

Dr. Thomas S. Bischof

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[Homepage](#), [Github](#), [LinkedIn](#), [Google Scholar](#)

EDUCATION

Massachusetts Institute of Technology Cambridge, MA, USA

Ph.D. Chemistry 2015

[Dissertation](#): On the origin of photons: understanding excitons and multiexcitons in colloidal semiconductor nanocrystals

University of California, Berkeley Berkeley, CA, USA

B.S. Chemistry 2010

EXPERIENCE

Pulsed Light Technologies Munich, Germany

Project Manager February 2024–October 2024

- Leader for a project with Marvel Fusion to develop a petawatt-class laser system for inertial fusion energy research.
- Responsible for budget of tens of millions of Euro, three direct engineering reports, and dozens of vendors and direct stakeholders.
- Designed and implemented project infrastructure for hardware and software development, including PLM.

NCT Dresden Dresden, Germany

Group Leader Clinical Translation, August 2022–January 2024

Department of Functional Imaging in Surgical Oncology

- Responsible for translational efforts in the group. This includes development of clinical imaging systems, as well as the design and implementation of clinical trials at the University Clinic Dresden.
- Developed and mentored student projects in biomedical imaging, microscopy, and spectroscopy.

Helmholtz Pioneer Campus Munich, Germany

Senior Scientist, Bruns Group February 2019–January 2024

- Responsible for translational research project development and execution.
- Designed and built experimental imaging systems for clinical trials in the USA and Germany.
- Developed and mentored student projects in microscopy, machine learning, and materials discovery.

Lumicell, Inc. Wellesley, MA, USA

Senior Scientist October 2016–June 2018

Advanced Optics Manager June 2018–January 2019

- Built clinical data and analytics pipelines for our first multi-center nation-wide clinical trial.

- Built models and projections for clinical trial endpoints, used in setting our strategy for all indications.
- Supported product development, manufacturing, and clinical education for the Lumicell Cavity Assessment System, a class 3 combination product including a drug, hardware, and software.
- Performed early-phase product development, including novel optical methods and expert systems.

Lawrence Berkeley National Laboratory

Berkeley, CA, USA

Postdoctoral Researcher; Advisor: Emory Chan

September 2015–October 2016

- Developed a high-throughput chemical automation platform for the synthesis and characterization of colloidal nanocrystals.
- Worked with a vendor to design and implement a custom reactor for the platform.
- Developed methods for automated layer-by-layer synthesis of semiconductor nanocrystals.

Massachusetts Institute of Technology

Cambridge, MA, USA

Graduate Researcher; Advisor: Mounji Bawendi

August 2010–July 2015

- Developed single-molecule spectroscopy methods to study the impact of multiexciton photophysics in semiconductor nanocrystals used for solid-state lighting.
- Designed and built microscopes and wide-field imaging setups for visible and infrared measurements, based on SPAD and SNSPD.
- Developed *in vivo* shortwave infrared (SWIR) optical methods for studying metabolism and vital signs in whole mice.

Universität Erlangen-Nürnberg

Erlangen, Germany

Undergraduate Researcher; Advisor: Michael Gottfried

June 2009–August 2009

- X-ray photoelectron spectroscopy of metalloporphyrins on metal surfaces.
- Automated experimental data collection and analysis process.

University of California, Berkeley

Berkeley, CA, USA

Undergraduate Researcher; Advisor: A. Paul Alivisatos

July 2008–August 2010

- Synthesized and characterized metal nanoparticles with ceramic coatings.
- Studied cation exchange in semiconductor nanocrystals using single-molecule spectroscopy.

SKILLS

- Software development: Python (including matplotlib, pandas, numpy, scipy, scikit-learn, opencv2), C, C++, Rust, Haskell, Scheme, PostgreSQL, SQLite, LaTeX, Qt, Linux (OpenSUSE, Debian, Ubuntu, Nix), BSD (FreeBSD), Windows, Raspberry Pi, Arduino, git, CI/CD, Docker, Github, Gitlab
- Hardware development: computer vision, optical imaging and microscopy, multispectral imaging, infrared imaging, fluorescence imaging, optical spectroscopy (CW and time-resolved), TCSPC, nanomaterial synthesis and classification, air-free chemistry, chemistry automation, PCB layout, 3D printing (FDM, SLS), printmaking (letterpress, screen printing), ultrafast laser development

- Drugs and medical devices: clinical trial design and implementation, quality systems (ISO 13485), clinical engineering, customer training
- Other: project management, supply chain management, product lifecycle management, export control (EU and ITAR), industrial controls engineering

PEER-REVIEWED PUBLICATIONS

- M. Schürmann, S. Steinecker, **T. Bischof**, C. Berrou, O. Plettenburg, T. Huser, H. Sudhoff, L.-U. Scholtz, O. Bruns, I. Todt. “Application of infrared light for detection of surgical relevant tissues during middle ear cholesteatoma surgery.” *Laryngorhinotologie*, **2024**, *103*, S302-S303. [Link](#)
- J. G. .P. Lingg, **T. S. Bischof**, B. A. Arús, E. D. Cosco, E. M. Sletten, C. J. Rowlands, O. T. Bruns, A. Chmyrov. “Shortwave-Infrared Line-Scan Confocal Microscope for Deep Tissue Imaging in Intact Organs.” *Laser Photonics and Reviews*, **2023**, *17*, 2300292. [Link](#)
- T.-W. Klein, S. Yang, M. A. Tusty, J. V. Nayak, M. T. Chang, O. T. Bruns, **T. S. Bischof**, T. A. Valdez, “Development of a shortwave infrared sinuscope for the detection of cerebrospinal fluid leaks.” *J. Biomed. Opt.*, **2023**, *9*, 094803. [Link](#)
- B. A. Arús, E. D. Cosco, J. Yiu, I. Balba, **T. S. Bischof**, E. M. Sletten, O. T. Bruns “Shortwave infrared fluorescence imaging of peripheral organs in awake and freely moving mice.” *Front. Neurosci.*, **2023**, *17*, 1135494. [Link](#)
- V. G. Bandi, M. P. Luciano, M. Saccomano, N. L. Patel, **T. S. Bischof**, J.G.P. Lingg, P. T. Tsrunchev, M. N Nix, B. Ruehle, C. Sanders, L. Riffle, C. M. Robinson, S. Difi-ippantonio, J. D. Kalen, U. Resch-Genger, J. Ivanic, O. T. Bruns, M. J. Schnermann. “Targeted multicolor *in vivo* imaging over 1,000 nm enabled by nonamethine cyanines.” *Nature Methods*, **19**, *19*, 353–358. [Link](#)
- E. D. Cosco, B. A. Arús, A. L. Spearman, T. L. Atallah, I. Lim, O. S. Leland, J. R. Caram, **T. S. Bischof**, O. T. Bruns, and E. M. Sletten. “Bright Chromenylium Polymethine Dyes Enable Fast, Four-Color *In Vivo* Imaging with Shortwave Infrared Detection.” *J. Am. Chem. Soc.*, **2021**, *143*, 6836–6846. [Link](#)
- K. E. Shulenberger, **T. S. Bischof**, J. R. Caram, H. Utzat, I. Coropceanu, L. Nienhaus, M. G. Bawendi. “Multiexciton Lifetimes Reveal Triexciton Emission Pathway in CdSe Nanocrystals.” *Nano Lett.*, **2018**, *18*, 5153–5158. [Link](#)
- O. T. Bruns*, **T. S. Bischof***, D. K. Harris, Y. Shi, L. Riedemann, T. Reiberger, A. Bartelt, F. B. Jaworski, D. Franke, M. W. B. Wilson, O. Chen, H. Wei, G. W. Hwuang, D. Montana, I. Coropceanu, J. Kloepper, J. Heeren, D. Fukumura, K. Jensen, R. K. Jain, M. G. Bawendi. “Next generation *in vivo* optical imaging with short-wave infrared quantum dots.” *Nat. Biomed. Eng.*, **2017**, *1*, 56. [Link](#)
- T. S. Bischof**, J. R. Caram, A. P. Beyler, M. G. Bawendi. “Extracting the average single-molecule biexciton photoluminescence lifetime from a solution of chromophores.” *Opt. Lett.*, **2016**, *41*, 4823–4826. [Link](#)
- E. S. Levy, C. A. Tajon, **T. S. Bischof**, J. Iafrati, A. Fernandez-Bravo, D. J. Garfield,

- M. Chamanzar, M. M. Maharbiz, V. S. Sohal, P. J. Schuck, B. E. Cohen, E. M. Chan. “Energy-Looping Nanoparticles: Harnessing Excited-State Absorption for Deep-Tissue Imaging.” *ACS Nano*. **2016**, *10*, 8423–8433. [Link](#)
7. J. R. Caram, S. N. Bertram, H. Utzat, W. R. Hess, J. A. Carr, **T. S. Bischof**, A. P. Beyler, M. W. B. Wilson, and M. G. Bawendi. “PbS Nanocrystal Emission Is Governed by Multiple Emissive States.” *Nano Lett.*, **2016**, *10*, 6070–6077. [Link](#)
 6. R. A. Jensen, I-C. Huang, O. Chen, J. T. Choy, **T. S. Bischof**, M. Lončar, M. G. Bawendi. “Optical Trapping and Two-Photon Excitation of Colloidal Quantum Dots Using Bowtie Apertures” *ACS Photonics*, **2016**, *3*, 423–427. [Link](#)
 5. A. P. Beyler, **T. S. Bischof**, J. Cui, I. Coropceanu, D. K. Harris, M. G. Bawendi. “Sample-Averaged Biexciton Quantum Yield Measured by Solution-Phase Photon Correlation.” *Nano Lett.* **2014**, *14*, 6792–6798. [Link](#)
 4. **T. S. Bischof**, R. E. Correa, D. Rosenberg, E. A. Dauler, M. G. Bawendi. “Measurement of Emission Lifetime Dynamics and Biexciton Emission Quantum Yield of Individual InAs Colloidal Nanocrystals.” *Nano Lett.* **2014**, *14*, 6787–6791. [Link](#)
 3. N. J. Thompson, M. W. B. Wilson, D. N. Congreve, P. R. Brown, J. M. Scherer, **T. S. Bischof**, M. Wu, N. Geva, M. Welborn, T. Van Voorhis, V. Bulović, M. G. Bawendi, and M. A. Baldo. “Energy harvesting of non-emissive triplet excitons in tetracene by emissive PbS nanocrystals.” *Nature Mater.* **2014**, *13*, 1039–1043. [Link](#)
 2. J. Cui, A. P. Beyler, **T. S. Bischof**, M. B. W. Wilson, M. G. Bawendi. “Deconstructing the photon stream from single nanocrystals: from binning to correlation.” *Chem. Soc. Rev.*, **2014**, *43*, 1287–1310. [Link](#)
 1. Y. Bai, M. Sekita, M. Schmid, **T. Bischof**, H.-P. Steinrück, J. M. Gottfried. “Interfacial coordination interactions studied on cobalt octaethylporphyrin and cobalt tetraphenylporphyrin monolayers on Au(111).” *Phys. Chem. Chem. Phys.* **2010**, *12*, 4336–4344. [Link](#)

PATENTS

M. G. Bawendi, O. T. Bruns, D. K. Harris, **T. S. Bischof**. “Short-wavelength infrared (SWIR) fluorescence in vivo and intravital imaging with semiconductor nanocrystals”. US Patent 11,077,213.

INDEPENDENT FUNDING

2020 Helmholtz Enterprise Spin-off Program (280k€)
2014 Morse Travel Grant, MIT Department of Chemistry
2009 DAAD RISE Fellowship

TEACHING EXPERIENCE

Massachusetts Institute of Technology	Cambridge, MA
Teaching Assistant, Biological & Physical Chemistry Laboratory	Spring 2011
Teaching Assistant, Introduction to Experimental Chemistry	Fall 2010

ARTISTIC EXHIBITIONS

2. Collaboration with Eric Beier and Gyde Becker, BIAS Dresden, May 2024. [Exhibition website](#)
1. Collaboration with Eric Beier, “Vom Schatten ans Licht”, NCT Dresden, August 2023–August 2024. [Exhibition website](#), [installation website](#)

LANGUAGES

English (native), German (B1)

PROFESSIONAL DEVELOPMENT

2014–2015	MIT Institute Committee on Radiation Protection
2013–2015	MIT Chemistry Department EHS Committee
2012–2013	EHS representative for the Bawendi group