosme, A. M., Lye, G. J. and Dalby, P. A. (2005) *Biotech Bioeng.* **89** (5), 599-607. High-throughput measurement of protein stability in microtiter plates.

106. Dalby PA, Lye GJ and Woodley JM (2005) One-pot synthesis and the integration of chemical and biocatalytic conversions. In Handbook of Chiral Chemicals (2nd Edn)(Ed D J Ager), CRC Press, Boca Raton, pp 419-428.

107. Miller, O. J. and Dalby, P. A. (2004) *Trends Biotech.* **22** (5), 203-205. Exposing hidden relationships using directed evolution.

108. Dalby, P. A. (2003) *Curr. Opin. Struct. Biol.* **13** (4), 500-505. Optimising enzyme function by directed evolution.

109. Lye, G. J., Ayazi-Shamlou, P., Baganz, F., Dalby, P. A., and Woodley, J. M. (2003) *Trends Biotech.* **21** (1), 29-37. Accelerated design of bioconversion processes using automated microscale processing techniques.

110. Lye, G. J., Dalby, P. A., and Woodley, J. M. (2002) *Org. Process Res. Dev.* **6** (4), 434-440. Better biocatalytic processes faster: New tools for the implementation of biocatalysis in organic synthesis

111. Dalby, P. A., Hoess, R. H., and DeGrado, W. F., (2000) *Protein Sci.* **9**, 2366-2376. Evolution of binding affinity in a WW domain probed by phage display.

112. Dalby, P. A., Oliveberg, M. O., and Fersht, A. R., (1998) *J. Mol. Biol.* **276**, 625-646. Folding Intermediates of Wild-type and Mutants of Barnase. I. Use of)-value Analysis and *m*-values to Probe the Cooperative Nature of the Folding Pre-equilibrium.

113. Dalby, P. A., Clarke, J., and Fersht, A. R., (1998) *J. Mol. Biol.* **276**, 647-656. Folding Intermediates of Wild-type and Mutants of Barnase. II. Correlation of Changes in Equilibrium Amide Exchange Kinetics, with the Population of the Folding Intermediate.

114. Dalby, P. A., Oliveberg, M. O., and Fersht, A. R., (1998) *Biochemistry*. ***37, 4674-4679.*** Movement of the Intermediate and Rate Determining Transition State of Barnase on the Energy Landscape with Changing Temperature.

Books

1. Sherwood D and Dalby PA. Modern thermodynamics for Chemists and Biochemists. 2018. 2nd Edition. Oxford University Press.

<u>Patent Applications</u>

1. Materials & methods relating to protein and nucleic acid evolution (2003). WO 03004595
2. In vitro evolution of enzyme specificity (2004). WO2004024918
3. Apparatus for dialysis (2003). GB 0327616.9
4. Microfluidic Method for Measuring Molecular Stability (2009). Filed 22/06/2009. GB0910759.0, PCT/GB2010/051001, WO 2010149995. Awarded.
5. Time-resolved method of protein analysis (2019). Filed 12/12/2019. GB 1918336.7
6. Method for bio-sensing a binding ability among a biomolecule and a virus using viral-lasing detection probes. (2019) EP 3502694 A1, WO2019121198.

<u>Conference Proceedings</u>

1. Ingram, C.U., Dalby, P.A., Hailes, H.C., Lye, G.J., Ward, J.M. (2003) *11th European Congress on Biotechnology*, Basel, Switzerland, 24-29 August. Engineering and directed evolution of multi-step biocatalytic pathways in bacteria.
2. Ingram, C.U., Dalby, P.A., Hailes, H.C., Lye, G.J., Ward, J.M. (2003) *Enzyme Engineering XVII*, Santa Fe, New Mexico, USA, 14-19 November. Engineering and directed evolution of multi-step biocatalytic pathways in bacteria.
3. Grant, Y., Matejtschuk, P., Dalby, P.A. (2009) Ultra Scale-Down Models to Optimise Freeze-Drying and Formulation. The Pharmaceutical and Healthcare Sciences Society. Freeze Drying Special Interest Group. 8 December, NIBSC, South Mimms, UK.

Invited Presentations

1. Office of Naval Research Molecular Biomimetics Program Review, November 1998. "Development of the WW-domain for Biosensing, by Phage Display"
2. Merck & Co., January 2000. "Evolution of Stability and Binding for a WW Domain using Phage Display"
3. Dept. Biochemistry & Molecular Biology, UCL, November 2001. "Focussed Error-prone PCR: A novel method for the directed evolution of enzymes".
4. Biochemical Engineering Research Network (BERN), Avecia, Billingham, UK, 12 December, 2002. "Implications of directed enzyme evolution and metabolic engineering for process bioinformatics".
5. European Protein Society Symposium, Florence, Italy, March 2003.
Panel member for "Career issues for Young Protein Scientists".
6. Royal Society of Chemistry Biotechnology Group - Achievements and Challenges in Biotransformation, London, UK, 30 March, 2004. "Expanding the Repertoire of Organic Synthesis by Transketolase".
7. CERC3 Young Chemists Workshop on Biocatalysis. Erlangen, Germany 24-27 March, 2004. "Expanding the Repertoire of Organic Synthesis by Transketolase".
8. Cambridge Antibody Technology 25 February, 2005. "High-throughput determination of protein stability in microplates"
9. Royal Society of Chemistry & Institute of Chemical Engineering - Monitoring Protein Integrity: Toward Process Analytical Technologies for Biopharmaceuticals, London, UK, 6 July, 2005. "High-throughput determination of protein stability in microplates".
10. IBC Life Sciences - Process Analytical Technologies for Biologics, Lisbon, Portugal, 5-6 October, 2005. "High-throughput measurement of protein stability in microtiter plates".
11. Protein Science Forum, Churchill College, Cambridge, UK, 14-15 November, 2005. "High-throughput measurement of protein stability in microtiter plates".
12. Dept. of Chemistry, University of Sussex, UK, 22 February, 2006. "A de novo engineered transketolase and beta-alanine:pyruvate transaminase pathway in *E.coli* for the biocatalytic synthesis of amino-alcohols".
13. Cambridge Healthtech Institute, Inaugural Engineering Protein Therapeutics for Delivery at the Protein Engineering Summit, Boston, USA, 26-27 April, 2006. "High-throughput measurement of protein stability in microtiter plates".
14. ACHEMA 2006, 28th International Exhibition-Congress on Chemical Engineering, Environmental Protection and Biotechnology, Frankfurt, Germany, 15-19 May, 2006. "High-throughput measurement of protein stability in microtiter plates".
15. 7th International Conference on Protein Stabilisation – ProStab 2007, Exeter, UK, 11-14 April, 2007. "Structural stability of an enzyme biocatalyst".
16. BioProcess International Conference, Paris, France, 24-25 April, 2007. "High-throughput formulation of proteins in microtiter plates".
17. Enzyme Engineering XIX, Harrison Hot Springs, BC, Canada, 23-28 September, 2007. "De novo pathway design and directed evolution for improved ketodiol and aminodiol synthesis".
18. Dept. of Chemical Engineering, Cambridge University, 17 October, 2007. "High-throughput determination of protein stability and refolding in microtiter plates"
19. Bioprocess UK Annual Conference, Cardiff, UK. 28-29 November, 2007. "UCL Biochemical Engineering: Current and Future Research"

20. Society for Biomolecular Screening Conference, Lille, France. 26-30 April 2009. “From microplate-based to microfluidic screening of protein structure and function”
21. Royal Society of Chemistry CBiF Annual Meeting, London, UK, 27 May 2009. “A synthetic biology approach for the stereoselective synthesis of keto-diols and amino-diols”
22. APS - Overcoming Formulation Challenges for Biopharmaceuticals, GSK House, London UK. 2-3 June 2009. “Micro-plate methods for formulation of protein stability and freeze-drying”
23. Plenary Speaker at the BIO World Congress on Industrial Biotechnology and Bioenergy, Montreal, Canada. 19-22 July 2009. “Accessing value-added chemicals in a biorefinery”
24. Session speaker **and chair** at the BIO World Congress on Industrial Biotechnology and Bioenergy, Montreal, Canada. 19-22 July 2009. “De novo pathway design and engineering for ketodiol and aminodiol synthesis”
24. Royal Society of Chemistry, Firbush, Scotland. 11-13 September 2009. “Directed evolution of transketolase for a de novo engineered synthetic pathway”
25. Plenary Speaker at EuropaBio's Forum for Industrial Biotechnology, Lisbon, Portugal. 20-22 October 2009. "Integrated process, pathway and enzyme engineering for chiral keto- and amino-diols"
26. Informa, Forced Degradation for biologics, London, UK. 13-14 April 2010. “Forced degradation studies of proteins formulated by high-throughput techniques”
27. VisionGain, Forced Degradation Strategies Conference, London, UK, 3-4 June 2010. “Pre-formulation of proteins by high-throughput techniques”.
28. EuroSciCon, Modern Challenges in Therapeutic Protein Production, Welwyn Garden City, UK, 11 June 2010. “Forced degradation studies of proteins formulated by high-throughput techniques”.
29. Gordon Research Conference on Biocatalysis, Smithfield, Rhode Island, USA. 11-16 July 2010. "Integrated process, pathway and enzyme engineering for chiral keto- and amino-diols".
30. Recovery XIV. Lake Tahoe, USA. 1-6 August 2010. “Screen early - fail early: Rapid microscale screening of protein properties for bioprocessing and formulation”.
31. The Royal Society. Engineering toxins for 21st century therapies, The Kavli Royal Society International Centre. 9-10 September 2010. “Engineering the enhanced production of enterokinase for use in novel biopharmaceutical fusion protein activation”.
32. Nanotechnology KTN: Nano4Life, The Royal Society, London UK. 24 February 2011. “A Novel Nanolitre Scale Technique for Determining Protein Stability and Drug-Binding Affinity” .
33. BioProcess International, Nice, France, 6 - 7 April 2011. “Screen early - fail early: Rapid microscale and microfluidic screening of proteins for manufacturability”.
34. EuroSciCon, 2nd Annual Modern Challenges in Therapeutic Protein Production, London, 10 June 2011. “Rapid Screening of Proteins for Manufacturability”.
35. Complexity and systems biology of microbial biofuels, Warwick, UK. 20-24 June 2011. “De novo pathway design and evolution”.
36. Session speaker **and chair** at the World Biopharm Forum 2011, Robinson College, Cambridge, UK. 29 June 2011. “Effect of bioprocess solution conditions on the structure of antibody”.
37. Belgian Academy of Sciences Synthetic Biology Symposium, Brussels, Belgium 12 December 2011. “Strategies for Enzyme evolution”
38. ISMB Birkbeck
39. BioProcess International, Prague, Czech Republic, 17-20 April 2012. “Effect of low pH viral inactivation conditions on the solution structure of antibody”
40. Tianguan China seminar. November 2011.
41. 9th International Conference on Protein Stabilisation – ProStab2012, 2-4 May 2012, Lisbon, Portugal. “Effect of solvent, temperature and enzyme engineering on the stability of *E. coli* transketolase”
42. RSC/APS MiBIO2012 conference. 30 October 2012, Cambridge, UK. “Screen early - fail early: Rapid analytical screens for protein formulation”
43. UCL/Camtech/Simtech Microfluidics, its Application and Commercialisation, UCL, London UK, 1 November 2013. “Rapid analytical screens for protein formulation”
44. SMI Quality by Design, London, 24-25 February 2014. “Early screening of manufacturing to improve biotherapeutic design and selection”

45. Royal Society of Chemistry Thermal Analysis Conference (TAC), 1 April 2014, GSK Ware, UK. “Use of IR-based heating technology for assessing protein stability”
46. IChemE ChemEngDayUK, Manchester 2014, 7-8 April 2014. “Towards the measurement and prediction of manufacturability for biopharmaceuticals”
47. 10th International Conference on Protein Stabilisation – ProStab2014, 7-9 May 2014, Stresa, Italy. “Rapid measurement of protein stability in nanolitre samples using optically induced thermal gradients”
48. BioprocessUK, Liverpool, 25-26 November 2014. “Evaluation of novel format biopharmaceuticals during manufacture”
49. Royal Society of Chemistry Biotechnology Group – Translational Biocatalysis, London, UK, 16 December, 2014. "Engineering transketolases with novel activities".
50. KTN Biopharmaceutical Analytical Symposium, Leeds, 4-5 March 2015 “Analytical challenges for protein aggregation and stability”
51. Oxford Global Formulation & Drug Delivery Congress, 18-19 May, 2015 “Measurement and prediction of formulation stability for biopharmaceuticals”
52. KTN Biopharmaceutical Analytical Symposium, CPI Darlington, 15 March 2016 “Analysis and modeling of Fab protein structure in aggregation-prone conditions”
53. BTC: Industry meets Academia - Unlocking the Potential for Innovation, 14 April 2016. UCL School of Pharmacy.”Biochemical Engineering and the Manufacturing of Emerging Macromolecular Therapies”
54. European Federation of Biotechnology: 17th European Congress on Biotechnology. Krakow, Poland, 3-6 July 2016. Plenary Speaker: “Conformational protein structure shifts in aggregation prone conditions for MAb and Fab”.
55. KTN Biopharmaceutical Formulation Group Meeting, UCL, London, 7 July, 2016. “Towards the prediction of formulations that minimise biopharmaceutical aggregation”.
56. ESBES Dublin Sept 11, 2016 “Protein And Enzyme Stability Engineering, Guided By Molecular Dynamics Simulation”
57. IPSEN Chester 6 Oct 2016 “Higher-order analysis and modeling of proteins and their formulations”
58. CHI PEGS Lisbon 31Oct - 4Nov 2016 “Elucidation of aggregation mechanisms in a therapeutic protein, and prediction of formulation strategies”
59. BioprocessUK 23 November 2016. “Analytical challenges in Formulation” Workshop.
60. BioProNet 13 February 2017. Recent breakthroughs and new perspectives in protein aggregation. “Elucidation of Aggregation Mechanisms in Therapeutic Protein and Prediction of Formulation Strategies”
61. Biophysical Analysis of Biotherapeutics meeting at the 13th Annual PEGS conference. May 1-5, 2017 at the World Trade Center in Boston
62. Oxford Global. 10th Annual Proteins & Antibodies and Biotherapeutics Congress scheduled for 24 – 25 April 2017 in London, UK
63. 2nd International Advanced Biomanufacturing Conference, May 22-23, 2017. Sheffield, UK.
64. Proteins, Aggregates and Particles meeting at the Annual European PEGS conference. November 14-17, 2017, Lisbon, Portugal.
65. Session Chair: Proteins, Aggregates and Particles meeting at the Annual European PEGS conference. November 14-17, 2017, Lisbon, Portugal.
66. BioProNet 5th Annual Conference, October 10-11, 2018, London, UK. “Analysis and control of protein dynamics and stability: downstream to formulation”
67. Cancer Research UK – UCL Centre, 28 March, London 2019. “Engineering and formulating stable protein therapies”
68. Royal Society of Chemistry Future Formulations III, 4 April 2019, Leicester, UK. “Enabling rapid liquid and freeze-dried formulation design for the manufacture and delivery of novel biopharmaceuticals”.
69. CASSS San Francisco, USA. 8-10 April 2019. “Analysis, control and engineering of protein dynamics, stability and aggregation”.
70. KTN Formulation. Manchester, UK. 11 July 2019. “Coformulated therapies. Formulation and analytical challenges”.
71. MIBio 2019 Stability of Biopharmaceuticals. Cambridge, UK. 13 November 2019. “Understanding formulations: looking beyond preferential exclusion”.

72. ESACT-UK 30th Annual Conference. Ashford, Kent, UK. 8-9 January 2020. “Analysis, control and engineering of protein dynamics, stability and aggregation”.
73. Royal Society of Chemistry Future Formulations IV, 23 June 2020, Online. “Enabling rapid liquid and freeze-dried formulation design for the manufacture and delivery of novel biopharmaceuticals”.
74. CHI Bioprocessing Summit 16-17 March 2021, Online. “Combining Biophysics and Modelling Approaches to Better Understand and Predict Protein Stability in Formulations”
75. PharmaTechIntegrates 2021. 23 Sept 2021. Online. Panel member on "Revolution not evolution of Biologics production".
76. BioProNet. 8-9 November 2021. Co-organiser and Session Chair: "Novel Protein Formats".
77. VaxHub. 19 November 2021, Online. "Freeze-dried formulation optimisation for ChAdOx1 vaccines"
78. BiologicsUK. London UK. 23 March 2022. "Mass Spectrometry And Molecular Dynamics To Characterise Proteins And Their Formulations".
79. Bioprocessing Summit Europe, Barcelona, Spain. 24 March 2022. "Design of Freeze-dried ChAdOx1 Vaccine Formulations"
80. Manchester MIB, 11 May 2022. "Strategies for protein and enzyme stabilisation: Mechanistic insights"
81. Oxford Global: Pharmaceutical Lyophilisation Symposium, on 8th November 2022. Online.
82. Institute of Physics: Antibody adsorption and solution stability. University of Manchester. 15-16 Dec 2022.
83. Keynote Lecture: KTN and BioProNet2 (Formulation, Quality and Delivery of Tomorrow’s Medicines), Manchester UK, 24 Jan 2023. "Aggregation mechanisms for single and co-formulated antibodies"

Grants

1. BBSRC studentship, 02/B1/E/08236. Engineering novel high-throughput routes and directed evolution of enzyme stability. 2002.
2. EPSRC First Grant Scheme, GR/S02532/01. Substrate walking: Increasing the synthetic repertoire of enzymes using a novel process £98k. 2002.
https://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=GR/S02532/01
3. EPSRC, GR/S62505/01. Next generation pharmaceuticals: Linking novel engineering and chemistry to a revolution in biocatalysis. Prof. John Woodley, Dr. John Ward, Dr Helen Hailes, Dr Gary Lye, Dr Frank Baganz, Dr Paul Dalby, £1.7m. 2003.
4. Eli Lilly and Company, for EPSRC EngD studentship. Directed evolution of the substrate specificity of trypsin. £44,271. 2003.
5. Eli Lilly and Company, for EPSRC EngD studentship. Development of microwell techniques to study protein damage during purification. £44,271. 2004.
6. BBSRC studentship, BBS/S/A/2004/10920. A combined computational design and genetic engineering approach for novel enzymes. 2004.
7. BBSRC studentship, BBS/S/K/2005/12160. Directed evolution and formulation for improved protein stability. 2005.
8. Cambridge Antibody Technology, for EPSRC EngD studentship. High throughput stability screening. £34,472. 2005.
9. Lonza Biologics, for EPSRC EngD studentship. Optimising biopharmaceutical protein crystallisation. £21,560. 2005.
10. DTI, TP/4/BIO/6/I/22034. Development of enhanced bioprocessing for advanced biopharmaceutical proteins. Dr Keith Foster (Syntaxin Ltd), Dr Nigel Allison (Health Protection Agency), Dr Paul Dalby (UCL), Prof Gary Lye (UCL), £1.2m. 2006.
11. EPSRC, EP/E001599/1. IMRC for Bioprocessing. One of 13 co-investigators, led by Prof Nigel Titchener-Hooker, £6.7m. April 2007 – March 2012.
12. BBSRC, BRIC, BB/E005942/1. A new microfluidic tool for rapid analysis of protein stability and integrity in bioprocesses. Dr Paul Dalby (PI), Dr Daniel Bracewell, Prof. Gabriel Aeppli, Prof. Quentin Pankhurst, £0.5m (£424k recovered from BBSRC) Jan 2007 – Dec 2009. **Final report - Graded A**.
13. NIBSC, for EPSRC EngD studentship. Use of novel microwell and ultra scale-down methods for the accelerated prediction of operating conditions that preserve protein structure during freeze-drying of biopharmaceuticals. £37,489.55. Oct 2006 – Sept 2010.

14. BBSRC, BB/E013104/1. Structural analyses of multicomponent protein complexes by analytical ultracentrifugation. Awarded to Prof S J Perkins (PI) Dr I R Tsaneva, Dr F Werner, Dr P Dalby and Dr Xuemei Yuan (coinvestigators). £126,933.66. 2007.
15. Prometic Biosciences Ltd, for EPSRC EngD studentship. *In silico* design of novel protein affinity chromatography ligands. £43,953. 2007.
16. BBSRC CASE studentship, BB/F018207/1. Rapid microscale evaluation of the impact of fermentation conditions on inclusion body formation, solubilisation and protein refolding yields. With Dr Micheletti, M. (lead PI) and John Liddell at Avecia Biologics. 2007.
17. CIF "High Throughput Analytical Facilities for Biological Macromolecules and Cells – particularly for therapeutic use" Awarded to Dr P Dalby (lead PI), Prof S J Perkins, Dr J M Ward, Dr H C Hailes, Dr K. Chester £475,000. 2008.
18. EPSRC, EP/G034656/1, "Industrial Doctoral Training Centre for Bioprocessing Engineering Leadership" Awarded to Nigel Titchener-Hooker (PI) (Centre Director), **Dalby, P.A. (CoI)** Centre Manager, with two other Centre Managers. £5900k, 09/09 - 03/18.
19. CIF II – DPI and fluorescence equipment (Paul Dalby, Steve Perkins & John Ward)
20. BBSRC Targeted Priority Studentships DTG in Bioprocessing for UCL (BBSRC BB/G016593/1). Six studentships (£494,460) awarded February 2009.
21. BBSRC Follow-on-funds, BB/FOF/272. A robust microfluidic device for rapid and ultra-low volume protein:drug interaction screening. Awarded to Paul A. Dalby (lead PI), Prof. Gabriel Aeppli (CoI), £189,666. 2009
22. GSK Whole bioprocessing studies of Dab derived molecules. Centre of Excellence. Awarded to Mike Hoare (PI), Paul Dalby and Gary Lye. £1,052,814. (£800,814 excl EngDs).
23. GSK, for EPSRC EngD studentship. Pre-formulation screening: High throughput tools to formulate dAbs and predict stability profiles. £86,693. 2009.
24. BBSRC Targeted Priority Studentships DTG in Bioprocessing for UCL (BBSRC BB/H015795/1). Four studentships (£333,124) awarded February 2010.
25. EPSRC EP/I033270/1, £5.8M, 2011-2016. Centre for Innovative Manufacturing in Emerging Macromolecular Therapies. Prof NJ Titchener-Hooker (Director), Dr PA Dalby (Co-Director), Dr S Farid (Co-Director), Dr LG Papageorgiou, Prof S Morris, Prof S Brocchini (London School of Pharmacy), Prof N Thornhill (Imperial College London).
26. BBSRC, BRIC2, BB/I017119/1. Elucidating aggregation mechanisms in antibody fragment-based therapeutics to improve their manufacturability. £561877.51 (£452k awarded), 2011-2014. Prof PA Dalby (PI), Prof. S Perkins, Dr J Christodoulou.
27. BBSRC BRIC BB/J003824/1. Microscale freeze-dried and liquid formulations of therapeutics to investigate the relationship between forced degradation and long-term shelf life. PhD studentship with NIBSC. October 2011-Sept 2014. (£85k). Student – Mathew Robinson
28. EPSRC EP/K503332/1 £2.41M, 2011-2016. Centre for Doctoral Training (CDT) in Innovative Manufacturing in Emerging Macromolecular Therapies. Supports 15 PhD studentships.
29. BBSRC BB/J014567/1 Doctoral Training Grant £5.4M, 2012-2014. Supports 54 PhD studentships across UCL, Kings College London, Birkbeck, Royal Veterinary College, and the London School of Tropical Medicine and Hygeine.
30. EPSRC EP/K014897/1 £1.927m. Feb 2013-June 2017. Bio-derived Feedstocks for Sustainable, UK-Based Manufacture of Chemicals and Pharmaceutical Intermediates. Prof Gary Lye, Prof Paul Dalby, Prof John ward, Prof Helen Hailes, Dr Tom Sheppard (Imperial), Dr Cleo Kontoravdi (Imperial), Prof Nilay Shah (Imperial), Prof David Leak (Bath)
31. BBSRC BRIC BB/K011162/1. £430k. Jan 2013-Jan 2016. Multi-modal fluorescence spectroscopy for online analysis of proteins in bioprocesses. Prof PA Dalby (PI), Prof G Aeppli (CoI, LCN).
32. BBSRC BB/K021354/1. £43k. 2013. US partnering on the use of neutron scattering to study aggregation in therapeutic proteins during manufacture and storage. Prof PA Dalby (PI), Dr D.G. Bracewell (CoI).
33. EPSRC EP/L015218/1 £3.71M, 2015-2022. Centre for Doctoral Training (CDT) in Innovative Manufacturing in Emerging Macromolecular Therapies. Supports 28 EPSRC PhD studentships.

34. NOVARTIS £320k. Helen Hailes (PI), Paul Dalby (CoI), John Ward (CoI). Engineering novel multi-enzyme cascades for synthesis 2014-2015.
35. EPSRC EP/K005030/1 £240,691. Equipment for Emerging Macromolecular Therapies. 2014-2015.
36. BBSRC BB/M009602/1 £458k. 2015-2018. 'Optimisation of a semi-synthetic ligation strategy for single glycoform glycotherapeutics'. Derek Macmillan (PI), Paul Dalby (CoI). LINK with Dextra Ltd.
37. Alexion. £343k. Enzyme engineering for improved synthesis of mRNA therapeutics. 2015-2017.
38. EPSRC EP/M028100/1 £520,000. A capability for the rapid formulation and manufacturing process development of novel freeze-dried biological therapies. 2015-2016.
39. EPSRC EP/N025105/1 £2,961,745. Enabling rapid liquid and freeze-dried formulation design for the manufacture and delivery of novel biopharmaceuticals. 2015-2021. Paul Dalby (PI), Ajoy Velayudhan (CoI), Robin Curtis (CoI), Jim Warwicker (CoI).
40. EPSRC IAA - Knowledge Exchange and Innovation fund. £13k. John Hales, Paul Dalby. 2016.
41. EPSRC EP/P006485/1 £10M. 2017-2023. Future Targeted Healthcare Manufacturing Hub. Prof NJ Titchener-Hooker (Director), Prof PA Dalby (Co-Director), Prof S Farid (Co-Director).
42. Marie Curie Research Fellowship. EUR 195,454. 2018-2020. Prof PA Dalby (PI), Dr Arka Mukhopadhyay (Research Fellow).
43. UCL Equipment Fund. £279k. 2019-2020. Prof Perkins (PI), PA Dalby (CoI)
44. Medical Research Foundation Fellowship. MRF-057-0004-RG-MCDO-C0800. Supporting Thomas MacDonnell. £254,390. 2020-2022. The Structure and Function of Beta-2-Glycoprotein I in SLE and APS.
45. Innovate UK Innovation Scholars secondments (IUK75419): £180k. 2021-2024. Paul Dalby (PI), Cheng Zhang (secondee). Computational methods to predict stable biologics formulations
46. EU H2020 IMI. 101007939 RealHOPE. £3.1M. 2021-2024. Real World Handling of Protein Drugs - Exploration, Evaluation and Education. Prof PA Dalby (Co-I). UCL portion £325k

Poster Presentations at National or International Meetings

1. Dalby, P.A., Fersht, A.R. (1997) 22nd Lorne Protein Conference. Lorne, Australia. "Folding Intermediates of Wild-type and Mutant Barnase".
2. Hibbert, E.G., Paramesvaran, J., Vertes, A., Russell, A.J., Woodley, J.M., Dalby, P.A. (2000) 1st NELSIC Meeting. UCL, UK, September. "Optimising Industrial Processes: Directed Evolution and Rational Design of Trypsin".
3. Dalby, P.A., Hoess, R.H., DeGrado, W.F. (2001) Biochemical Engineering XII. Sonoma, CA, USA, 10-15 June. "Evolution of Stability and Binding for a WW Domain using Phage Display".
4. Miller, O.J., Dalby, P.A. (2001) SCI - London's Chemistry. House of Commons, London, October. "Focussed Error-prone PCR: A novel method for the directed evolution of enzymes".
5. Miller, O.J., Dalby, P.A. (2001) 3rd NELSIC Meeting. UCL, UK, December. "Focussed Error-prone PCR: A novel method for the directed evolution of enzymes".
6. Hibbert, E.G., Vertes, A., Woodley, J.M., Dalby, P.A. (2003) 5th European Symposium of the Protein Society. Florence, Italy, March. "Implications of Directed Evolution and Metabolic Engineering for Process Bioinformatics".
7. Ingram, C.U., Dalby, P.A. , Hailes, H.C., Lye, G.J., Ward, J.M. (2003) 11th European Congress on Biotechnology, Basel, Switzerland, 24 – 29 August. "Engineering and directed evolution of multi-step biocatalytic pathways in bacteria".
8. Aucamp, J.P., Cosme, A.M., Lye, G.J., Dalby, P.A. (2004) International Congress on Biocatalysis, Hamburg, Germany, 29Aug-1Sept. "Engineering novel high-throughput screening routes for biocatalyst development programmes".
9. Aucamp, J.P., Lye, G.J., Dalby, P.A. (2004) 5th European Symposium of Biochemical Engineering Science, Stuttgart, Germany, 8-11 September. Engineering novel high-throughput screening routes for biocatalyst development programmes.
10. Paramesvaran, J., Woodley, J.M., Russell A.J. and Dalby, P.A. (2005) Biochemical Engineering XIV Conference, Harrison Hot Springs, BC, Canada, 10-14 July. Engineering specificity-enhanced proteases by directed evolution of bovine trypsin.

11. Costelloe, S.J., Senussi, T., Hibbert, E.G., Smith, M.E.B., Hailes, H.C., Ward, J.M., Dalby, P.A. (2005) Biochemical Society - Biocatalysis: Enzymes, Mechanisms and Bioprocesses, Manchester, UK, 21-22 November. Evolution and engineering of transketolase substrate specificity.
12. Dimitriadou, E.K., Lye, G.J., Dalby, P.A. (2006) Paper accepted for poster presentation at *International Congress on Biocatalysis Biocat 2006*, Hamburg, Germany, 3-7 September. Light-emitting biosensor by redesign of photoprotein aequorin.
13. Hibbert, E.G., Senussi, T.O., Smith, M.E.B., Dalby, P.A. (2007) Biochemical Engineering Research Network (BERN), Birmingham, UK, 5 January. Complementary protein engineering approaches for altered transketolase substrate specificity.
14. Hibbert, E.G., Smith, M.E.B., Smithies, K., Kaulmann, U., Hailes, H.C., Ward, J.M., Dalby, P.A. (2007) European Symposium of the Protein Society, Stockholm, Sweden, 13-16 May. Comparison of the natural and directed evolution of transketolase.

Workshops, Short Courses, Policy Making & Review

1. Univ. Pennsylvania School of Medicine Summer Workshop. Delaware, USA, July 1999. "Evolution of Stability and Binding for a WW Domain using Phage Display".
2. Metabolic Engineering and Directed Evolution. BBSRC, U.Warwick, November 2000. "Forced evolution of a trypsin-based bioprocess"
3. EPSRC Life Sciences Interface Programme, Regional Seminar. Institute of Materials, London 13 June 2003
4. RSC/IChemE workshop, Beyond the molecular frontier: the chemistry/chemical engineering interface in the UK, Redhill, Surrey 6-7 December 2004. By invite.
5. EPSRC Chemistry Programme's Regional Meeting. London, 9th February 2005.
6. Technology Strategy Board (TSB) Roadmapping Workshop on Biotechnology, 8th February 2008. By invite.
7. Royal Academy of Engineering. Engaging with Synthetic Biology. 18 June 2009.
8. BBSRC IBTI Club Scoping Workshop. London. 9-10 July 2009. By invite.
9. Quinquennial review of MRC Protein and Nucleic Acid Division, Cambridge UK, December 2009. By invite.
10. BBSRC Bioprocessing Research Industry Club (BRIC) Scoping Workshop. London. 7 December 2009. By invite.
11. BBSRC Research Grant Panel Committee C as pool member 14-15 September 2010.
12. BBSRC Research Grant Panel Committee D as core member January 2011-December 2014.
13. BBSRC/EPSRC and engineers meeting 27th February 2012 by invite.
14. Scientific review and evaluation of the Austrian Research Promotion Agency (FFG) K2- Centre ACIB, Graz, Austria, May 2012.
15. IBLF Industrial Biotechnology Skills Group, Leeds, biannual since 2012.
16. BBSRC Bioprocessing Research Industry Club (BRIC) Steering Group Member since July 2013.
17. KTN / CPI analytical development workshop for the CPI National Biologics Manufacturing Centre (NBMC) 26 November 2013.
18. TSB assessor for Technology Inspired Innovation 2011.
19. TSB assessor for Advanced Manufacturing Supply Chain Initiative Competition 2012.
20. TSB assessor for Biomedical Catalyst 2012.
21. TSB assessor for Technology Inspired Competition 2013.
22. TSB assessor for Advanced Manufacturing Supply Chain Initiative (AMSCI) competition 2013.
23. TSB/BBSRC assessor and panel member for IB Catalyst competition 2014 (Rounds 1 and 2).
24. Innovate UK assessor and panel member for IB Catalyst competition 2015 (Rounds 3 and 4).
25. Innovate UK assessor and panel member for Bioprocess analysis competition 2016.
25. Innovate UK assessor for iCURE competition 2016.
25. Innovate UK assessor for Materials and Manufacturing competition 2016.
26. External Reviewer of Research at the Department of Chemistry, DTU 2019.

Other National or International Meetings attended

1. Royal Society Discussion Meeting on Protein Folding. London, UK, 1994.

2. BBSRC, EPSRC & MRC - Taking a small look at life. London, March 2001.
3. BBSRC, EPSRC & MRC - Tomorrows technology. London, May 2001.
4. Protein Science Forum, Novartis, Horsham, UK, 18-19 November 2002.
5. Royal Academy of Engineering - Nanotechnology. London, UK, October 2003.
6. Biochemical Engineering Research Network (BERN), Birmingham, UK, January 2005.
7. Royal Society - Bioinformatics - From molecules to systems. London, UK, April 2005.
8. BIA & Bioprocess UK - The Challenges of Improving the Formulation and Delivery of Biopharmaceuticals, Bradford, UK, 9 June 2005.

Conferences organized

1. Royal Society of Chemistry Biotechnology Group - Achievements and Challenges in Biotransformation, London, UK, March 2004.
2. MBI® - Challenges and Opportunities in Biocatalysis: Accelerating Development & Increasing Yield, Dept Biochemical Engineering, London, UK, April 2005.
3. Royal Society of Chemistry Biotechnology Group - Therapeutic Proteins: Chemical & Enzymatic Modification, London, UK, June 27th, 2006.
4. MBI® - Challenges and Opportunities in Biocatalysis: Accelerating Development & Increasing Yield, Dept Biochemical Engineering, London, UK, November 2006.
5. MBI® - Challenges and Opportunities in Biocatalysis, UCL, London, UK, October 2007.
6. MBI® - Challenges and Opportunities in Biocatalysis, UCL, London, UK, October 2008.
7. Royal Society of Chemistry Biotechnology Group – Advances in Biocatalysis, UCL, London, UK, April 21st, 2009.
8. Royal Society of Chemistry Biotechnology Group – High-Value Chemicals from Biomass, RSC, London, UK, Sept 17th, 2013.
9. Royal Society of Chemistry Biotechnology Group – Translational Biocatalysis, RSC, London, UK, Dec 16th, 2014.
10. BioProNet Analytical Workshop – UCL, London, UK, 14th January 2015.
11. KTN Biopharmaceutical Formulation Group Meeting, UCL, London, 7 July, 2016
12. ACS BIOT Session Chair April 2017. QbD.
13. Royal Society of Chemistry Biotechnology Group – Biotransformations: From Science to Industrial Application, RSC, London, UK, Dec 19th, 2017.
14. KTN Formulation. Manchester, 2018.
15. KTN Formulation. Manchester, 2019.
16. KTN Formulation. Virtual, 2020
17. BioProNet2. Virtual, 2021.

Theses completed

1. Edward G. Hibbert (2004) "Engineering & molecular biology approaches to improving trypsin-based bioprocesses"
2. Oliver J. Miller (2005) "The Directed Evolution of Transketolase, a Carbon-Carbon Bond-Forming Enzyme"
3. Jean P. Aucamp (2005) "Engineering a novel high-throughput screen for directed evolution of enzyme stability"
4. Sean J. Costelloe (2007) "Natural evolution and engineering of transketolase"
5. Gareth Mannall (2007) "Characterisation of the effect of process factors upon protein refolding yield"
6. Tarik Senussi (2007) "Directed evolution to modify the substrate specificity of transketolase, a carbon-carbon bond forming enzyme"
7. Janahan Paramesvaran (2008). "Directed evolution of the substrate specificity of trypsin".
8. Julio Martinez-Torres (2009). “Characterisation of the structural stability of transketolase under biocatalytically relevant conditions”
9. Brenda Parker (2009). “Directed evolution methods for the production of industrially useful biocatalysts”

10. Jaspreet Dosanjh (2010) “Protein damage during purification: understanding the effects of size exclusion chromatography on the structure of biosynthetic human insulin (BHI)”
11. Michael Rose (2010) “Investigation of excipient factors affecting protein stability in formulations, using high throughput techniques”
12. Yuki Abe (2010) “The molecular basis for antibody stability in the bioprocess environment”
13. Lydia Coward (2012). “Chemoenzymatic synthesis of novel, structurally diverse compounds”
14. Yitzchak Grant (2011) “Engineering the rational design and optimsation of lyophilization for biological materials”
15. Subhas Pradhan (2013) “Rational design of enterokinase for the development of enhanced biopharmaceutical proteins”
16. John Strafford (2011) “Docking and bioinformatics tools to guide enzyme engineering”
17. Eleftheria Polykarpou (2011) “Optimisation of Chromatography for Downstream Protein Processing”
18. Shahina Ahmad (2011) “Analysis of the precipitation and aggregation of engineered proteins”
19. Phattaraporn Morris (2011) “What causes an enzyme to degrade during biocatalysis?”
20. Gemma Ordidge (2012) “Rapid microscale evaluation of the impact of fermentation conditions on inclusion body formation, solubilisation and protein refolding yields”. PhD collaboration with Avecia.
21. Raha Jahromi Fard (2013) “Evolutionary and mutagenesis studies of transketolase to guide further protein engineering”- submitted.
22. Hani El-Sabbahy (2013) “Development of preparative microfluidic techniques for rapid throughput quantitation of product quality attributes”.
23. Evi Dimitriadou (2014) “Redesign of calcium-regulated photoprotein aequorin towards the development of a novel ion bioreporter”
24. Udofoyo Uye (2014) “Stability, structure and formulation of antibody fragments during bioprocessing”. EngD Collaboration with GSK
25. Panwajee Payongsri (2014) “Synthetic Biology Approaches for the production of chiral aminoalcohols in engineered *E. coli* strains”
26. Lucy Rayner (2015) “Molecular mechanism of human antibody aggregation in solution”
27. Samir Aoudjane (2016) “All optical thermal control for microfluidic biological analysis systems - for assessment of Hepatitis B Virus mutational patterns in a clinical setting”
28. Mathew Robinson (2016) “Investigating the relationship between forced degradation and long-term shelf life for biotherapeutics”. BBSRC BRIC-funded PhD collaboration with NIBSC.
29. David Hilton (2016) “Elucidating the aggregation mechanisms of antibody fragments through biophysical analysis”
30. Weiluo Lee (2016) “Directed evolution of bovine enterokinase for high functional expression in *E. coli*”
31. Cheng Zhang (2017) “Freeze-drying of engineered proteins using protein modelling tools and experimental validation”
32. Pierre Affaticati (2017) “Engineering transketolase for industrial biotechnology”
33. Haoran Yu (2019) “Protein Engineering of Transketolase for Industrial Applications”
34. Victoria Wood (2019) “Use of in silico and biophysical techniques to predict protein stability”
35. Nuria Codina (2019) “Stability and aggregation-prone conformations of an antibody fragment antigen-binding (Fab)”
36. Henry Wilkinson (2019) “Exploration and exploitation of non-canonical amino acid incorporation to detect or improve transketolase activity and stability”
37. Jay Joshi (2020) "The development of next-generation small volume biophysical screening for the early assessment of monoclonal antibody manufacturability"
38. Icken Roberto Hernandez Lopez (2020) "Development Of A High-Throughput Screening Method For Transketolase And Protein Engineering For Biotechnology Applications"
39. Valentina Spiteri (2021) "Unravelling the structure of glycosylated and deglycosylated immunoglobulin G antibodies"
40. Akash Pandya (2021) "Mapping the interaction between excipients with proteins in formulations by computational modelling and NMR"

41. Ji Ho Shin (2022) "Characterisation of the Interaction Between Recombinant Staphylococcal Protein-As and Human Heavy Chain Variable Domains"

PhD and Masters examinations

1. Luis Briseño-Roa (2005) "Enzyme and directed evolution technologies for nerve agent neutralisation", University of Cambridge.
2. Joseph Bennett (2008) "Structural characterization of two enzymes from the crotonase superfamily", University of York
3. Richard Davies (2008),UCL
4. Jamie Biddlecombe (2009), "Antibody stability in bioprocessing focusing on shear effects at solid-liquid interfaces", UCL
5. Benoit Villiers (2009), "Directed evolution of a non-ribosomal peptide synthase enzyme", University of Cambridge.
6. Abhishek Deshpande (2009), University of Cambridge
7. William Bryant (2010), "Functional Genomics, analysis of adaptation in and applications of models to the metabolism of engineered Escherichia coli" UCL
8. Wiktor Banachewicz (2010) "Biophysical characterization of the ultrafast folding homeodomain - Pit1", University of Cambridge
9. Evdoxia Gourbatsi (2010) "Development of high concentration therapeutic antibody formulations and monitoring procedures for improved delivery and protein product quality assurance", University of Kent.
10. Inass Hassan (2010) UCL
11. Rosanna Smith (2011) "Structure and function of the avian neuronal nucleus for sound localisation" UCL
12. Nicole Lim (MPhil) (2011) University of Cambridge.
13. Aaron Westlake (MRes) (2012) University of Exeter.
14. Marcel Reichen (2012) "Multiplexed microfabricated cell culture device for stem cell process development", UCL.
15. Hanieh Khalili (2012), "Site-specific PEGylation of antibody fragments" School of Pharmacy, UCL.
16. Jasmin Baboo (2012) "Automated high-throughput approaches for the development and investigation of novel oxidative biocatalytic processes" UCL.
17. Angelica Ozanne (2012) "Investigations into the Formation of pdu Microcompartments in Mammalian and Bacterial Cells as Novel 'Organelles' for Protein Folding and Post-Translational Modifications". University of Kent.
18. Ahir Pushpanath (2012) "Analysis of the D2-hydroxyacid dehydrogenases". Birkbeck University.
19. Oliver Hardick (2013). UCL
20. Annika Frank (2013). York
21. Amana Murni Halim (2014) UCL.
22. Roomteen Tavakole-Keshe (2014) UCL.
23. Karolina Peciak (2014) "Site selective conjugation at native amino acids" UCL School of Pharmacy
24. Creigh Tilbe-Pulatmen (2014/15) Kent.
25. (2015) Oxford Brookes
26. Benjamin Lichmann (2015) UCL.
27. Luca Rossoni (2015) Nottingham.
28. Desmond Schofield (2016) UCL.
29. Thomas McDonnell (2016) UCL.
30. Rhys Thomas (2016) Leeds.
31. Lewis Bradshaw (2017) UCL
32. Hassan Alkassem (2018) UCL
33. Sophie Newgas (2018) UCL
34. Maria-Jose Del Carmen Henriquez Morales (2018) UCL
35. Ben Miller (2019) UCL
36. Lok Lui (2019) UCL

37. Charles Moore-Kelly (2019) Birmingham
38. Bouran Sohrabi (2019) UCL
39. Shahid Uddin (2019) Kent
40. Qing Tee (2019) UCL
41. Ed Nesbitt (2019) Bath
42. Alina Kulakova (2019) DTU
43. Charlotte Frankling (2019) QMU
44. Luke Richards, (2020) Univ Melbourne, Australia
45. Rudolf Kohulák (2020) UCL
46. Noelle Colant (2020) UCL
47. Liem Bui-Le (2021) Imperial
48. Longinus Ogogua (2021) DMU
49. Maria Laura Greco (2021) Manchester
50. Peter Chandler (2021) Univ Monash, Australia
51. Greta Jasulaityte (2021) UCL
52. Neha Patel (2022) UCL
53. Helena Philpott (2022) UCL, Chemistry
54. Nina Warner (2022) Cambridge Chemistry - Machine Learning in Freeze-Dried formulations
55. Oskar Jacek Lange (2022) Imperial - Towards the Decentralized Manufacturing of Multi-Domain Proteins
56. Braulio Carillo Sanchez (2022) UCL - Design and production of engineered extracellular vesicles in Chinese hamster ovary cells.
57. Ram Jha (2022) UCL, Cancer Institute, Autolus - Development of a protein-protein displacement platform using an anti-minocycline single domain antibody and a dedicated displaceable peptide for the generation of an OFF-switch CAR T cell