

# PROF. DR. LEONHARD MÖCKL

PROFESSORSHIP FOR NANO-OPTICAL IMAGING

*Friedrich-Alexander-Universität Erlangen-Nürnberg*

*Faculty of Medicine I/CITABLE & Faculty of Sciences/Department of Physics*

*Deutsches Zentrum Immuntherapie*

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## RESEARCH EXPERIENCE

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2024-present **Friedrich-Alexander-Universität Erlangen-Nürnberg**

*Professor, Faculty of Medicine and Faculty of Sciences/Department of Physics*

Biomedical ultra-resolution microscopy, identification of the functional interplay between glycocalyx and cell state, analysis of glycocalyx-mediated control of cell mechanics, artificial discovery of novel microscopy concepts, philosophy of science

2020-present **Max Planck Institute for the Science of Light, Erlangen**

*Associated Group Leader*

Functional super-resolution microscopy and biophysical analysis of the glycocalyx, image and data analysis, development and optimization of novel therapeutic compounds

2016-2020 **Stanford University**

*Postdoctoral Researcher*

Mentor: W.E. Moerner (Nobel Laureate 2014)

Main collaborator: Carolyn R. Bertozzi (Nobel Laureate 2022)

Analysis of the mammalian glycocalyx and cellular systems at the nanoscale; AI-based analysis of single-molecule data, identification of glyco-immune checkpoint receptors.

2015-2016 **LMU Munich, Department of Chemistry**

*Postdoctoral Researcher*

Principal Investigator: Christoph Bräuchle

Development and microscopic analysis of novel therapeutic compounds, investigation of the interaction between the endothelial glycocalyx and quantum dots.

## EDUCATION

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2011-2015 **LMU Munich**

*PhD in Chemistry (summa cum laude)*, December 2015 (started in parallel to Master)

Thesis advisors: Christoph Bräuchle and Thisbe K. Lindhorst

Thesis: "The Sweet Side of the Membrane – Sugars in Biophysics, Bacterial Adhesion, and siRNA Delivery"

2011-2013 **LMU Munich**

*MSc in Chemistry* (final grade: 1.11), July 2013

Thesis advisor: Christoph Bräuchle

Committee members: J. Evers and R. Beckmann

2008-2011 **LMU Munich**

*BSc in Chemistry* (final grade: 1.24), July 2011

Thesis advisor: Christoph Bräuchle

1999-2008 **Kaiser-Heinrich-Gymnasium Bamberg**

*High School*, final grade 1.0

## **FUNDING**

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2025	European Research Council (Doctoral Network) <i>Self-organisation and barrier functions of the mammalian glycocalyx</i>	290.000 €
2024	Forum Humanum <i>Organization of the interdisciplinary symposium “Wissenschaft im Spiegel”</i>	25.000 €
2023	German Research Foundation (DFG) <i>Elucidating the Siglec-sialome axis of immune cell regulation with super-resolution microscopy and single-molecule/-particle tracking</i>	275.000 €
2023	Wilhelm Sander Stiftung <i>Unraveling the interplay between oncogenic events, glycocalyx state, and cellular behavior</i>	190.000 €
2023	Max Planck Society <i>A tailored optical setup for molecular resolution microscopy via barcoded DNA-PAINT</i>	120.000 €
2020	Else-Kröner-Fresenius-Stiftung <i>Optimised bisacylphosphane oxides and tailored photonic crystal fibers for gentle photolabile cancer therapy</i>	400.000 €

## **AWARDS AND SCHOLARSHIPS**

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2024	ACS Au Rising Star in Biological, Medicinal, and Pharmaceutical Chemistry
2024	Invited guest at the 73 <sup>rd</sup> Lindau Nobel Laureate Meeting
2023	Best poster award for “XLumina: An Auto-differentiating Discovery Framework for Super-Resolution Microscopy” at NeurIPS 2023 with C. Rodríguez, S. Arlt, and M. Krenn
2023	Arnold Sommerfeld Prize
2023	Invited guest at the 72 <sup>nd</sup> Lindau Nobel Laureate Meeting
2022	Participant at the Zukunftskolleg Symposium, Konstanz
2022	Visiting Scientist at the 71 <sup>st</sup> Lindau Nobel Laureate Meeting
2021	RSC Horizon Award for Chemical Biology (Co-Awardee)
2019	Presentation at the Symposium on the Science of Light, MPI Erlangen
2017	Best poster prize at the ChEM-H retreat (Stanford University)
2016	Römer Prize for an outstanding PhD thesis
2016	PhD Prize of the LMU Munich (one of the five best PhD theses across all faculties)
2014	Römer Prize for an outstanding master thesis
2012	Publication award of the Center for Nanoscience (CeNS), Munich
2009-2014	Scholarship of the German Academic Scholarship Foundation
2008	Award by the City of Bamberg for an outstanding high school graduation
2006	Six-week research internship in the lab of Peter Wasserscheid, FAU Erlangen
2003-2005	Regional and state-wide prizes at the German science competition “Jugend Forscht”

## **SKILLS**

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### **Languages**

German (native speaker), English (fluent), Latin (Latinum), ancient Greek (Graecum), French (basic), Italian (basic)

### **Techniques**

- Advanced optics for conventional and super-resolution microscopy via dSTORM and DNA-PAINT
- Deep Learning (GPU-based machine learning, TensorFlow/Python)

- Molecular biology techniques (bacterial and mammalian cell culture (BSL 1 and 2), transfection, gel electrophoresis, blotting, bacterial culture, protein purification)
- PSF engineering with phase masks for 3D super-resolution imaging
- Chemical biology techniques (metabolic labeling, cell surface modifications)
- Image analysis (MatLab, ImageJ, Python, VutaraSRX)
- Programming (MatLab and Python, basic knowledge of C and Java)
- Inorganic chemistry techniques (high-pressure chemistry)

#### **Other Interests**

Philosophy (see publications), music (piano, harpsichord, organ, saxophone), literature, Chess, Go/Weiqi/Baduk, volleyball, rowing

### **UNIVERSITY SERVICES**

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#### **Teaching experience, supervision, and outreach**

2023-present	Member of the consortium working to expand and refine the Lindau Guidelines within The Lindau Nobel Laureate Meetings
2023-present	Co-chair of the working group “Logical fundamentals of empirical knowledge” (APIG)
2021-present	Advisor of 5 PhD, 12 Master, and 4 Bachelor students
2021-present	Associate Member of the German Society for Cell Biology
2020-present	Associate Member of the International Max Planck Research Schools “Physics of Light” and “Physics of Medicine” (IMPRS-PL/-PM)
2024-2025	Master seminar on the logical foundations of empirical knowledge and on optical methods for the clinic FAU Erlangen (6 SWS)
2024-2025	Master seminar on advanced physical techniques for clinical applications, FAU Erlangen (2 SWS)
2022-2023	Master seminar on microscopy and optics in biology, FAU Erlangen (2 SWS)
2021-2022	Master seminar on the applications of light in biology and biophysics, FAU Erlangen (2 SWS, two lecturers)
2020-2022	Member of the Corona Safety Committee, MPI for the Science of Light
2017-2020	Mentoring of two PhD students at Stanford University
2016-2020	Organization of three interdisciplinary collaborations at Stanford University (study and experimental design, work coordination)
2016	Giving lectures as a representative for two professors at LMU Munich (quantum mechanics, thermodynamics)
2015-2015	Teaching assistant (10 h/week): Introductory and advanced physical chemistry (Bachelor’s and Master’s level)
2012-2016	Organization of several interdisciplinary collaborations at LMU Munich (study and experimental design, work coordination)
2011-2015	University tours for high school students on open days
2009	Member of a student board to improve the organization of practical courses

#### **Referee Duties**

ACS Nano (13.7), Angewandte Chemie (12.1), Applied Physics Letters (3.52), Biomedical Optics Express (3.9), Cell (31.4), Chemistry – a European Journal (5.16), Chemie in Unserer Zeit (0.31), Communications Biology (4.05), Current Opinion in Colloid & Interface Science (5.79), Entropy (2.42), International Journal of Molecular Sciences (5.92), Nature Methods (28.5), Nature Biotechnology (54.9), Nature Photonics (37.9), Optica (9.78), Optics Express (3.56), Optics Letters (3.78), Science Advances (12.8)

## Conference Organization and Editorial Duties

2024-2025	Guest editor at <i>European Journal of Cell Biology</i> , curated issue: “Glycobiology”
2024	Co-organizer of the symposium “Nature – Natural law – Knowledge: Transcendental prerequisites of empirical methodology”, Erlangen, December 2024
2024	Co-organizer of the symposium “Wissenschaft im Spiegel“, Tübingen, October 2024
2024	Co-organizer of the symposium “Theory of objects and object cognition from perspective of transcendental philosophy”, Wuppertal, February 2024
2021-2022	Topic Editor at <i>Frontiers</i> with Kayvon Pedram, curated issue: “Emerging Topics at the Intersection of Glycoscience and Human Health”

## AFFILIATIONS

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- American Association for the Advancement of Science (AAAS)
- American Chemical Society (ACS)
- Archivbibliothek für Post-Neukantianismus und kritischen Idealismus der Gegenwart (APIG)
- Biophysical Society (BPS)
- Franconian Society for Philosophy (FGPh)
- German Chemical Society (GDCh)
- German Society for Cell Biology (DGZ)
- International Max Planck Research Schools “Physics of Light” and “Physics of Medicine”

## PUBLICATIONS

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### Submitted Articles

3. D. M. Joseph,\* L. N. Sison,\* N. Yurekli,\* S. Culpepper, and **L. Möckl**, “Spatial mapping of cell-surface protein glycosylation at molecular resolution”  
Preprint: <https://www.biorxiv.org/content/10.1101/2025.09.30.679542v1>
2. J. Porat, V. Poli, K. Almahayni, B. M. George, F N. de Luna Vitorino, L. Yi, C. Bras Costa, Y. Zhou, A. Crompton, H. Wen, L. Zheng, P. K. Gregersen, S. Agarwal, B. A. Garcia, Y. Xie, **L. Möckl**, I. Zanoni, K. R. Simpfendorfer, and **R. A. Flynn**, “DNASE1L3 surveils mitochondrial DNA on the surface of distinct mammalian cells”  
Preprint: <https://www.biorxiv.org/content/10.1101/2025.10.05.680464v1>
1. D. M. Joseph,\* N. Yurekli,\* S. Fritsche, R. Hashem, O.-M. Thoma, I. Larafa, T. Boric, C. Bielawski, K. Almahayni, K. Franze, M. Waldner, and **L. Möckl**, “Glycan Atlasing: Nanoscale analysis of glycocalyx architecture enables functional tracing of cell state”, *in revision at Nat. Nanotechnol.*  
Preprint: <https://www.biorxiv.org/content/10.1101/2025.04.29.651200v1>

### Peer-Reviewed Journal Articles (h-index: 21)

45. C. Brunner,\* L. Pietsch,\* I. vom Sondern,\* M. Röhrli, C. Popov, M. Trollmann, R. Taylor, M. Blessing, C. Holler, K. Almahayni, S. Jaeschke, V. Sandoghdar, **R. Böckmann**, **T. K. Lindhorst**, and **L. Möckl**, “Bottom-up investigation of spatiotemporal glycocalyx dynamics with interferometric scattering microscopy”, accepted for publication at *J. Am. Chem. Soc.*, <https://pubs.acs.org/doi/10.1021/jacs.5c08659>  
Preprint: <https://www.biorxiv.org/content/10.1101/2025.05.09.653034v1>
44. K. Almahayni\*, L. Masullo\*, I. Pachmayr, M. Honsa, L. Heinze, S. Fritsche, H. Grabmayr, **R. Jungmann**, and **L. Möckl**, “Ångström-resolution imaging of cell-surface glycans”, *Nat. Nanotechnol.* 2025, <https://doi.org/10.1038/s41565-025-01966-5> [OA]
  - >> Featured in *Nature*: <https://doi.org/10.1038/d41586-025-02376-2>
  - >> Research Briefing in *Nat. Nanotechnol.* : <https://doi.org/10.1038/s41565-025-01989-y>
  - >> Featured in *The Analytical Scientist*: <https://tinyurl.com/5n7mrt2b>

43. B. George,\* M. Eleftheriou,\* E. Yankova, J. Perr, P. Chai, G. Nestola, K. Almahayni, Sian Evans, A. Damaskou, H. Hemberger, C. Lebedenko, J. Rak, Q. Yu, E. Bapcum, J. Russell, J. Bagri, R. Volk, M. Spiekermann, R. Stone, G. Giotopoulos, B. Huntly, J. Baxter, F. Camargo, J. Liu, B. Zaro, G. Vassiliou, **L. Möckl**, J. de la Rosa, **R. Flynn**, and **K. Tzelepis**, “Targeting cell surface NPM1 as a therapeutic strategy against acute myeloid leukemia”, *Nat. Biotechnol.* 2025, <https://doi.org/10.1038/s41587-025-02648-2>
42. S. Fritsche and **L. Möckl**, “A framework for the simulation of individual glycan coordinates to analyze spatial relationships within the glycocalyx”, *Front. Cell Dev. Biol.* **12**, 1519831 (2025), <https://doi.org/10.3389/fcell.2024.1519831> [OA]
41. J. Perr, A. Langen, K. Almahayni, G. Nestola, P. Chai, C. Lebedenko, R. Volk, D. Detrés, R. Caldwell, M. Spiekermann, H. Hemberger, N. Bisaria, T. Aiba, Francisco Sánchez-Rivera, K. Tzelepis, E. Calo, **L. Möckl**, B. Zaro, and **R. Flynn**, “RNA binding proteins and glycoRNAs form domains on the cell surface for cell penetrating peptide entry”, *Cell* **188**, 1878 (2025), <https://doi.org/10.1016/j.cell.2025.01.040> [OA]
40. K. Almahayni, J. Bachir, D. M. Josph, N. Yürekli, S. Möllmert, and **L. Möckl**, “From biophysics to biomedical physics”, *ACS Bio & Med Chem Au* **5**, 320 (2025), <https://doi.org/10.1021/acsbiochemau.4c00096> [OA]  
>> *Front Cover*
39. **C. Rodríguez**, S. Arlt, **L. Möckl**, and **M. Krenn**, „XLuminA: An Auto-differentiating Discovery Framework for Super-Resolution Microscopy”, *Nat. Commun.* **15**, 10658 (2024), <https://doi.org/10.1038/s41467-024-54696-y> [OA]
38. K. Almahayni,\* J. Bachir,\* R. Conti, A. Widera, M. Spiekermann, D. Wehner, H. Grützmacher, and **L. Möckl**, “Tailored Bisacylphosphane Oxides for Precise Induction of Oxidative Stress-Mediated Cell Death in Biological Systems”, *ACS ChemBio* **20**, 77 (2024), <https://doi.org/10.1021/acscchembio.4c00399> [OA]  
>> *Front Cover*
37. C. Holler,\* R. Taylor,\* A. Schambony, **L. Möckl**, and **V. Sandoghdar**, “A paintbrush for delivery of nanoparticles and small molecules to live cells with micrometer spatial and millisecond temporal control”, *Nat. Methods* **21**, 512 (2024), <https://www.nature.com/articles/s41592-024-02177-x>
36. K. Almahayni,\* G. Nestola,\* M. Spiekermann,\* and **L. Möckl**, “A simple, economic, and robust rail-based setup for super-resolution localization microscopy” [invited], *J. Phys. Chem. B* **127**, 4553 (2023), <https://doi.org/10.1021/acs.jpca.3c01351> [OA]
35. K. Almahayni and **L. Möckl**, “Setting the stage for universal pharmacological targeting of the glycocalyx” [invited], *Curr. Top. Membr.* **91**, 61 (2023), <https://doi.org/10.1016/bs.ctm.2023.02.004>
34. K. Almahayni, M. Spiekermann, A. Fiore, G. Yu, **K. Pedram**, and **L. Möckl**, “Small-molecule inhibitors of mammalian cell surface glycosylation” [invited], *Matrix Biol. Plus* **16**, 100108 (2022), <https://doi.org/10.1016/j.mbplus.2022.100108> [OA]
33. J. Wang\*, M. Han\*, A. Roy, H. Wang, **L. Möckl**, L. Zeng, W.E. Moerner, and L. S. Qi, “Multi-color super-resolution imaging to study human coronavirus RNA during cellular infection”, *Cell Rep. Methods* **2**, 100170 (2022), <https://doi.org/10.1016/j.crmeth.2022.100170> [OA]
32. A. M. Yoshikawa, A. Rangel, T. Feagin, E. Chun, L. Wan, A. Li, **L. Möckl**, D. Wu, M. Eisenstein, S. Pitteri, and **H. Tom Soh**, “Discovery of indole-modified aptamers for highly specific recognition of protein glycoforms”, *Nat. Commun.* **12**, 7016 (2021), <https://doi.org/10.1038/s41467-021-26933-1> [OA]

31. S. Wisnovsky, **L. Möckl**, S. Malaker, K. Pedram, G. Hess, N. Riley, M. Gray, M. Bassik, W.E. Moerner, and C. Bertozzi, “Genome-Wide CRISPR Screens Reveal a Specific Mucin Glycoprotein Binding Domain for the Siglec-7 Immune Checkpoint Receptor”, *Proc. Natl. Acad. Sci. USA* **118**, e2015024118 (2021), <https://doi.org/10.1073/pnas.2015024118>
30. J. Evers, C. Herzog, and **L. Möckl**, “From Small Beginnings to a Steep Ascent: The Fraunhofer-Society from 1949 to 1974”, *Chem. unserer Zeit* **55**, 101 (2021), <https://doi.org/10.1002/ciuz.201900034>
29. **L. Möckl** and W. E. Moerner, “Super-resolution microscopy with single molecules in biology and beyond – essentials, current trends, and future challenges” [invited], *J. Am. Chem. Soc.* **142**, 17828 (2020), <https://doi.org/10.1021/jacs.0c08178> [OA]
28. M. Debets,\* O. Tastan,\* S. Wisnovsky, S. Malaker, N. Angelis, **L. Möckl**, J. Choi, H. Flynn, L. Wagner, G. Bineva-Todd, A. Antonopoulos, A. Cioce, W. Browne, Z. Li, D. Briggs, H. Douglas, G. Hess, A. Agbay, C. Roustan, S. Kjaer, S. Haslam, A. Snijders, M. Bassik, W.E. Moerner, V. Li, C. Bertozzi, and B. Schumann, “Chemical design yields an O-GalNAc-specific metabolic label”, *Proc. Natl. Acad. Sci. USA* **117**, 25293 (2020), <https://doi.org/10.1073/pnas.2007297117> [OA]  
Preprint: <https://www.biorxiv.org/content/10.1101/2020.04.23.057208v1> [OA]
27. N. Raddaoui\*, S. Groce\*, F. Geiger, A. Borodavka, **L. Möckl**, S. Stazzoni, B. Viverge, C. Bräuchle, T. Frischmuth, H. Engelke, and T. Carell “Super-sensitive multi-fluorophore RNA-FISH for early virus detection and flow-FISH using click chemistry”, *ChemBioChem* **21**, 2214 (2020), <https://doi.org/10.1002/cbic.202000081>
26. **L. Möckl**, “The Emerging Role of the Mammalian Glycocalyx in Functional Membrane Organization and Immune System Regulation” [invited], *Front. Cell Dev. Biol.* **8**, 253 (2020), <https://doi.org/10.3389/fcell.2020.00253> [OA]
25. **L. Möckl**, A. R. Roy, and W.E. Moerner, “Deep learning in single-molecule microscopy: fundamentals, caveats, and recent developments” [invited], *Biomed. Opt. Express* **11**, 1633 (2020), <https://doi.org/10.1364/BOE.386361> [OA]
24. **L. Möckl\***, A. R. Roy\*, P. Petrov, and W.E. Moerner, “Accurate and rapid background estimation in single-molecule localization microscopy using the deep neural network BGnet”, *Proc. Natl. Acad. Sci. USA* **117**, 60 (2020), <https://doi.org/10.1073/pnas.1916219117> [OA]
23. **L. Möckl**, P. Petrov, and W.E. Moerner, “Accurate phase retrieval of complex point-spread-functions with deep residual neural nets”, *Appl. Phys. Lett.* **115**, 251106 (2019), <https://doi.org/10.1063/1.5125252>  
Preprint: <https://arxiv.org/abs/1906.01748> [OA]  
>> *Editor’s Pick; highlighted in LaserFocusWorld*
22. **L. Möckl\***, K. Pedram\*, A. R. Roy, V. Krishnan, A.-K. Gustavsson, O. Dorigo, C. Bertozzi, and W.E. Moerner, “Quantitative Super-Resolution Microscopy of the Mammalian Glycocalyx”, *Dev. Cell* **50**, 57 (2019), <https://doi.org/10.1016/j.devcel.2019.04.035>  
>> *Front Cover*  
Online presentation: <https://jrnclub.org/research-films/sr-microscopy-mammalian-glycocalyx>  
Preprint: <https://doi.org/10.26434/chemrxiv.7381724.v1> [OA]
21. C. Shurer\*, J. Kuo\*, L. Roberts\*, J. Gandhi, M. Colville, T. Enoki, H. Pan, J. Su, J. Noble, J. O’Donnell, R. Yin, K. Pedram, **L. Möckl**, M. Hollander, L. Kourkoutis, W.E. Moerner, C. Bertozzi, G. Feigensohn, H. Reesink, and M. Paszek, “Physical Principles of Membrane Shape Regulation by the Glycocalyx”, *Cell* **177**, 1757 (2019), <https://doi.org/10.1016/j.cell.2019.04.017>

20. G. Despras, **L. Möckl**, A. Heitmann, I. Stamer, C. Bräuchle, and **T. K. Lindhorst**, “A photoswitchable cluster trimannoside as a tool for probing orientation effect in bacterial adhesion”, *ChemBioChem* **20**, 2373 (2019), <https://doi.org/10.1002/cbic.201900269>
19. A. Beil\*, F. Steudel\*, C. Bräuchle, H. Grützmacher, and **L. Möckl**, “Bisacylphosphane oxides as photolabile cytotoxic agents and potential photo-latent anticancer drugs”, *Sci. Rep.* **9**, 6003 (2019), <https://doi.org/10.1038/s41598-019-42026-y> [OA]
18. E. Broda, Adriano A. Torrano, L. Löbber, **L. Möckl**, Christoph Bräuchle, and **Hanna Engelke**, “Invasiveness of Cells Leads to Changes in Their Interaction Behavior with the Glycocalyx”, *Adv. Biosyst.* **2018**, 1800083 (2018), <https://doi.org/10.1002/adbi.201800083>
17. N. Raddaoui\*, S. Stazzoni\*, **L. Möckl**, B. Vivege, F. Geiger, H. Engelke, C. Bräuchle, and **T. Carell**, “Dendrimer-Based Signal Amplification of Click-Labelled DNA in Situ”, *ChemBioChem* **18** (17), 1716 (2017), <https://doi.org/10.1002/cbic.201700209>
16. K. Kolbe, **L. Möckl**, V. Sohst, J. Brandenburg, R. Engel, S. Malm, C. Bräuchle, O. Holst, **T. K. Lindhorst**, and **N. Reiling**, “Azido Pentoses: A New Tool To Efficiently Label *Mycobacterium tuberculosis* Clinical Isolates”, *ChemBioChem* **18** (13), 1172 (2017), <https://doi.org/10.1002/cbic.201600706> [OA]  
>> Back Cover
15. M. Vater\*, **L. Möckl**\*, V. Gormanns\*, C. Schultz Fademrecht, A. M. Mallmann, K. Ziegart-Sadowska, M. Zaba, M. L. Frevert, C. Bräuchle, F. Holsboer, T. Rein, U. Schmidt, and **T. Kirmeier**, “New insights into the intracellular distribution pattern of cationic amphiphilic drugs”, *Sci. Rep.* **7**, 44277 (2017), <https://doi.org/10.1038/srep44277> [OA]
14. B. Uhl, S. Hirn, R. Immler, K. Mildner, **L. Möckl**, M. Sperandio, C. Bräuchle, C. A. Reichel, D. Zeuschner, and **F. Krombach**, “The endothelial glycocalyx controls interactions of quantum dots with the endothelium and their translocation across the blood–tissue border”, *ACS Nano* **11** (2), 1498 (2017), <https://doi.org/10.1021/acsnano.6b06812>
13. **L. Möckl**\*, S. Hirn\*, A. A. Torrano, B. Uhl, C. Bräuchle, and **F. Krombach**, “The glycocalyx regulates the uptake of nanoparticles by human endothelial cells in vitro”, *Nanomedicine* **12** (3), 207 (2017), <https://doi.org/10.2217/nmm-2016-0332>
12. **J. Evers**, **L. Möckl**, G. Oehlinger, R Köppe, **H. Schnöckel**, O. Barkalov, **S. Medvedev**, and P. Naumov, “More Than 50 Years after Its Discovery in SiO<sub>2</sub> Octahedral Coordination Has Also Been Established in SiS<sub>2</sub> at High Pressure”, *Inorg. Chem.* **56** (1), 372 (2016), <https://doi.org/10.1021/acs.inorgchem.6b02294>
11. **J. Evers**, C. Herzog, **L. Möckl**, C. von Plotho, P. Stallhofer, and R. Staudigl, “From the Sprecknie to Silicon Valley – 100 years of Single Crystal Growth from the Melt”, *Chem. unserer Zeit* **50** (6), 410 (2016), <https://doi.org/10.1002/ciuz.201600759>
10. **L. Möckl**\*, C. Fessele\*, G. Despras, **C. Bräuchle**, and **T. K. Lindhorst**, “En route from artificial to natural: Evaluation of inhibitors of mannose-specific adhesion of *E. coli* under flow”, *Biochim. Biophys. Acta* **1860** (9), 2031 (2016), <https://doi.org/10.1016/j.bbagen.2016.06.021>
9. **L. Möckl**, **T. K. Lindhorst**, and **C. Bräuchle**, “Artificial Formation and Tuning of Glycoprotein Networks on Live Cell Membranes: A Single-Molecule Tracking Study”, *ChemPhysChem* **17** (6), 829 (2016), <https://doi.org/10.1002/cphc.201500809>  
>> Inside Cover
8. **L. Möckl**\*, A. Müller\*, **C. Bräuchle**, and **T. K. Lindhorst**, “Switching first contact: photocontrol of *E. coli* adhesion to human cells”, *Chem. Comm.* **52** (6), 1254 (2016), <https://doi.org/10.1039/c5cc08884d> [OA]

7. **L. Möckl**, A. K. Horst, K. Kolbe, T. K. Lindhorst, and **C. Bräuchle**, “Microdomain Formation Controls Spatiotemporal Dynamics of Cell-Surface Glycoproteins” *ChemBioChem* **16** (14), 2023 (2015), <https://doi.org/10.1002/cbic.201500361>  
>> *Inside Cover*
6. **J. Evers** and **L. Möckl**, “Wichard von Moellendorff”, *Chem. unserer Zeit* **49** (4), 236 (2015), <https://doi.org/10.1002/ciuz.201500655>
5. K. Brunner\*, J. Harder\*, T. Halbach, J. Willibald, F. Spada, F. Gnerlich, K. Sparrer, A. Beil, **L. Möckl**, C. Bräuchle, K.-K. Conzelmann, and **T. Carell**, “Cell-Penetrating and Neurotargeting Dendritic siRNA Nanostructures“, *Angew. Chem. Int. Ed.* **54** (6), 1946 (2015), <https://doi.org/10.1002/anie.201409803>
4. **J. Evers**, P. Mayer, **L. Möckl**, G. Oehlinger, R. Köppe, and **H. Schnöckel**, “Two high-pressure phases of SiS<sub>2</sub> as missing links between the extremes of only edge-sharing and only corner-sharing tetrahedra”, *Inorg. Chem.* **54** (4), 1240 (2015), <https://doi.org/10.1021/ic501825r>
3. **L. Möckl**, D. C. Lamb, and **C. Bräuchle**, “Super-resolved Fluorescence Microscopy: Nobel Prize in Chemistry 2014 for Eric Betzig, Stefan Hell, and William E. Moerner”, *Angew. Chem. Int. Ed.* **53**, 13972 (2014), <https://doi.org/10.1002/anie.201410265>
2. J. Evers, **L. Möckl**, and **H. Nöth**, “Der Wittelsbacher und der Hope-Diamant”, *Chem. unserer Zeit* **46** (6), 356 (2012), <https://doi.org/10.1002/ciuz.201200585>
1. F.M. Mickler, **L. Möckl**, N. Ruthardt, M. Ogris, E. Wagner, and **C. Bräuchle**, “Tuning nanoparticle uptake: live-cell imaging reveals two distinct endocytosis mechanisms mediated by natural and artificial EGFR targeting ligand”, *Nano Lett.* **12** (7), 3417 (2012), <https://doi.org/10.1021/nl300395q>

#### Invited, not Peer-Reviewed Articles

5. **L. Möckl**, “On the Responsibility of the Scientist”, *ChemistryViews* 2023, <https://doi.org/10.1002/chemv.202300043>
4. K. Almahayni, M. Spiekermann, and **L. Möckl**, “Fluorophores’ talk turns them dark“, *Nat. Methods* **19**, 932 (2022), <https://doi.org/10.1038/s41592-022-01565-5>
3. **M. Melin**, H. Hettrick, M. Gloviczki, S. Rockson, **L. Möckl**, E. Ebong, and F. Alves, “Weightlessness and lymphatic and venous function – a review of the data”, *Vein Magazine* **14** (2), 22 (2021), <https://pubs.royle.com/publication/?m=23305&i=721658&p=26&ver=html5>
2. **L. Möckl**, **J. Evers**, and C. Herzog, “Von Kautschuk zu Metallen: ein Werkslabor mit Weltgeltung“, *Nachr. Chem.* **66** (9), 892 (2018), <https://doi.org/10.1002/nadc.20184076062>
1. **L. Möckl**, “Die neue Macht des Forschers“, *Nachr. Chem.* **66** (2), 103 (2018), <https://doi.org/10.1002/nadc.20184071931>

#### Book Chapters

2. **L. Möckl**, “Asceticism in the Sciences”, in: *Der Wahrheitsanspruch der Theologie in Geschichte und Gegenwart. Festschrift für Wolfgang Klausnitzer*, Heiligenkreuz: Be&Be Verlag, 2021.
1. **L. Möckl**, “The logical position of the hypothesis”, in: *Vernunft und Leben aus transzendentaler Perspektive. Festschrift für Albert Mues zum 80. Geburtstag*, Würzburg: Königshausen & Neumann, 2018.

#### Edited Books

1. M. Gerten, **L. Möckl**, and M. Scherbaum (Eds.): *Vernunft und Leben aus transzendentaler Perspektive. Festschrift für Albert Mues zum 80. Geburtstag*, Würzburg: Königshausen & Neumann, 2018.

## Newspaper Articles

1. L. Möckl, “Forschen verpflichtet”, in: *Die Welt*, 22.10.2020, S.2.  
<http://epaper.welt.de/archiv/list/?etag=2020-10-22>

## Translations

2. D. Herschbach, “Michael Polanyi: Vater der chemischen Dynamik und des impliziten Wissens”, *Angew. Chem.* **129**, 3485 (2017) (English into German), <https://doi.org/10.1002/ange.201610968>.
1. W.E. Moerner, “Spektroskopie, Visualisierung und Photomanipulation einzelner Moleküle: die Grundlage für superhochauflösende Mikroskopie (Nobel-Aufsatz)”, *Angew. Chem.* **127**, 8182 (2015) (English into German), <https://doi.org/10.1002/ange.201501949>.

## Internet Links

<https://mpl.mpg.de/research-at-mpl/independent-research-groups/moeckl/>  
<https://scholar.google.com/citations?user=FwtXPv8AAAAJ&hl>  
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[https://www.researchgate.net/profile/Leonhard\\_Moeckl](https://www.researchgate.net/profile/Leonhard_Moeckl)

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## PRESENTATIONS

### Invited Talks

25. “Analysis of native cell-surface glycosylation patterns with molecular resolution”, **Hot Topics in Immunomedicine Lecture Series**, Erlangen, November 11, 2025
24. “Spatial cell-surface glycosylation: a new axis of cellular regulation and information display”, **CSP Retreat 2025**, Waischenfeld, October 10, 2025
23. “Mapping the interplay between cell state and nanoscale glycocalyx architecture with multiplexed super-resolution microscopy”, **IZKF Workshop 2025**, Erlangen, October 7, 2025
22. “Multiplexed molecular-resolution microscopy of cell-surface glycan architecture”, **Symposium on Near-field Cell Biology 2025**, Erlangen, September 12, 2025
22. “Multiplexed molecular-resolution microscopy of glycans in their native environment: A new window into glycocalyx biology”, **2025 Carbohydrates Gordon Research Conference**, Holderness, June 19, 2025
21. “Unraveling the functional role of the glycocalyx with multiplexed, molecular-resolution microscopy”, **Seminar Series in Virology**, Institute for Virology, University Clinic Erlangen, January 24, 2025
20. “Kantian Echoes in Science”, **Kant-Siderazioni - Trecento anni di Immanuel Kant: fonti, interpretazioni, risonanze contemporanee**, Università degli studi di Roma Tre, December 13, 2024
19. “Unraveling the functional role of the glycocalyx with advanced optical and biomedical techniques”, **Seminars in biophysical chemistry**, University of California, Berkeley, November 12, 2024
18. “Unraveling the functional role of the glycocalyx with highly multiplexed, molecular-resolution microscopy”, **Joint seminars in biomedicine and physical chemistry**, Stanford University, November 8, 2024
17. “The interplay between glycocalyx state and cell mechanics”, **2<sup>nd</sup> Sino-German symposium on glycoimmunology**, FAU Erlangen Nuremberg, September 12, 2024

16. “Light and beyond: Understanding the functional role of the glycocalyx in biology and novel photolabile molecules for precise cell ablation”, **Janelia Seminar Series**, Janelia Farm, May 7, 2024
15. “Objekt-Begriffe in der Naturwissenschaft”, **Gegenständlichkeit und Objekterkenntnis aus transzendentalphilosophischer Perspektive**, Bergische Universität Wuppertal, February 8, 2024
14. “Quantitative super-resolution microscopy of the glycocalyx reveals mechanisms of glycan-mediated cancer cell immune evasion”, **1<sup>st</sup> Sino-German symposium on glycoimmunology**, Tongji University, Shanghai, October 17, 2023
13. “How cancer cells hijack sugars to dodge the attack of the immune system”, **Light Meets Medicine Symposium**, Waischenfeld, December 12, 2022
12. “Using light to investigate and manipulate biological systems – studies on the glycocalyx and photolabile cancer therapeutics”, **Physikalisch-Chemisches Kolloquium**, LMU Munich, July 13, 2022
11. “Towards Cracking the Mystery of the Glycocalyx with Super-resolution Microscopy”, **GDCh Colloquium**, CAU Kiel, October 28, 2021
10. “How sugars can regulate the immune system”, **Max Planck – uOttawa Annual Meeting**, Erlangen/Ottawa, October 19, 2021
9. “Cracking the sugar code with super-resolution microscopy”, **IMPRS Symposium**, MPL Erlangen, October 6, 2021
8. “Optical investigation of glyco-immune checkpoints”, **Immune Domains Workshop**, Erlangen, June 1, 2021
7. „Gezuckerte Zellen – die süße Seite der Biologie“, **Art Meets Science**, Erlangen, January 25, 2021
6. “Single-Molecule Imaging: A Window into Biological Nanoscale from 3D Super-Resolution Microscopy and Neural Nets” [shared plenary talk with W.E. Moerner], **AI for Biomedical Imaging Across Scales**, IBM Almaden Research Center, San Jose, February 4, 2020
5. “BGnet: Background determination for arbitrary point-spread-function images with deep neural nets”, **MPI Erlangen**, September 24, 2019
4. “Current Challenges in Glycocalyx Research”, **Department of Electrical Engineering**, Stanford University, October 29, 2018
3. “Quantitative super-resolution microscopy reveals the architecture of the mammalian glycocalyx and its changes during cancer progression”, **ACS Fall Meeting 2018**, Boston, August 21, 2018
2. “The New Responsibility of the Scientist”, **Experiment Future / WiFo der GDCh**, Berlin, September 14, 2017
1. “Epistemological Roots of the Empirical Method”, **Interdisciplinary Conference of the German Academic Scholarship Foundation**, Berlin, April 15, 2016

## Oral

8. “Unraveling the functional role of the glycocalyx with highly multiplexed, molecular-resolution microscopy”, **GlycoBioTec2025**, Berlin, February 12, 2025
7. “On the logical position of the hypothesis “, **SLSAeu23 - Models, Metaphors, and Simulations: Epistemic Transformations in Literature, Science, and the Arts**, Erlangen, May 18, 2023

6. “Tracing structure-function relationships in glycocalyx biology”, **Chemiedozententagung 2023**, Dresden, March 13, 2023
5. “Biophysics, super-resolution microscopy, and bioengineering reveal structure-function relationships in glycocalyx biology”, **GlycoBioTec2023**, Berlin, January 19, 2023
4. “Joining single-molecule techniques and deep learning to study complex biological systems”, **Symposium on the Science of Light 2019**, MPI Erlangen, March 27, 2019
3. “Quantitative super-resolution microscopy reveals the architecture of the mammalian glycocalyx and its changes during cancer progression”, **SMLM Symposium 2018**, Berlin, August 29, 2018
2. “Switching First Contact: Photocontrolled Adhesion of *E. coli* bacteria to live human cells”, **GDCh conference on photochemistry**, Jena, September 28, 2016
1. “The Effect of Microdomain Formation on the Spatiotemporal Dynamics of Membrane Glycans”, **EuroCarb XVIII**, Moscow, August 6, 2015

### Posters

12. “Revealing the functional interplay between glycocalyx state and cell mechanics by integrating super-resolution microscopy, mechanical fingerprinting, and chemical biology”, **SMLM Symposium 2024**, Lisbon, August 2024 – with K. Almahany, H. Hammoud, C. Wardzala, K. Wang, J. Salvador, S. Möllmert, M. Paszek, J. Cramer, and J. Guck
11. “Large-Scale Discovery of Experimental Designs in Super-Resolution Microscopy with XLuminA”, **ICML2024**, Vienna, July 2024 – with C. Rodríguez, S. Arlt, and M. Krenn  
Selected for an oral presentation
10. “XLuminA: An Auto-differentiating Discovery Framework for Super-Resolution Microscopy”, **NeurIPS 2023**, New Orleans, December 2023 – with C. Rodríguez, S. Arlt, and M. Krenn  
Selected for an oral presentation
9. “Unraveling the nanoscale architecture of RNA binding proteins on the cell membrane and identifying csNPM 1 as a therapeutic target for AML”, **SMLM Symposium 2023**, Vienna, August 2023 – with J. Perr, B. Zaro, R. Flynn, *et al.*
8. “Quantitative super-resolution imaging reveals mammalian glycocalyx dynamics”, **BPS 2018**, San Francisco, February 2018 – with K. Pedram, A. R. Roy, C. Bertozzi, and W.E. Moerner
7. “2D and 3D super-resolution imaging of the mammalian glycocalyx”, **ChEM-H chemistry/biology interface retreat**, Palo Alto, June 2017 – with K. Pedram, A. R. Roy, C. Bertozzi, and W.E. Moerner
6. “Artificial Formation and Tuning of membrane glycoprotein networks”, **Engineering Life**, Dresden, September 2015 – with T. K. Lindhorst and C. Bräuchle
5. “How sugars control membrane protein dynamics”, **iPoLS 2014**, Munich, July 2014 – with C. Bräuchle
4. “Formation of artificial glycoprotein networks on living cells”, **Labex Workshop on Membranes 2014**, Paris, March 2014 – with A. K. Horst, K. Kolbe, T. K. Lindhorst, and C. Bräuchle
3. “Membrane protein glycosylation and the galectin lattice”, **CIPSM conference 2014**, Wildbad Kreuth, January 2014 – with C. Bräuchle
2. “Regulative potential of membrane protein glycosylation”, **CeNS Workshop 2013**, Venice, September 2013 – with C. Bräuchle

1. “The surface on the surface – studies on the glycocalyx”, **CeNS Workshop 2012**, Venice, September 2012 – with C. Bräuchle