Sven Timo Stripp, Ph.D.

Molecular Biophysics & Bioinorganic Chemistry

H-index: 23, ca. 1.800 citations

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1. PERSONAL INFORMATION

Born 1980 in Wesel, Germany. Married, two children (*2009 and *2012).

2. RESEARCH EXPERIENCE

2020 – present **Freie Universität Berlin**

Habilitation at the Institute of Chemistry and Biochemistry
"Influence of Outer Coordination Sphere Effects on the Catalytic Proceedings of [FeFe]-Hydrogenase"

2015 – present **Freie Universität Berlin**

Group leader at the Department of Physics, Bioinorganic Spectroscopy

2010 – 2015 **Freie Universität Berlin**

Postdoc at the Department of Physics, Experimental Molecular Biophysics (Prof. Dr. J. Heberle)

3. EDUCATION

2007 – 2010 **Ruhr-Universität Bochum**

Dissertation in Biology, degree: Dr. rer. nat. (summa cum laude)
Faculty of Biology and Biotechnology, Photobiotechnology (Prof. Dr. T. Happe)
"Molekulare Grundlagen der Sauerstoffsensitivität von [FeFe]-Hydrogenasen"

2001 – 2007 **Ruhr-Universität Bochum**

Studies of Chemistry and Biology, degree: diploma
Faculty of Biology and Biotechnology, Photobiotechnology (Prof. Dr. T. Happe)
"Optimierung der heterologen Expression eines Proteins aus Chlamydomonas reinhardtii in Clostridium acetobutylicum"

4. RESEARCH PROFILE

Main Research Interests

- Microbial energy metabolism with respect to gaseous substrates
- Understanding gas-processing (metallo-) enzymes at the molecular and cellular level (biocatalysis, redox regulation, proton homeostasis, signaling, etc.)
- Chemiosmotic coupling and charge transfer across biological membranes
- Influence of the outer coordination sphere on biocatalysis, including proton transfer and/or electron transfer, bifurcation, hydrogen bonding, protein structural changes, etc.
- Development of operando spectroscopy under biologically relevant conditions (i.e., at ambient temperature, ambient pressure, and in the presence of water at moderate pH values) and spectroscopical investigations of whole cells

Experimental Expertise

- Vibrational spectroscopy, in particular ATR FTIR and Resonance Raman spectroscopy
- Protein Film Electrochemistry and Spectro-electrochemistry
- Cloning, overexpression, and anaerobic purification of (membrane) proteins
- Microbiology experience includes bacteria (*E. coli, C. acetobutylicum, S. oneidensis, Synechocystis spec.*), fungii (*S. cerevisiae*), and algae (*C. reinhardtii*)
- Electronic spectroscopy, in particular UV/vis absorbance and fluorescence emission
- Atomic force microscopy (AFM) and scanning near-field optical microscopy (SNOM)

Scientific Network

Prof. Dr. Ulf-Peter Apfel	Ruhr-Universität Bochum (DE)
Prof. Dr. Gustav Berggren	Uppsala Universitet (SWE)
Prof. Dr. Oliver Einsle	Universität Freiburg (DE)
Prof. Dr. Tobias Erb	MPI for Terrestrial Microbiology Marburg (DE)
Prof. Dr. Shun Hirota	Marseille Université (FR)
Prof. Dr. Christoph Légere	Nara Institute of Science and Technology (JP)
Prof. Dr. Silke Leimkühler	Universität Potsdam (DE)
Prof. Dr. Ross Milton	Université de Genève (CH)
Prof. Dr. Antonio Pierik	Universität Kaiserlautern (DE)
Prof. Dr. Marcus Ribbe	University of California, Irvine (USA)

Miscellaneous

- Part of the DFG priority program 1927 “Iron-Sulfur for Life” ironsulfurforlife.de
- Member of “Deutsche Gesellschaft für Biophysik” dgfb.org
- Organizer of the international “Hydrogenase Symposium” 2018 – 2020

5. TOP FIVE PUBLICATIONS

Proton Transfer Mechanisms in Bimetallic Hydrogenases.

Hulin T, Hirota S*, and Stripp ST*. *Acc. Chem. Res.* 2020; 54: 232 – 41
https://doi.org/10.1021/acs.accounts.0c00651

Spectroscopic Investigations under *in vivo* Conditions Reveal the Complex Hydride Chemistry of [FeFe]-hydrogenase.

Mészáros LS, (…) Stripp ST*, and Berggren G*. *Chem. Sci.* 2020; 11: 4608 – 17.
https://doi.org/10.1039/D0SC00512F

The Molecular Proceedings of Biological Hydrogen Turnover.

Haumann M* and Stripp ST*. *Acc. Chem. Res.* 2018; 51 (8): 1755 – 63.
https://doi.org/10.1021/acs.accounts.8b00109

Accumulating the Hydride State in the Catalytic Cycle of [FeFe]-hydrogenases.

Winkler M, (…), Stripp ST*, and Happe T*. *Nat. Comm.* 2017; 8: 16115.
https://doi.org/10.1038/ncomms16115

Stepwise Isotope Editing of [FeFe]-hydrogenases Exposes Cofactor Dynamics.

Senger M, (…) Stripp ST*. *Proc. Natl. Acad. Sci. U S A.* 2016; 113(30): 8454 – 59.
https://doi.org/10.1073/pnas.1606178113

6. EXTERNAL FUNDING

Deutsche Forschungsgemeinschaft (DFG)

Grant support of 330.000 € for

"Real-time Spectroscopy for the Analysis of Gas-processing Metalloenzymes" (2019 – 2022)

Focus Area Functional Materials at the Nanoscale (FU Berlin)

Project support of 23.000 € for

"Studying Proton-coupled Electron Transfer in Hydrogenases by Attenuated Total Reflection Fourier-transform Infrared Spectroscopy" (2015)

Project support of 30.000 € for

"Protein-assisted in-vitro Generation of a Hydrogen-forming, Bio-inorganic Cofactor Monitored by LASER-powered Surface-enhanced Infrared Absorption Spectroscopy" (2013)

7. TEACHING

Lectures and lab courses

“Physikalische Chemie für Biochemiker*innen“	lecture & seminar	BSc	2020 – 21
“Biophysik für Biochemiker*innen”	lecture & lab course	BSc	2016 – 19
“Physik für die Grundschule”	lecture & seminar	BSc	2015 – 19
“Advanced Biophysics”	lecture & lab course	MSc	2012 – 19
“Biophysik für Bachelor”	lecture & seminar	BSc	2012 – 18

Supervision of Students

Bachelor	**Master**	**PhD**
Viktor Eichmann (2017)	Janina Drauschke (2019)	Federico Baserga (2017 - now)
Konstantin Laun (2016)	Konstantin Laun (2018)	Hendrik Mohrmann (2013 - 18)
Iuliia Baranova (2016)	Federico Baserga (2016)	Moritz Senger (2014 - 18)
Olga Shulenina (2015)	Moritz Senger (2012)	

8. PUBLICATION LIST

2008 – 2014 (doctoral student/postdoc, selected entries)

4. How oxygen attacks [FeFe] hydrogenases from photosynthetic organisms.
   Stripp ST, Goldet G, Brandmayr C, Sanganas O, Vincent KA, Haumann M, Armstrong FA, Happe T*. Proc. Natl. Acad. Sci. U S A. 2009; 106(41): 17331 – 6

5. Electrochemical kinetic investigations of the reactions of [FeFe]-hydrogenases with CO and O_2: comparing the importance of gas tunnels and active-site electronic/redox effects.
   Goldet G, Brandmayr C, **Stripp ST**, Happe T, Cavazza C, Fontecilla-Camps JC, Armstrong FA*. J. Am. Chem. Soc. 2009; 131(41): 14979 – 89

10. Formaldehyde - a rapid and reversible inhibitor of hydrogen production by [FeFe]-hydrogenases. Wait AF, Brandmayr C, **Stripp ST**, Cavazza C, Fontecilla-Camps JC, Happe T, Armstrong FA*. J. Am. Chem. Soc. 2011; 133(5): 1282 – 5

13. Surface-enhanced infrared absorption spectroscopy (SEIRAS) to probe monolayers of membrane proteins.
    Ataka K, **Stripp ST**, Heberle J*. Biochim. Biophys. Acta. 2013;1828(10):2283 – 93

2015 – present (group leader/ PI)

17. Photosynthesis and hydrogen metabolism revisited. On the potential of light-driven hydrogen production in vitro.
Stripp ST, Heberle J*. Biohydrogen 2015 (pp. 211 – 38). Berlin, Boston: DE GRUYTER.

18. Identification of an Isothiocyanate on the HypEF Complex Suggests a Route for Efficient Cyanyl-Group Channeling during [NiFe]-Hydrogenase Cofactor Generation.
Stripp ST*, Lindenstrauss U, Sawers RG, Soboh B. PLoS One. 2015; 10(7): e0133118

19. Stepwise Isotope Editing of [FeFe]-Hydrogenases Exposes Cofactor Dynamics.
Senger M, Mebs S, Duan J, Wittkamp F, Apfel UP, Heberle J, Haumann M, **Stripp ST***. Proc. Natl. Acad. Sci. U S A. 2016; 113(30): 8454 – 59

20. Wasserstoffkatalyse in Mikroalgen.
Senger M and **Stripp ST***. 2017 Nachrichten aus der Chemie. 2017; 65: 123 – 7

21. Proteolytic cleavage orchestrates cofactor insertion and protein assembly in [NiFe]-hydrogenase biosynthesis.
Senger M, **Stripp ST**, Soboh B*, J. Biol. Chem. 2017; 292(28): 11670 – 81

22. Accumulating the Hydride State in the Catalytic Cycle of [FeFe]-Hydrogenases.
Winkler M, Senger M, Duan J, Esselborn J, Wittkamp F, Hofmann E, Apfel UP, **Stripp ST***, Happe T* Nat. Comm. 2017; 8: 16115

23. Bridging Hydride at Reduced H-Cluster Species in [FeFe]-Hydrogenases Revealed by Infrared Spectroscopy, Isotope Editing, and Quantum Chemistry.
Mebs S*, Senger M, Duan J, Wittkamp F, Apfel UP, Happe T, Winkler M, **Stripp ST***, Haumann M*. J. Am. Chem. Soc. 2017; 139: 12157 − 60

24. Proton-Coupled Reduction of the Catalytic [4Fe-4S] Cluster in [FeFe]-Hydrogenases.
Senger M, Laun K, Wittkamp F, Duan J, Happe T, Winkler M, Apfel UP*, **Stripp ST***. Angew. Chemie Int. Ed. 2017; 56 (52): 16503 – 06

25. Protonengekoppelte Reduktion des katalytischen [4Fe-4S]-Zentrums in [FeFe]-Hydrogenasen. Senger M, Laun K, Wittkamp F, Duan J, Happe T, Winkler M, Apfel UP*, **Stripp ST***. Angew. Chem. 2017; 129 (52): 16728 – 32

26. Protonation/Reduction Dynamics at the Hydrogen-forming Cofactor of [FeFe]-Hydrogenases.

Senger M, Mebs S, Duan J, Shulenina O, Laun K, Kertess L, Wittkamp F, Apfel UP, Happe T, Winkler M*, Haumann M*, **Stripp ST***. Phys. Chem. Chem. Phys. 2018; 20: 3128 – 40

27. Hydrogen and oxygen trapping at the H-cluster of [FeFe]-hydrogenase revealed by site-selective spectroscopy and QM/MM calculations.
Mebs S, Kositzki R, Duan J, Senger M, Wittkamp F, Apfel UP, Happe T, **Stripp ST**, Winkler M*, Haumann M*. BBA - Bioenergetics 2018; 1859: 28 – 41

28. Wasserstoffproduktion nach dem Vorbild der Nature.
Apfel UP, **Stripp ST***. GIT Laborfachzeitschrift 2018; 6: 28 – 29

29. [FeFe]-hydrogenases: recent developments and future perspectives.
Wittkamp F, Senger M, **Stripp ST**, Apfel UP*. Chem. Comm. 2018; 54: 5934 – 42

30. Spectroscopical Investigations on the Redoxchemistry of [FeFe]-Hydrogenases in the Presence of Carbon Monoxide. Laun K, Mebs S, Duan J, Wittkamp F, Apfel UP, Happe T, Winkler M, Haumann M*, **Stripp ST***. MOLECULES 2018; 23: 1669

31. The molecular proceedings of biological hydrogen turnover.
Haumann M, **Stripp ST***. Acc. Chem. Res. 2018; 51 (8): 1755 – 63

32. Crystallographic and spectroscopic assignment of the proton transfer pathway in [FeFe]-hydrogenases. Duan J, Senger M, Esselborn J, Engelbrecht V, Wittkamp F, Apfel Ulf-Peter, Hofmann E, **Stripp ST**, Happe T*, Winkler M*. Nat. comm. 2018; 9: 4726

33. Infrared Characterization of the Bidirectional O_2-sensitive [NiFe]-hydrogenase from *Escherichia coli*. Senger M, Laun K, Soboh B, **Stripp ST***. CATALYSTS 2018; 8: 530

34. Differential Protonation at the Catalytic Six-Iron Cofactor of [FeFe]-Hydrogenases Revealed by ^{57}Fe Nuclear Resonance X-ray Scattering and Quantum Mechanics/Molecular Mechanics Analyses. Mebs S, Duan J, Wittkamp F, **Stripp ST**, Happe T, Apfel UP1, Winkler M, Haumann M*. Inorg. Chem. 2019; 58 (5): 4000 – 16

35. Wasserstoff gewinnen mit biologischen Eisen-Schwefel-Zentren.
Stripp ST*. Nachrichten aus der Chemie 2019; 67 (5): 55 – 58

36. Geometry of the Catalytic Active Site in [FeFe]-Hydrogenases is Determined by Hydrogen Bonding and Proton Transfer.
Duan J, Mebs S, Laun K, Wittkamp F, Heberle J, Happe T, Hofmann E, Apfel UP, Winkler M, Senger M, Haumann M, **Stripp ST***. ACS Catalysis 2019; 9: 9140 – 49

37. Discovery of Novel [FeFe]-Hydrogenases for Biocatalytic H_2-production.
Land H, Ceccaldi P, Mészáros LS, Lorenzi M, Redman HJ, Senger M, **Stripp ST**, Berggren G*.
Chem. Sci. 2019; 10: 9941 – 48

38. How [FeFe]-Hydrogenase Facilitates Bidirectional Proton Transfer.
Senger M, Eichmann V, Laun K, Duan J, Wittkamp F, Knör G, Apfel UP, Happe T, Winkler M, Heberle J, **Stripp ST***. J. Am. Chem. Soc. 2019; 141 (43): 17394 – 403

39. Spectroscopic Investigations under in vivo Conditions Reveal the Complex Metal Hydride Chemistry of [FeFe]-hydrogenase. Mészáros LS, Ceccaldi P, Lorenzi M, Redman HJ, Pfitzner E, Heberle J, Senger M, **Stripp ST***, Berggren G*. Chem. Sci. 2020; 11: 4608 – 17

40. Current State of [FeFe]-Hydrogenase Research: Biodiversity and Spectroscopic Investigations.
Land H, Senger M, Berggren G.*, **Stripp ST***. ACS catal. 2020; 10 (13): 7069 – 86

41. [FeFe]-Hydrogenase Maturation: H-Cluster Assembly Intermediates Tracked by Electron Paramagnetic Resonance, Infrared, and X-Ray Absorption Spectroscopy.
Németh B, Senger M, Redman HJ, Ceccaldi P, Broderick J, Magnuson A, **Stripp ST**, Haumann M, Berggren G*. J. Biol. Inorg. Chem. 2020; 25: 777 – 88

42. Characterization of a putative sensory [FeFe]-hydrogenase provides new insight into the role of the active site architecture.
Land H, Sekretaryova AL, Huang P, Redman HJ, Németh B, Polidori N, Mészáros L, Senger M, **Stripp ST***, Berggren G*. Chem. Sci. 2020; 11: 12789 – 801

43. Temperature Dependence of Structural Dynamics at the Catalytic Cofactor of [FeFe]-hydrogenase. **Stripp ST**, Mebs S, Haumann M*. Inorg. Chem. 2020; 59 (22): 16474 – 88

44. Ligand effects on structural, protophilic and reductive features of stannylated dinuclear iron dithiolato complexes. Abul-Futouh H*, Almazahreh LR, Abaalkhail SJ, Görls H, **Stripp ST**, Weigand W*. New. J. Chem. 2021; 45: 36 – 44

45. Proton Transfer Mechanisms in Bimetallic Hydrogenases.
Hulin T, Hirota S*, **Stripp ST***. Acc. Chem. Res. 2021; 54 (1): 232 – 41

46. Bands from Bonds. **Stripp ST***.
Nat. Rev. Chem. 2021 https://doi.org/10.1038/s41570-021-00256-7