

## Dr Benjamin Schumann MRSB MRSC

Group Leader, The Francis Crick Institute • Lecturer, Imperial College London

Imperial College London	The Francis Crick Institute	Date of birth: 10/05/1985
Department of Chemistry	1 Midland Rd	ben.schumann@crick.ac.uk
London W12 0BZ	London NW1 1AZ	www.crick.ac.uk/research/labs/ben-schumann

### Research Vision

Development of chemical “precision tools” to understand how glycans impact biological processes.

### Appointments and Education

- 1/11/2018 - Group Leader and Lecturer in Chemical Biology  
Imperial College London and the Francis Crick Institute
- 2016 - 2018 Postdoctoral fellow, advisor: Prof. Carolyn R. Bertozzi  
Stanford University
- 2011 - 2015 Doctoral studies, advisor: Prof. Peter H. Seeberger  
Max Planck Institute of Colloids and Interfaces and Freie Universität Berlin  
24/11/2015 Degree: Doctor rerum naturalium (*summa cum laude*, outstanding)
- 2005 - 2010 Undergraduate studies  
Universität Tübingen  
26/10/2010 Degree: Diploma in Biochemistry (grade 1.0, outstanding);

### Funding

2018-24 Francis Crick Institute core funding, approx. £1.8m • 2020 BBSRC Responsive Mode Grant (Co-I), approx. £200K • 2019 Wellcome Trust, Biomedical Resource Grant (Co-I), approx. £260K • 2019-20 2x Crick-Imperial co-funded studentships • Imperial ICB CDT studentship co-funded by GSK.

### Awards and Fellowships

2017 Otto Hahn Medal for outstanding doctoral research by the Max Planck Society • 2016 Award for Excellence in Glycosciences, German Association of Glycosciences • 2016-18 Feodor Lynen postdoctoral fellowship, Alexander von Humboldt-Foundation • 2014 German Academic Exchange Service fellowship, guest scientist in Wuxi, China • 2011-13 Kekulé doctoral scholarship, Fonds der Chemischen Industrie • 2008-10 Full scholarship, German Academic Scholarship Foundation

### Teaching Experience

Since 2019 Lecture course Bioorganic Chemistry Y2; tutorials Y1, lab demonstrating Y2, Personal Tutor activity • since 2018 Supervision and mentoring of Master's (MSci, MRes) and doctoral students

### Scientific Committees and Academic Activities

Since 2020 European Symposium of Biological and Organic Chemistry committee • since 2020 European Glycosciences Consortium Organising committee • since 2020 Departmental Equality, Diversity and Inclusion Committee • since 2019 RSC Chemical Biology and Bioorganic Group committee • since 2019 Co-Director Imperial College Glycosciences Training, Research and Infrastructures Centre • Reviewer activities (e.g. *PNAS*, *JACS*, *Nat. Catal.*, *Nat. Commun.*, *Nat. Chem. Biol.*) • 2018-19 Organiser, London Chemical Biology Symposium • 2016-17 Junior Editor, “Essentials of Glycobiology, 3<sup>rd</sup> Edition • 2012 Laboratory animal science training (FELASA cat. B).

### Publications, Patents and Symposia

Author on 11 research publications (5x first, 3x corresp.), 2 Reviews, 1 book chapter, co-inventor on 3 patent applications, invited speaker on various national and international symposia.

## Most Recent Research Papers

Cioce, A., Bineva-Todd, G., Agbay, A. J., Choi, J., Wood, T. M., Debets, M. F., Browne, W. M., Douglas, H. L., Roustan, C., Tastan, O. Y., Kjaer, S., Bush, J. T., Bertozzi, C. R., **Schumann, B.**<sup>†</sup> Metabolic engineering optimizes bioorthogonal glycan labeling. *In preparation*.

Debets, M. F., Tastan, O. Y., Wisnovsky, S. P., Malaker, S. A., Angelis, N., Moeckl, L. K. R., Choi, J., Flynn, H., Wagner, L. J. S., Bineva-Todd, G., Antonopoulos, A., Cioce, A., Browne, W. M., Li, Z., Briggs, D. C., Douglas, H. L., Hess, G. T., Agbaya, A. J., Roustan, C., Kjaer, S., Haslam, S., Snijders, A. P., Bassik, M. C., Moerner, W. E., Li, V. S. W., Bertozzi, C. R., **Schumann, B.**<sup>†</sup> Metabolic precision labeling enables selective probing of O-linked N-acetylgalactosamine glycosylation. *Proc. Natl. Acad. Sci. USA.* **2020**, *117*.

**Schumann, B.**<sup>†</sup>, Malaker, S. A., Wisnovsky, S. P., Debets, M. F., Agbay, A. J., Fernandez, D., Wagner, L. J. S., Lin, L., Choi, J., Fox, D. M., Peh, J., Gray, M. A., Pedram, K., Kayvon Pedram, Kohler, J. J., Mrksich, M., Bertozzi, C. R.<sup>†</sup> Bump-and-hole engineering identifies specific substrates of glycosyltransferases in living cells. *Mol. Cell.* **2020**, *78*. Cover art; *highlighted in Mol. Cell*: doi.org/10.1016/j.molcel.2020.05.019. <sup>†</sup>Co-corresponding authors.

Choi, J., Wagner, L. J. S., Timmermans, S. B. P. E., Malaker, S. A., **Schumann, B.**, Gray, M. A., Debets, M. F., Takashima, M., Gehring, J., Bertozzi, C. R. Engineering Orthogonal Polypeptide GalNAc-Transferase and UDP-Sugar Pairs. *J. Am. Chem. Soc.* **2019**, *141*.

Kaplonek, P., Khan, N., Reppe, K., **Schumann, B.**, Emmadi, M., Lisboa, M. P., Xu, F.-F., Calow, A. D. J., Parameswarappa, S. G., Witzernath, M., Pereira, C. L., Seeberger, P. H. Improving Vaccines Against *Streptococcus pneumoniae* Using Synthetic Glycans. *Proc. Natl. Acad. Sci. U. S. A.* **2018**, *115*.

**Schumann, B.**, Reppe, K., Kaplonek, P., Wahlbrink, A., Anish, C., Witzernath, M., Pereira, C. L., Seeberger, P. H. Development of an Efficacious, Semisynthetic Glycoconjugate Vaccine Against *Streptococcus pneumoniae* Serotype 1. *ACS Cent. Sci.*, **2018**, *4*.

Qin, C., **Schumann, B.**, Zou, X., Pereira, C. L., Tian, G., Hu, J., Seeberger, P. H., Yin, J. Total Synthesis of a Densely Functionalized *Plesiomonas shigelloides* Serotype 51 Aminoglycoside Trisaccharide Antigen. *J. Am. Chem. Soc.*, **2018**, *140*.

**Schumann, B.**, Hahm, H. S., Parameswarappa, S. G., Reppe, K., Wahlbrink, A., Govindan, S., Kaplonek, P., Pirofski, L., Witzernath, M., Anish, C., Pereira, C. L., Seeberger, P. H. A Semisynthetic *Streptococcus pneumoniae* Serotype 8 Glycoconjugate Vaccine. *Sci. Transl. Med.*, **2017**, *9*, online.

**Schumann, B.**<sup>\*</sup>, Parameswarappa, S. G.<sup>\*</sup>, Lisboa, M. P., Kottari, N., Guidetti, F., Pereira, C. L., Seeberger, P. H. Nucleophile-directed Stereocontrol over Glycosylations using Geminal Difluorinated Nucleophiles., *Angew. Chem. Int. Ed.*, **2016**, *55*.

**Schumann, B.**, Pragani, R., Anish, C., Pereira, C. L., Seeberger, P. H. Synthesis of Conjugation-ready Zwitterionic Oligosaccharides by Chemoselective Thioglycoside Activation. *Chem. Sci.*, **2014**, *5*.

Dimmer, K. S., Papić, D., **Schumann, B.**, Sperl, D., Krumpke, K., Walther, D. M., Rapaport, D. A Crucial Role for Mim2 in the Biogenesis of Mitochondrial Outer Membrane Proteins. *J. Cell Sci.*, **2012**, *125*.

## Reviews, book chapters

Cioce, A., Malaker, S. A.<sup>†</sup>, **Schumann, B.**<sup>†</sup> Generating Orthogonal Glycosyltransferase-Nucleotide Sugar Pairs as Next Generation Glycobiology Tools. In press, *Curr. Opin. Chem. Biol.* **2021**.

Zol-Hanlon, M. I., **Schumann, B.**<sup>†</sup> Open Questions in Chemical Glycobiology. *Commun. Chem.*, **2020**, *3*.

Anish, C.<sup>\*</sup>, **Schumann, B.**<sup>\*</sup>, Pereira, C. L., Seeberger, P. H. Chemical Biology Approaches to Designing Defined Carbohydrate Vaccines. *Chem. Biol.*, **2014**, *21*.

**Schumann, B.**, Anish, C., Pereira, C. L., Seeberger, P. H. Carbohydrate Vaccines. In Biotherapeutics: Recent Developments using Chemical and Molecular Biology. Royal Society of Chemistry, London. **2013**.

### **Patents**

Parameswarappa, S. G., Khan, N., Lisboa, M. P., **Schumann, B.**, Pereira, C. L., Seeberger, P. H. Pneumococcal Polysaccharide-protein Conjugate Composition. European Patent Application No. EP 16 179 133.0, **2016**.

**Schumann, B.**, Parameswarappa, S. G., Hahm, H. S., Govindan, S., Anish, C., Pereira, C. L., Seeberger, P. H. Synthetic Vaccines against Streptococcus pneumoniae Serotype 8. European Patent Application No. EP 14 186 597.2, **2014**.

**Schumann, B.**, Anish, C., Pereira, C. L., Seeberger, P. H. Synthetic Vaccines against Streptococcus pneumoniae. European Patent Application No. EP 13 196 568.3, **2013**.

\*Co-first author.

†Corresponding author.