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Education

2007 – 2010 Ph.D. University of Freiburg (Chemistry), Germany
Mentor: Dr. Oliver Einsle
2003 – 2007 B.A. and M.A. (Diplom) University of Göttingen (Biology), Germany

Postgraduate Training

2012 – 2017 Postdoctoral Research Fellow, HHMI and Vollum Institute, Oregon Health & Science University, Portland, Oregon, USA
Mentor: Dr. Eric Gouaux

Faculty Appointment

2024 – date Professor, Department of Molecular Biosciences, Weinberg College of Arts and Sciences, Northwestern University, Evanston, Illinois, USA
2024 – date Professor, Department of Pharmacology (secondary appointment), Feinberg School of Medicine, Northwestern University, Evanston, Illinois, USA
2021 – 2024 Associate Professor, Department of Structural Biology, Van Andel Institute, Grand Rapids, Michigan, USA
2017 – 2021 Assistant Professor, Department of Structural Biology, Van Andel Institute, Grand Rapids, Michigan, USA

Active Research Support

NIH NHLBI R01 HL153219 09/01/2020 – 09/30/2029
Structural and Functional Studies of the Human TRPM4 and TRPM5 Channels.
Role: PI

NIH NINDS R01 NS149623 06/01/2026 – 04/30/2031
Molecular Mechanism of Magnesium Transport in Neuronal Homeostasis.
Role: MPI

NIH NIGMS R35 GM138321 (NCE) 07/02/2020 – 06/30/2026
Elucidating Structures and Molecular Mechanisms of Pannexin Channels
Role: PI

Completed Research Support:

NIH NINDS R01 NS112363 05/15/2020 – 02/28/2026
Structural and Functional Studies of CALHM Channels.
Role: PI

NIH NCI U01 CA271376 07/07/2022 – 06/30/2024
Annotating dark ion-channel functions using evolutionary features, machine learning and knowledge graph mining

Role: Multi-PI

NIH NHLBI R56 HL144929

09/15/2019 – 08/31/2020

Structural and Functional Studies of the Human TRPM4 and TRPM5 Channels

Role: PI

Scientific Society Memberships

2019 – date Biophysical Society
2019 – date American Heart Association
2019 – date Review Board for Pacific Northwest National Laboratory for cryo-EM Project Proposals
2024 Chair of the Membrane Transport Subgroup of the Biophysical Society
2023 Co-chair of the Membrane Transport Subgroup of the Biophysical Society
2022 Secretary/Treasure of the Membrane Transport Subgroup of the Biophysical Society

Invited Seminars as a Faculty Member

2026 Vanderbilt Institute of Chemical Biology (VICB) seminar series, Vanderbilt University, Nashville, TN
2026 The 43rd International School of Biophysics in Erice, Sicily, Italy
2026 Department of Biomedical Sciences, Iowa State University, Ames, IA
2026 International Symposium on Regulation of Cell Functions by Transient Receptor Potential Channels, Herrsching, Germany
2026 Zhejiang University School of Basic Medical Sciences 'Qiushi' Distinguished Lecture Series, Hangzhou, China
2026 Ligand Recognition and Molecular Gating GRC, Lucca, Italy
2025 75th Annual Meeting of the American Crystallographic Association, Lombard, IL
2025 Department of Biochemistry and Molecular Biology, Saint Louis University School of Medicine, St Louis, MO
2025 Beijing Frontier Research Center for Biological Structure, Tsinghua University, Beijing, China
2025 Symposium on Membrane Trafficking, Depolarization, and Membrane Rupture, Shanghai, China
2025 Cryo-EM Subgroup Symposium, Biophysical Society Annual Meeting, Los Angeles, CA
2024 Ion Channels Gordon Research Conference, South Hadley, MA
2024 Department of Physiology, Johns Hopkins University School of Medicine, MD
2023 Department of Structural Biology, St. Jude Children's Research Hospital, TN
2023 Ion Channel Symposium 2023 Shanghai, China
2023 The 9th International Ion Channel Conference, Shanghai, China
2023 Department of Molecular Biosciences, Northwestern University, IL
2023 Department of Biochemistry and Molecular Biophysics, Columbia University, NY
2022 Neurocrine Biosciences, San Diego, CA
2022 The Murnau Conference, Germany
2022 Department of Neuroscience, University of Texas Southwestern Medical Center, TX
2022 IUPAB Ion Channel Biophysics Meeting, Canada
2022 Vollum Institute, Oregon Health & Science University, OR
2021 Symposium "Ion channels: Novel members, Structures and Function"
2019 Amgen, Shanghai, China
2019 Institute of Biochemistry, University of Freiburg, Germany
2019 Department of Biochemistry and Molecular Biology, Rosalind Franklin University, IL

Peer-Reviewed Publications and Preprints

co-corresponding author; * co-first author

1. Hu J, Ievleva S, Park SJ, Lee J, Cheng J, O'Dea G, Sheng J, Du J[#] & Lü W[#]. (2026). Temperature and intrinsic Ca²⁺ reshape TRPM4 pharmacology. *Nature Structural & Molecular Biology*.

2. Liu Y*, Hu J*, Xue C#, Huang W#, Ievleva S, **Lü W#**, Du J# & Cao Z#. (2026). Noncanonical calcium-independent TRPM4 signaling governs intestinal fluid homeostasis. *Nature Communications* 17:1253.
3. Ruan Z, Lee J, Li Y, Orozco I, Du J# & **Lü W#**. (2026). A single allosteric site merges activation, modulation and inhibition in TRPM5. *Nature Chemical Biology* 22:402–410.
4. Li Y*, Ruan Z*, Lee J, Orozco I, Du J# & **Lü W#**. (2025). Structural basis of PANX1 permeation and positive modulation by mefloquine. *Nature Communications* 16:11057.
5. Taujale R*, Park SJ*, Gravel N, Soleymani S, Carter R, Boyd K, Keuning S, Ruan Z, **Lü W#** & Kannan N#. (2025). Identification and classification of ion-channels across the tree of life provide functional insights into understudied CALHM channels. *eLife* 14:RP106134.
6. Kumar S*, Jin F*, Park SJ, Choi W, Keuning S, Massimino R, Vu S, **Lü W#** & Du J# (2025) Convergent Agonist and Heat Activation of Nociceptor TRPM3. *Nature Structural & Molecular Biology* 33:34-42.
7. Hu J, Park SJ, Orozco I, O’Dea G, Ye X, Du J# & **Lü W#**. (2024). Physiological temperature drives TRPM4 ligand recognition and gating. *Nature* 630:509-515.
8. Huang Y, Kumar S, Lee J, **Lü W#** & Du J#. (2024). Coupling enzymatic activity and gating in an ancient TRPM channel and its molecular evolution. *Nature Structural & Molecular Biology* 31, 1509-1521.
9. Ruan Z, Lee J, Li Y, Du J# & **Lü W#**. (2024). Human Pannexin 1 Channel is NOT Phosphorylated by Src Tyrosine Kinase at Tyr199 and Tyr309. *eLife* 13:RP95118.
10. Mihaljević L*, Ruan Z*, Osei-Owusu J, **Lü W#** & Qiu Z#. (2023). Inhibition of the proton-activated chloride channel PAC by PIP2. *eLife* 12:e83935.
11. Osei-Owusu J*, Ruan Z*, Matasic DS, **Lü W#** & Qiu Z#. (2022). Molecular mechanism underlying desensitization of the proton-activated chloride channel PAC. *eLife* 11:e82955.
12. Müller C*, Zhang L*, Zipfel S, Topitsch A, Lutz M, Eckert J, Prasser B, Chami M, **Lü W**, Du J#, Einsle O#. (2022). Molecular interplay of an assembly machinery for nitrous oxide reductase. *Nature* 608:626–631.
13. Osei-Owusu J, Kots E, Ruan Z, Mihaljević L, Chen KH, Tamhaney A, Ye X, **Lü W**, Weinstein H, Qiu Z. (2022). Molecular determinants of pH sensing in the proton-activated chloride channel. *Proceedings of the National Academy of Sciences USA* 119(31):e2200727119.
14. Ruan Z*, Haley E*, Orozco IJ*, Sabat M, Myers R, Roth R, Du J# & **Lü W#**. (2021). Structures of the TRPM5 channel elucidate mechanisms of activation and inhibition. *Nature Structural & Molecular Biology* 28:604–613.
15. Yu J*, Zhu HAT*, Lape R, Greiner T, Du J, **Lü W**, Sivilotti L, Gouaux E. (2021). Mechanism of gating and partial agonist action in the glycine receptor. *Cell*, Doi.org/10.1016/j.cell.2021.01.026.
16. Osei-Owusu J, Yang J, Leung KH, Ruan Z, **Lü W**, Krishnan Y, Qiu Z. (2021). Proton-activated chloride channel PAC regulates endosomal acidification and transferrin receptor-mediated endocytosis. *Cell reports*, 34(4).
17. Ruan Z*, Osei-Owusu J*, Du J, Qiu Z# & **Lü W#**. (2020). Structures and pH sensing mechanism of proton-activated chloride channel. *Nature* 588(7837): 350-354. DOI: 10.1038/s41586-020-2875-7.
18. Ruan Z, Orozco IJ, Du J#, **Lü W#**. (2020). Structures of human pannexin 1 reveal ion pathways and mechanism of gating, *Nature* 584(7822): 646-651. DOI: 10.1038/s41586-020-2357-y.
19. **Lü W#** & Du J#. (2020). The N-terminal domain in TRPM2 channel is a conserved nucleotide binding site. *Journal of General Physiology* 152(5): e201912555. DOI: 10.1085/jgp.201912555.
20. Huang Y, Fliegert R, Guse AH, **Lü W#** & Du J#. (2019). A structural overview of the ion channel of the TRPM family. *Cell Calcium* 85: 102111. DOI: 10.1016/j.ceca.2019.10211.

21. Choi W*, Clemente N*, Sun W, Du J# & **Lü W#**. (2019). The structures and gating mechanism of human calcium homeostasis modulator 2. *Nature* 576(7785): 163-167. DOI: 10.1038/s41586-019-1781-3.
22. Huang Y, Roth B, Sun W, **Lü W#** & Du J#. (2019). Ligand recognition and gating mechanism through three ligand-binding sites of human TRPM2 channel. *eLife* 8: e50175. DOI: 10.7554/eLife.50175.
23. Haley E*, Choi W*, Fan C, Sun W, Du J# & **Lü W#**. (2019). Expression and purification of the human lipid-sensitive cation channel TRPC3 for structural determination by single-particle cryo-electron microscopy. *Journal of Visualized Experiments* (143): e58754. DOI: 10.3791/58754.
24. Huang Y, Winkler PA, Sun W, **Lü W#** & Du J#. (2018). Architecture of the TRPM2 channel and its activation mechanism by ADP-ribose and calcium. *Nature* 562(7725): 145-149. DOI: 10.1038/s41586-018-0558-4.
25. Fan C*, Choi W*, Sun W, Du J# & **Lü W#**. (2018). Structure of the human lipid-gated cation channel TRPC3. *eLife* 7: e36852. DOI: 10.7554/eLife.36852.
26. Winkler PA*, Huang Y*, Sun W*, Du J & **Lü W**. (2017). Electron cryo-microscopy structure of a human TRPM4 channel. *Nature* 552(7684): 200-204. DOI:10.1038/nature24674.
27. **Lü W***, Du J*, Goehring A, Gouaux E. (2017). Cryo-EM structures of the triheteromeric NMDA receptor and its allosteric modulation. *Science* 355(6331): eaal3729. DOI: 10.1126/science.aal3729.
28. Mansoor S, **Lü W**, Oosterheert W, Shekhar M, Tajkhorshid E, Gouaux E. (2016). X-ray structures define human P2X3 receptor gating cycle and antagonist action. *Nature* 538(7623): 66-71. DOI: 10.1038/nature19367.
29. Du J*, **Lü W***, Wu S, Cheng Y, Gouaux E. (2015). Glycine receptor mechanism elucidated by electron cryo-microscopy. *Nature* 526(7572): 224-229. DOI: 10.1038/nature14853.
30. Rycovska-Blume A, **Lü W**, Andrade S, Fendler K, Einsle O. (2015). Structural and functional studies of NirC from *Salmonella typhimurium*. *Methods in Enzymology* 556: 475-497. DOI: 10.1016/bs.mie.2014.12.034.
31. Lee CH*, **Lü W***, Michel JC, Goehring A, Du J, Song X, Gouaux E. (2014). NMDA receptor structures reveal subunit arrangement and pore architecture. *Nature* 511(7508): 191-197. DOI: 10.1038/nature13548.
32. **Lü W**, Du J, Schwarzer NJ, Wacker T, Andrade SL, Einsle O. (2013). The formate/nitrite transporter family of anion channels. *Biological Chemistry* 394(6): 715-727. DOI: 10.1515/hsz-2012-0339.
33. **Lü W**, Schwarzer NJ, Du J, Gerbig-Smentek E, Andrade SL, Einsle O. (2012). Structural and functional characterization of the nitrite channel NirC from *Salmonella typhimurium*. *Proceedings of the National Academy of Sciences USA* 109(45): 18395-18400. DOI: 10.1073/pnas.1210793109.
34. **Lü W**, Du J, Schwarzer NJ, Gerbig-Smentek E, Einsle O, Andrade SL. (2012). The formate channel FocA exports the products of mixed-acid fermentation. *Proceedings of the National Academy of Sciences USA* 109(33): 13254-13259. DOI: 10.1073/pnas.1204201109.
35. Guttenberg G, Hornei S, Jank T, Schwan C, **Lü W**, Einsle O, Papatheodorou P, Aktories K. (2012). Molecular characteristics of *Clostridium perfringens* TpeL toxin and consequences of mono-O-GlcNAcylation of Ras in living cells. *Journal of Biological Chemistry* 287(30): 24929-24940. DOI: 10.1074/jbc.M112.347773.
36. Maier S, Schleberger P, **Lü W**, Wacker T, Pflüger T, Litz C, Andrade SL. (2011). Mechanism of disruption of the Amt-GlnK complex by PII-mediated sensing of 2-oxoglutarate. *PLoS One* 6(10): e26327. DOI: 10.1371/journal.pone.0026327.
37. Du J*, Say RF*, **Lü W**, Fuchs G, Einsle O. (2011). Active-site remodelling in the bifunctional fructose-1,6-bisphosphate aldolase/phosphatase. *Nature* 478(7370): 534-537. DOI: 10.1038/nature10458.

38. Guttenberg G, Papatheodorou P, Genisyuerek S, **Lü W**, Jank T, Einsle O, Aktories K. (2011). Inositol hexakisphosphate-dependent processing of *Clostridium sordellii* lethal toxin and *Clostridium novyi* alpha-toxin. *Journal of Biological Chemistry* 286(17): 14779-14786. DOI: 10.1074/jbc.M110.200691.
39. **Lü W**, Du J, Wacker T, Gerbig-Smentek E, Andrade SL, Einsle O. (2011). pH-dependent gating in a FocA formate channel. *Science* 332(6027): 352-354. DOI: 10.1126/Science.1199098. Erratum: *Science* 332(6031): 792.
40. Helfmann S, **Lü W**, Litz C, Andrade SL. (2010). Cooperative binding of MgATP and MgADP in the trimeric PII protein GlnK2 from *Archaeoglobus fulgidus*. *Journal of Molecular Biology* 402(1): 165-177. DOI: 10.1016/j.jmb.2010.07.020.
41. **Lü W**, Du J, Stahl M, Tzivelekidis T, Belyi Y, Gerhardt S, Aktories K, Einsle O. (2010). Structural basis of the action of glucosyltransferase Lgt1 from *Legionella pneumophila*. *Journal of Molecular Biology* 396(2): 321-331. DOI: 10.1016/j.jmb.2009.11.044.