Curriculum Vitae

MARTIN W. TREBBIN

The State University of New York
University at Buffalo
Department of Chemistry &
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EDUCATION AND TRAINING

Graduate Institution	University of Hamburg, Germany.	Chemistry	Dipl.-Chem. (07/2009)
Graduate Institution	University of Bayreuth, Germany.	Physical Chemistry	Dr. *rer. nat.* (*summa cum laude*, 12/2013, with Prof. Dr. Stephan Förster)

PROFESSIONAL APPOINTMENTS

08/2018- Empire Innovation Assistant Professor,
Department of Chemistry &
Research and Education in eNergy, Environment and Water (RENEW) Institute,
University at Buffalo, SUNY flagship, USA.

10/2014-08/2018 Assistant Professor ("Ultrafast Structure Determination in Liquids"),
Centre for Ultrafast Imaging (CUI),
Department of Physics,
University of Hamburg, Germany.

01-09/2014 Postdoctoral Fellow, Physical Chemistry with Prof. Dr. Stephan Förster
University of Bayreuth, Germany.

PUBLICATIONS, AND PRESENTATIONS

Google Scholar (Citations 1118, h-index 20): http://trebbinlab.com/publications/

Peer-Reviewed Research Papers – Selection
(Lockdown + Spending Stop(!) from Spring 2020 till Summer 2021)
(senior/corresponding author denoted by *)

(1) Klebl, D.P., Gravett, M.S.C., Kontziampasis, D., Wright, D.J., Bon, R.S., Monteiro, D.C.F., **Trebbin, M.** Sobott, F., White, H.D., Darrow, M.C., Thompson, R.F., Muench, S.P.* "Need for speed: examining protein behavior during CryoEM grid preparation at different timescales". *Structure* **2020**, *28*(11), 1238-1248.e4, DOI: https://doi.org/10.1016/j.str.2020.07.018

(2) Vakili, M., Vasireddi, R., Gwozdz, P.V., Monteiro, D.C.F., Heymann, M., Blick, R. H., **Trebbin, M.*** "Microfluidic polyimide gas dynamic virtual nozzles for serial crystallography". *Rev. Sci. Instrum.* **2020**, *91*, 085108, DOI: https://doi.org/10.1063/5.0012806

(3) *Sobolev, E.,* et al. …, **Trebbin, M.**, …, Maia, F.R.N.C* "Megahertz single-particle imaging at the European XFEL". *Nature Commun. Phys.* **2020***, 3(97), DOI: https://doi.org/10.1038/s42005-020-0362-y*

(4) Klebl, D., Monteiro, D.C.F, Kontziampasis, D., Kopf, F., Sobott, F., White, H., **Trebbin, M.***, Muench, S.* "Sample deposition onto cryo-EM grids - from sprays to jets and back". *Acta Cryst. D* **2020**, *76*, 340-349. DOI: https://doi.org/10.1107/S2059798320002958

(5) Monteiro, D.C.F.*, von Stetten, D., Stohrer, C., Sans, M., Pearson, A.R., Santoni, G., van der Linden, P., **Trebbin, M.*** "3D-MiXD: 3D-printed X-ray-compatible microfluidic devices for rapid, low-consumption serial synchrotron crystallography data collection in flow".
IUCrJ **2020**, 7(2), 207-219, DOI: https://doi.org/10.1107/S2052252519016865

(6) Oleksandr Yefanov, et al. …, **Trebbin, M.**, …, Chapman, H.N., Barty, A*. "Evaluation of serial crystallographic structure determination within megahertz pulse trains".
Struct. Dyn. **2019**, *6*, 064702, DOI: https://doi.org/10.1063/1.5124387

(7) Kontziampasis, D., Klebl, D.P., Iadanza, M.G., Scarff, C.A., Kopf, F., Sobott, F., Monteiro, D.C.F., **Trebbin, M.**, Muench, S.P., White H.D.* "A cryo-EM grid preparation device for time-resolved structural studies".
IUCrJ **2019**, *6*(6), 1024-1031, DOI: https://doi.org/10.1107/S2052252519011345

(8) Vasireddi, R., Kruse, J., Vakili, M., Kulkarni, S., Keller, T. F., Monteiro, D.C.F. **Trebbin, M.*** "Solution blow spinning of polymer/nanocomposite micro-/nanofibers with tunable diameters and morphologies using a gas dynamic virtual nozzle".
Nature Sci. Rep. **2019**, *9*, 14297, DOI: https://doi.org/10.1038/s41598-019-50477-6

(9) Vakili, M., Merkens, S., Gao, Y., Vasireddi, R., Sharpnack, L., Meyer, A., Blick, R.H., **Trebbin, M.*** "3D micromachined polyimide mixing devices for in situ X-ray imaging of solution-based block copolymer phase transitions".
Langmuir **2019**, *35*, 32, 10435-10445, DOI: https://doi.org/10.1021/acs.langmuir.9b00728

(10) Merkens, S., Vakili, M., Sanchez-Iglesias, A., Litti, L., Gao, Y., Gwozdz, P.V., Sharpnack, L., Blick, R.H., Liz-Marzan, L.M., Grzelczak, M.*, **Trebbin, M.*** "Time-resolved analysis of the structural dynamics of assembling gold nanoparticles".
ACS Nano **2019**, *13*(6), 6596-6604, DOI: https://doi.org/10.1021/acsnano.9b00575

(11) Monteiro, D.C.F., Vakili, M., Harich, J., Sztucki, M., Meier, S.M., Horrell, S., Inokentijs, J., **Trebbin, M.*** "A microfluidic flow-focusing device reduces sample consumption for serial synchrotron crystallography experiments in liquid flow".
J. Synchrotron Rad. **2019**, *26*, 406-412. DOI: https://doi.org/10.1107/S1600577519000304

(12) Vakili, M., Cunningham, V.J., **Trebbin, M.**, Theato, P.* "Polymerization-induced thermal self-assembly of functional and thermoresponsive diblock copolymer nano-objects via RAFT aqueous polymerization".
Macromol. Chem. Phys. **2019**, *220*, 1800370, DOI: https://doi.org/10.1002/macp.201800370

(13) Wiedorn, M., et al. …, **Trebbin, M.**, …, Chapman, H.N., Barty, A.* "Megahertz serial crystallography".
Nat. Commun. **2018**, *9*, 4025. DOI: https://doi.org/10.1038/s41467-018-06156-7

(14) Schlenk, M., Drechsler, M. Karg, M., Zimmermann, W., **Trebbin, M.**, Förster, S.* "Splitting and separation of colloidal streams in sinusoidal microchannels".
Lab Chip **2018**, *18*, 3163. DOI: https://doi.org/10.1039/C8LC00255J

(15) Hofmann, E., Krüger, K., Haynl, C., Scheibel, T., **Trebbin, M.**, Förster, S.* "Microfluidic nozzle device for ultrafine fiber solution blow spinning with precise diameter control".
Lab Chip **2018**, *18*, 2225. DOI: https://doi.org/10.1039/C8LC00304A

(16) With, S., **Trebbin, M.**, Bartz, C.B.A., Neuber, C., Dulle, M., Yu, S., Roth, S.V., Schmidt, H.-W., Förster, S.* "Fast diffusion-limited lyotropic phase transitions studied in situ using continuous flow microfluidics/microfocus-SAXS".
Langmuir **2014**, *30*(42), 12494. DOI: https://doi.org/10.1021/la502971m

(17) Benecke, G., Wagermaier, W., Li, C., Schwartzkopf, M., Flucke, G., Hoerth, R., Zizak, I., Burghammer, M., Metwalli, E., Müller-Buschbaum, P., **Trebbin, M.**, Förster, S., Paris, O., Roth, S.V.*, Fratzl, P.* "A customizable software for fast reduction and analysis of large X-ray scattering data sets: applications of the new DPDAK package to small-angle X-ray scattering and grazing-incidence small-angle X-ray scattering".
J. Appl. Cryst. **2014**, *47*, 1797. DOI: https://doi.org/10.1107/s1600576714019773

(18) **Trebbin, M.**, Krüger, K., DePonte, D., Schulz, J., Roth, S.V., Chapman, H.N., Förster, S.* "Microfluidic liquid jet system with compatibility for atmospheric and high-vacuum conditions". *Lab Chip* **2014**, *10*, 1733. DOI: https://doi.org/10.1039/C3LC51363G

(19) **Trebbin, M.**, Steinhauser, D., Perlich, J., Buffet, A., Roth, S.V., Zimmermann, W., Thiele, J., Förster, S.* "Anisotropic particles align perpendicular to the flow direction in narrow microchannels". *Proc. Natl. Acad. Sci. U.S.A.* **2013**, *110*, 6706. DOI: https://doi.org/10.1073/pnas.1219340110

(20) Thiele, J., Windbergs, M., Abate, A.R., **Trebbin, M.**, Shum, H.-C., Förster, S., Weitz, D.A.* "Early development drug formulation on a chip: fabrication of nanoparticles using a microfluidic spray dryer". *Lab Chip* **2011**, *11*, 2362. DOI: https://doi.org/10.1039/C1LC20298G

Other Peer-Reviewed Research Papers
(senior/corresponding author denoted by *)

(21) Glier, T.E., Vakili, M., **Trebbin, M.*** "Microfluidic synthesis of thermo-responsive block co-polymer nano-objects via RAFT polymerization". *J. Polym. Res.* **2020**, *27*(333), DOI: https://doi.org/10.1007/s10965-020-02290-3

(22) Kiran, P.*, Ramakrishn, V., **Trebbin, M.**, Udayashankar, N.K., Shashikala, H.D. "Effective role of CaO/P_2O_5 ratio on SiO_2-CaO-P_2O_5 glass system". J. Adv. Res. **2017**, *8*, 279-288. DOI: https://doi.org/10.1016/j.jare.2017.02.001

(23) Khajuria, D.K.*, Vasireddi, R., **Trebbin, M.** Karasik, D., Razdan, R. "Novel therapeutic intervention for osteoporosis prepared with strontium hydroxyapatite and zoledronic acid: In vitro and pharmacodynamic evaluation". *Mat. Sci. Eng. C* **2016**, *71*, 698-708 (2016). DOI: https://doi.org/10.1016/j.msec.2016.10.066

(24) Hermida-Merino, D., **Trebbin, M.**, Förster, S., Rodriguez-Llansola, F., Portale, G.* "Microfluidic assisted self-assembly of pH-sensitive low-molecular weight hydrogelators close to the minimum gelation concentration". *Macromol. Symp.* **2015**, *358*(1), 59-66. DOI: https://doi.org/10.1002/masy.201500032

(25) Pillai, S.K.T., Kretschmer, W.P., Denner, C., Motz, G., Hund, M., Fery, A., **Trebbin, M.**, Förster, S., Kempe, R.* "SiCN nanofibers with a diameter below 100 nm synthesized via concerted block copolymer formation, microphase separation, and crosslinking". *Small* **2012**, *9*, 984. DOI: https://doi.org/10.1002/smll.201370042

(26) Pillai, S.K.T., Kretschmer, W.P., **Trebbin**, M., Förster, S., Kempe, R.* "Tailored nanostructuring of end-group-functionalized high-density polyethylene synthesized by an efficient catalytic version of Ziegler's 'Aufbaureaktion'". *Chem. Eur. J.* **2012**, *18*, 13974. DOI: https://doi.org/10.1002/chem.201202506

(27) Hanske, C., Erath, J., Kühr, C., **Trebbin, M.**, Schneider, C., Wittemann, A., Fery, A.* "Adsorption of spherical polyelectrolyte brushes: from interactions to surface patterning". *Zeitschrift f. Phys. Chem.* **2012**, *226*(7-8), 569-584. DOI: https://doi.org/10.1524/zpch.2012.0265

(28) Taheri, S.M., Fischer, S., **Trebbin, M.**, With, S., Schröder, J.H., Perlich, J., Roth, S.V., Förster, S.* "Lyotropic phase behavior of polymer-coated iron oxide nanoparticles". *Soft Matter* **2012**, *8*, 12124. DOI: https://doi.org/10.1039/C2SM26777B

(29) Schlicke, H., Schröder, J.H., **Trebbin, M.**, Petrov, A., Ijeh, M., Weller, H., Vossmeyer, T.* "Freestanding films of crosslinked gold nanoparticles prepared via layer-by-layer spin-coating". *Nanotechnology* **2011**, *22*(30), 305303. DOI: https://doi.org/10.1088/0957-4484/22/30/305303

(30) Rosenberg, M.L., Aasheim, J.H.F., **Trebbin, M.**, Uggerud, E., Hansen, T.* "Synthesis of a 1,3,4,5-tetrahydrobenzindole β-ketoester". *Tetrahedron Lett.* **2009**, *50*(47), 6506-6508. DOI: https://doi.org/10.1016/j.tetlet.2009.09.032

RESEARCH FUNDING (PI, unless otherwise noted)

Current Support

(funded) $150k, Role: PI, University at Buffalo Vice President for Research and the Research Foundation, 2020
"Funding Support - Hybrid 3D-micro-nanofabrication workstation based on a femtosecond laser"
(It is the goal of this proposal to receive funding support for a hybrid 3D-micro-nanofabrication workstation that will solidify the role of UB in BioXFEL. Recent developments in ultrafast femtosecond laser technology have enabled us to fabricate 3D geometries with arbitrary shapes that can't be fabricated using traditional mask lithography in cleanrooms. These novel 3D fabrication methods can be harnessed to produce 3D microscopic sample delivery devices that suitable for time-resolved structure determination experiments at XFELs. This workstation is a hybrid system that combines two differed 3D fabrication technologies (additive and subtractive manufacturing) which allows the 3D fabrication of almost any imaginable shape micro-/nanostructures and the ability to cut/remove/engrave/drill/texture/weld various materials on the micro-scale without damaging the surrounding material.)

Past Support

(funded) ca. 2 M€ ($2.2M), Role: Co-I ($291k share), Federal Ministry of Education and Research, Germany, 07/2016-06/2019.
„*HATRX-SFX: Hadamard-Kristallographie als Methode zur zeitaufgelösten Untersuchung der Strukturdynamik von Biomolekülen"*
(We will build on our experience and expertise in time-resolved X-ray data collection, reaction initiation and sample delivery to deliver an endstation dedicated to time-resolved serial synchrotron crystallography (SSX) in the ns-ms time domain. It will be sited at beamline P14.EH2 (T-REXX) at PETRA III, in a dedicated hutch, allowing development to take place in parallel with normal beamline operations. To enable fast time-resolved experiments we will introduce a trigger laser in an on-axis geometry, ensuring the laser and X-rays probe the same volume of the sample. The unique properties of the PETRA III ring will allow us to deliver a top-hat, small cross-section high-flux X-ray beam, perfectly matched to the crystal size and laser beam, in order to uniformly excite and probe each crystal. In addition, we will further develop both solid-support and microfluidic mixing jet-based methods for sample delivery (P11 & P14). In any time-resolved experiment diagnostics are vital. We will thus interface real-time spectroscopic diagnostics to provide information on the degree of reaction initiation in each sample and details of sample size and distribution. In this project we aim to demonstrate practical time-resolved crystallographic experiments on biomacromolecular systems are possible at PETRA III. The availability of a dedicated and optimized resource for time-resolved structural studies will support the continuing development of the nascent German and European time-resolved structural biology community.)

(funded) 33 k€ ($37k), Role: Co-I, Partnership for Innovation, Education and Research, 2015-16
"*Mechanistic studies on cation exchange reactions in nanocrystals via in-situ optical and synchrotron X-ray structural characterization*"
(Cation exchange reactions (CE) have emerged as a powerful chemical tool to obtain nanocrystal (NC) shapes, compositions or structures not accessible by other methods. This opens up tremendous expectations to modify the electronic and thus optical properties of NCs, but also to controllably tune their stoichiometry. Different exchange systems have been studied with special attention to the main thermodynamic parameters affecting the exchange reaction. However, a reliable accepted mechanism has not been established yet and furthermore there is not a single kinetic model universally applicable to such processes. Based on the lack of this information, this project aims to study the kinetics and thermodynamics governing cation exchange reactions. The key idea is to use a continuous-flow device (CFD) equipped with optic and X- ray flow cells to enable in-situ optical and synchrotron structural characterization of the starting materials, intermediate and final products of the exchange reactions.)

(funded) 50 k€ ($56k), Role: PI, Partnership for Innovation, Education and Research, 2016-18
"*Controlled nano- and micro-droplet generation using microfluidic liquid jet devices*"
*(*For nano- and microanalytical applications, such as bioanalytics and nano-rheology, the control of the sample volume is essential. In the last decade it has been shown that microfluidics is ideally suited for the manipulation and generation of defined volumes of diluted liquids, e.g. solution of single-particles or macromolecular crystals. In this project the development of smart microfluidic liquid jet devices for the production of nano- and micro-droplets is proposed. The integration of piezoelectric actuators in our established microfluidic jet devices enables us to achieve single-file monodisperse micro-droplets. By the integration of several actuators making multi-mode frequencies possible the generation of satellite droplets in the sub-µm regime can be triggered and influenced.).

Book Chapters

(1) *Invited chapter*. "Crystal Structure Determination, History of" in Encyclopedia of Condensed Matter Physics (Elsevier), *in preparation*.

Other Publications (non-peer Reviewed)

(1) "PETRA IV: Upgrade of PETRA III to the Ultimate 3D X-ray Microscope - Conceptual Design Report (CDR)", *DESY Publication Database* **2019**, DOI: https://doi.org/10.3204/PUBDB-2019-03613

(2) "ESRF Highlights 2019", The European Synchrotron Radiation Facility, February **2020**, pages 76-77. https://www.esrf.fr/home/UsersAndScience/Publications/Highlights/esrf-highlights-2019.html

Invited Lectures to USA Universities and National Laboratories

(1) *Invited talk (planned)*. Trebbin, M.* „Title T.B.D.". Arizona State University (Spring 2021 or Fall 2022, postponed due to COVID).

(2) *Invited talk*. Trebbin, M.* et. al. "Reduction of Clogging in Mixing Systems", BioXFEL Online-Workshop on Clogging, November 13th 2018.

(3) *Invited Talk*. Trebbin, M.* et al. "Investigation of Time-Resolved Dynamics Using Rapid Mixing Microfluidics: from Nanostructures to Structural Biology", BioXFEL: NSF Site visit, May 15th 2019, Buffalo, NY, USA.

(4) *Invited Participation*. "2019 Workshop on Advanced Crystallography", December NSF's ChemMatCARS at Advanced Photon Source, Argonne National Lab, Argonne, USA.

(5) *Invited talk/contribution*. Trebbin, M. * et. al. Understanding structure-function relationship of proteins via rapid mixing. LCLS-II-HE "First Experiments" meeting, SLAC, Stanford, USA (2017).

(6) *Invited talk*. Trebbin, M. * et al. Microfluidic Tools for Time-Resolved Structural Biology. LCLS-II-Workshop "Scientific Opportunities for Ultrafast Hard X-rays at High Repetition Rate: An Energy Upgrade of LCLS-II", SLAC, Stanford, USA (2016).

(7) *Invited talk*. Trebbin, M.* et al. Microfluidics at High-Intensity X-ray Sources. LCLS/SLAC User's Meeting 2014, SLAC, Stanford, USA (2014).

(8) Multiple talks at local seminars in Buffalo (HWI, RENEW and Chemistry)

International Invited Presentations

(9) *Invited talk*. Trebbin, M.* et al. "Microfluidic Reaction Control for Time-Resolved Structure Determination at XFELs and Synchrotrons", FEBS Advanced Course 2019 "Biomolecules in Action II", June 23rd-28th 2019, Hamburg, Germany.

(10) *Invited talk*. Trebbin, M. * et. al. Investigation of Time-Resolved Dynamics Using Rapid Mixing Microfluidics. University of Münster, Germany. (2018)

(11) *Invited talk*. Trebbin, M. * et. al. Investigation of Time-resolved Structural Dynamics Using Rapid Mixing Microfluidics. University of Düsseldorf, Germany. (2018)

(12) *Invited talk*. Trebbin, M. * et. al. Rapid Mixing Microfluidics for Time- Resolved X-ray Scattering: from Nanostructures to Structural Biology. Nanotechnology meets Bioengineering Workshop (Fudan-, Macquarie- and Hamburg University), Macquarie University, Sydney, Australia (2017).

(13) *Invited talk*. Trebbin, M. * et. al. Rapid Mixing Microfluidics for Time-Resolved X-ray Scattering. Microfluidics Workshop at European XFEL, Schenefeld, Germany (2017).

(14) *Invited talk*. Trebbin, M. * et. al. Time-Resolved Structural Biology via Rapid Mixing Microfluidics. Protein Science Days 2017, Lund University, Lund, Sweden (2017).

(15) *Invited talk*. Trebbin, M.* et al. Time-Resolved Structural Investigations using Microfluidics at High-Intensity X-ray Sources: from Nanostructures to Structural Biology. Department of Multifunctional Materials, ETH Zürich, Switzerland (2016).

Invited Presentations to Scientific Meetings in the USA (Local, National, and International Conferences)

(16) *Invited Talk*. Trebbin, M.* "Mentorship Talk: Navigating Your Postdoc in Structural Biology", Diffraction Methods in Structural Biology, July 26th - 27th 2020, Gordon Research Seminar, Lewiston, ME, USA. (postponed until further notice due to COVID)

(17) *Invited talk*. Trebbin, M.* et. al. "Microfluidic Reaction Control for Time-Resolved Structure Determination at XFELs and Synchrotrons", BioXFEL Conference, February 11th-14th 2019, San Diego, CA, USA.

Contributed Conference Presentations (Local, National, and International)

(18) *Poster*. Trebbin, M.* et. al. "Time-resolved structure determination via rapid mixing microfluidics", Miniaturized Systems for Chemistry and Life Sciences (μTAS 2019), October 27th-31st 2019, Basel, Switzerland.

(19) *Participation and Poster Judge*. 7th BioXFEL International Conference 2020, January 27th – 30th 2020, San Juan, Puerto Rico.

(20) *Participation*. 45th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz 2020), November 8th – 13th, 2020, Buffalo, NY (virtual)).

(21) *Participation*. EuXFEL Sample Environment Online Workshop, October 21st – 22nd 2020, virtual.

(22) *Participation* in LCLS (Virtual) "Non-Linear Multidimensional Methodologies for Studying Chemical Sciences", December 9th -10th 2020, virtual.

(23) *Participation*. Bright Future for In Situ and Operando Structural Science at APS-U Virtual Workshop, January 11th -15th 2021, virtual.

(24) *Participation*. BioXFEL Annual Meeting 2021, January 31st – February 4th 2021, virtual.

(25) *Invited talk* Trebbin, M. * et al. Rapid Mixing and Microfluidic Sample Environments for XFELs. Oslo Nordic Workshop on Soft and Biological Matter, Department of Chemistry, University of Oslo, Norway (2017).

(26) *Invited talk*. Trebbin, M. * et al. Microfluidics at High Intensity X-Ray Sources - Latest Results. XFEL/DESY User's Meeting 2017, Photon Science Satellite Meeting: "SAXS/WAXS/GISAXS-User Workshop at DESY", DESY Hamburg, Germany (2017).

(27) *Invited talk*. Trebbin, M. * et al. Time-Resolved Structural Investigations using Microfluidics at High-Intensity X-ray Sources: from Nanostructures to Structural Biology. Workshop on triggering time-resolved reactions "Light. Mixing. Action!", EU-Action CM1306 Workshop, Porto, Portugal (2016).

(28) *Invited talk*. Trebbin, M. * et al. Rapid Mixing and Microfluidic Sample Environments for XFELs. Single Particle Injection Technology workshop with a focus on samples & injection. Laboratory of Molecular Biophysics, Uppsala University, Sweden (2016).

(29) *Poster*. Trebbin, M. * et al. Time-Resolved Microfluidics at High-Intensity X-ray Sources. 4th International Soft Matter Conference (ISMC4), ESRF, Grenoble, France (2016).

(30) *Invited talk*. Trebbin, M. * et al. Considerations for time-resolved rapid mixing experiments at XFELs. 3rd Ringberg Meeting on Structural Biology with FELs (by invitation only), Max Planck Society, Ringberg Castle, Tegernsee, Bavaria, Germany (2016).

(31) *Talk*. Trebbin, M. * et al. Microfluidics at Microfocus X-ray Sources: Status and Perspectives. XFEL/DESY User's Meeting 2016, Photon Science Satellite Meeting: "SAXS/WAXS/GISAXS-User Workshop at DESY", DESY Hamburg, Germany (2016).

(32) *Talk*. Trebbin, M. * et al. Microfluidics at high-intensity X-ray sources. SRPS6, 6th International Conference on Synchrotron Radiation in Polymer Science, Madrid, Spain (2015).

(33) *Invited attendance*. 2nd Ringberg Meeting on Structural Biology with FELs (by invitation only), Max Planck Society, Ringberg Castle, Tegernsee, Bavaria, Germany (2015).

(34) *Talk*. Trebbin, M. * et al. X-rays and Microfluidics: Current and Future Developments. XFEL/DESY User's Meeting 2015, Photon Science Satellite Meeting: "SAXS/WAXS/GISAXS-User Workshop at DESY", DESY Hamburg, Germany (2015).

(35) *Talk*. Trebbin, M.* et al. Anisotropic particles align perpendicular to the flow direction in narrow microchannels. 34th Dynamics Days Europe, University of Bayreuth, Germany (2014).

(36) *Invited talk*. Trebbin, M.* et al. Microfluidic Sample Environment Platform. 2nd PSCM Workshop on "Enhanced User Support and Partnership Projects for Soft Matter Science", ESRF/ILL, Grenoble, France (2014).

(37) *Talk*. Trebbin, M.* et al. Microfluidic Liquid Jet System with compatibility for atmospheric and high-vacuum conditions. FLOW14, 1st International Conference on Micro & Nanofluidics Fundamentals and Applications, University of Twente, Enschede, The Netherlands (2014).

(38) *Talk*. Trebbin, M.* et al. Microfluidics at high-intensity X-ray sources: from microflow chips to microfluidic liquid jet systems. 22nd International Congress on X-ray Optics and Microanalysis (ICXOM), University of Hamburg, Germany (2013).

(39) *Invited talk*. Trebbin, M.* et al. Versatile Microfluidics: on microfocus SAXS, perpen-dicular colloid alignment and liquid jets Invited talk. Laboratoire Interdisciplinaire de Physique, Université Joseph Fourier, Grenoble, France (2013).

(40) *Talk*. Trebbin, M.* et al. Microfluidics at P03/MiNaXS: The latest results. HASYLAB User's Meeting 2013 - Satellite Meeting: Status and Perspectives of Small Angle X-ray Scattering at DESY, DESY Hamburg, Germany (2013).

(41) *Invited talk*. Trebbin, M.* et al. Microfluidic liquid jet systems. XFEL User's Meeting 2013 - Satellite Meeting: Challenges for sample delivery at the European XFEL Facility, DESY Hamburg, Germany (2013).

(42) *Talk*. Trebbin, M.* et al. Spider silk fiber formation in microfluidic devices. 4th Scientific Seminar of the North-Bavaria Biomaterials Alliance (NBBA), University of Erlangen, Germany (2012).

(43) *Talk*. Trebbin, M.* et al. Anisotropic particles align perpendicular to flow-direction in narrow microchannels. 17th Fall Seminar on Nonlinear Dynamics 2012, University of Bayreuth, Germany (2012).

(44) *Talk*. Trebbin, M.* et al. Status of the microfluidic TR-SAXS Project at P03/MiNaXS. HASYLAB User's Meeting 2012 - Satellite Meeting: Status and Perspectives of Small Angle X-ray Scattering at DESY, DESY Hamburg, Germany (2012).

(45) *Talk*. Trebbin, M.* et al. Particle-orientation control in microfluidic devices. 25th ECIS Conference (European Colloid and Interface Society) & 45th Biennial Meeting of the German Colloid Society, Technical University of Berlin, Germany (2011).

(46) *Talk*. Trebbin, M.* et al. Latest results from microfluidics at MiNaXS. HASYLAB User's Meeting 2011 - Satellite Meeting: Status and Perspectives of Small Angle X-ray Scattering at DESY, DESY Hamburg, Germany (2011).

(47) *Talk*. Trebbin, M.* et al. A microfluidic sample environment at a microfocus beamline - basics and perspectives. 2nd TUM-HASYLAB Colloquium "The metal-polymer interface", DESY Hamburg (2010).

(48) Several posters at international conferences 2009-2013.

Participation in Funding / Grant Writing Workshops

(1) Office for Research Advancement, NIH R01 Workshop December 14th 2018, Buffalo, NY, USA.
(2) SUNY NSF CAREER Grant Writing Workshop, March 20th-22nd 2019, Albany, NY, USA.
(3) SUNY DoD Day 2019, June 13th -14th 2019, Washington, D.C. USA.
(4) NSF Presentation - Dr. Carol A. Bessel, Division of Chemistry, October 11th 2019, Buffalo, NY, USA.
(5) Research Fundamentals at UB, January 21st 2020, Buffalo, NY, USA.
(6) UB DoD Panel Discussion, January 22nd 2020, Buffalo, NY, USA.
(7) Writing Grant Proposals Workshop (NIH/NSF) by Grant Writers Seminars and Workshops, Jan 27th 2020, San Jaun, Puerto Rico (during BioXFEL 2020 conference).
(8) ORA NSF CAREER Info Session, February 11th 2020, Buffalo, NY.
(9) SUNY's NSF CAREER Award proposal writing Workshop, March 19-20th 2020, virtual.
(10) SUNY's 2020 Write Winning NIH Proposals Workshop, August 13-14th 2020, virtual.
(11) ARIS/SUNY NSF Broader Impact Workshop, April 23rd, 2021, virtual.
(12) NSF Early Career Investigator Workshop, May 17th - 18th 2021, virtual.
(13) SUNY's 2021 Write Winning Grant Proposals Workshop (NIH/NSF), August 24-25th 2021, virtual.

HONORS AND AWARDS

Since 2014	Multiple international invited talks: USA (SLAC/LCLS, ASU), Germany (e.g. EuXFEL, Max Planck Society), Switzerland (ETH Zürich), Australia, Sweden, Norway, Portugal.
Winter 15/16	1st place University of Hamburg, Department of Physics, teaching prize for "Microfluidics I" in category "Specialized Lecture"
Summer 16	3rd place University of Hamburg, Department of Physics, teaching prize for "Microfluidics" in category "Specialized Lecture"
Summer 18	2nd place University of Hamburg, Department of Physics, teaching prize for "Microfluidics" in category "Specialized Lecture"

PROFESSIONAL SERVICE

Editorial Boards

2018-2019 Editorial Board Member, Conceptual Design Report (CDR) for PETRA IV at the German Electron Synchrotron (DESY). Now available:
"PETRA IV: Upgrade of PETRA III to the Ultimate 3D X-ray Microscope - Conceptual Design Report (CDR)", *DESY Publication Database* **2019**,
DOI: https://doi.org/10.3204/PUBDB-2019-03613

Sessions Chaired at Conferences

(1) BioXFEL Online-Workshop on Clogging, Nov 13th 2018 (Chair).
(2) BioXFEL Conference 2019, San Diego, CA (chair of session: "Serial crystallography instrumental developments").

Journal Articles Reviewer

Since 2015 Reviewer for different journals: ACS (Omega, Nano, The Journal of Physical Chemistry), Springer (Nature Methods), Elsevier (Polymer, Colloids and Surfaces B, Computer Physics Communications), RSC (Lab Chip), IUCr (IUCrJ, Journal of Synchrotron Radiation, Journal of Applied Crystallography), ACA (Structural Dynamics) Springer (Journal of Mechanical Science and Technology), JOVE, Referee for beamtime proposals (DESY PETRA III, SLAC LCLS PRP) and funding agencies (Department of Energy (DOE), Swiss National Science Foundation (SNF))

UNIVERSITY ACTIVITIES/SERVICE

Department Committees:

- Graduate Recruitment Committee since 2018
- Shared Instrumentation Committee (MS/Small Equipment Subcommittee) since 2018
- Safety Inspection Committee since 2019

OTHER ACTIVITIES/PUBLIC OUTREACH

- **Member of the Local Conference Organizing Committee** of the "45th International Conference on Infrared, Millimeter, and Terahertz Waves" (November 8th and 13th, 2020). While the organization of this event started out like a traditional in-person 600-700 people conference, COIV-19 forced us to pivot and switch to a virtual format. Since my responsibility was in the technical sector, I was tasked to find and implement technical solutions within just a few months for hosting a virtual conference. With the help of the other members of the local organizing committee, we successfully realized a virtual conference with multiple parallel sessions in different virtual conference room. Special emphasis was made on the realization of virtual poster session, that had to be as close as possible to an in-person experience, since it is important for young scientists to make new connections.

- **Mentoring of young scientists from undergraduate to postdoctoral levels**. During my career I was fortunate to mentor and work with many talented young scientists. Since October 2014 I have mentored 15 undergraduate students, 12 MSc students, 10 PhD students and 3 postdoctoral researchers in my lab who have found exciting positions at prestigious institutions (EuXFEL, SOLEIL, ETH Zürich, Research Center Jülich) or industry. I also developed new graduate courses on "Microfluidics" (University of Hamburg, 3 teaching prizes specialized lecture) and "CHE512C Nanostructure Characterization" (University at Buffalo)

- Throughout my career I have participated in **multiple public outreach activities** such as the DESY Summer School Program, the Hamburg Centre for Ultrafast Imaging's New Year's Reception (with live microfluidic experiments) and "Light and Schools"-program (motivational presentation about science for high school students and Q&A about what it's like to be a scientist and how to become one). As MSc and PhD student I was member of the local Young Chemist Forum (University if Hamburg, Germany, until 2010) that hosted multiple departmental events, such as a then-novel in-house conference "InfoBBQ" for undergraduate students to get to know local research groups and choose their future supervisors within the Chemistry Department. Since our first inception of this event, it has become a yearly tradition and highlight.

- Participated in several activities **supporting young scientists**, e.g. practical research internships, helped student with "research abroad"-semester (ERASMUS), DESY Summer School Program, CUI New Year's Reception (with live microfluidic experiments) or "Light and Schools"-program (motivational presentation and answered questions about what it's like to be a scientist).

Extracurricular activities & courses

SoSe 2013	Entrepreneurship Lectures, University of Bayreuth
WiSe 10/11	Management Fundamentals (Economics-MSc level, 6 ECTS) University of Bayreuth
WiSe 10/11	International Management (Economics-BSc level, 5 ECTS), University of Bayreuth
SoSe 08	Modern economics for Chemists (MSc level), University of Hamburg
WiSe 07/08	Methods of industrial research (MSc level), Guest lecture by Dr. Treuling (BASF), University of Hamburg
WiSe 07/08	R&D Management and R&D Controlling (MSc level), University of Hamburg
04/2007- 05/2010	Young Chemists (JCF), active member, by the German Chemical Society (GDCh)
02/2003- 10/2003	Civil service as group leader in an institution for handicapped people: Hamburger Werkstatt GmbH

Personal interests

Entrepreneurship, Management, Marketing, Meditation, Personal Development, Photography, Travelling.

TEACHING AND STUDENT RELATED ACTIVITIES

Teaching experience during PhD

(1) Physical Chemistry I Tutorials
(2) Physical Chemistry II Tutorials
(3) Inorganic Chemistry Lab Course (6-7 weeks, ca. 60 students)
(4) 10+ practical research training with students in the lab (3-6 weeks each)
(5) Supervised multiple BSc/MSc students

Teaching experience at University of Hamburg

(6) Nanoscience Physics I Tutorials (66-961) Winter 2014/15
(7) Nanoscience Physics II Tutorials (66-965) Summer 2015
(8) Microfluidics (66-318) Winter 2015/16
(9) Nanostructure Physics Practical Lab Course (microfluidics experiment) (66-980), Winter 2015/16
(10) Autumn School (66-984) Winter 2015/16
(11) Microfluidics I (66-322) Summer 2016
(12) Advanced Solid State Physics (66-304) Winter 2016/17
(13) Tutorials Advanced Solid State Physics (66-305) Winter 2016/17
(14) Microfluidics (66-318) Winter 2016/17
(15) Nanostructure Physics Practical Lab Course (microfluidics experiment) (66-980), Winter 2016/17
(16) Autumn School (66-984) Winter 2016/17
(17) Microfluidics I (66-322), Summer 2017
(18) Experimental Physics I for Nanoscience Students (66-960) Winter 2017/18
(19) Tutorials Experimental Physics I for Nanoscience Students (66-961) Winter 2017/18
(20) Microfluidics I (66-318), Winter 2017/18

Teaching experience University at Buffalo

(21) *Physical Chemistry Topics – Nanomaterials (Section C)* (CHE 512) Spring 2019 (updated/expanded).
"This course CHE512, is intended to provide students with an introduction to the structures and properties of nanoscale materials, as well as synthetic concepts and modern characterization techniques."
(22) *Physical Chemistry* (CHE319) Fall 2019 (updated/expanded)
"The goal of this course is to provide the student with the necessary physical chemistry for their future career in chemistry. The course will cover topics in thermodynamics, chemical kinetics and statistical mechanics. The mathematical tools required to solve problems associated with these topics will be reviewed."
(23) *Physical Chemistry Topics – Nanostructure Characterization (Section C)* (CHE 512) Spring 2020 (updated/expanded, transition to remote from Spring break 2020 onwards).
"This course CHE512, is intended to provide students with a solid introduction to different nanostructure characterization techniques and then dive deeper into advanced techniques such as in situ and time-resolved structure determination."
(24) *Physical Chemistry* (CHE319) Fall 2020 (updated/expanded, fully remote)
"The goal of this course is to provide the student with the necessary physical chemistry for their future career in chemistry. The course will cover topics in thermodynamics, chemical kinetics and statistical mechanics. The mathematical tools required to solve problems associated with these topics will be reviewed."

(25) *Physical Chemistry Topics – Nanostructure Characterization (Section C)* (CHE 512) Spring 2021 (updated/expanded, fully remote).
"This course CHE512, is intended to provide students with a solid introduction to different nanostructure characterization techniques and then dive deeper into advanced techniques such as in situ and time-resolved structure determination.
Covered topics include:
- Scattering-/diffraction-techniques for the characterization of materials - fundamentals and advanced experiments (e.g. time-resolved/molecular movies)
- Specialized microscopy techniques - from super-resolution optical microscopy over mapping microscopy (e.g. atomic force, spectroscopy, etc.) and to X-ray/electron nanoscopy
- (Microfluidic) flow chemistry fundamentals and approaches for in situ nanomaterials synthesis
- Advanced 3D-Micro-/Nanofabrication beyond traditional 3D-printing"

(26) *Physical Chemistry* (CHE319) Fall 2021 (updated/expanded, hybrid: in-person & remote)
"The goal of this course is to provide the student with the necessary physical chemistry for their future career in chemistry. The course will cover topics in thermodynamics, chemical kinetics and statistical mechanics. The mathematical tools required to solve problems associated with these topics will be reviewed."

(27) *Physical Chemistry Topics – Nanostructure Characterization (Section C)* (CHE 512) Spring 2022 (to be updated/expanded, hybrid: in-person & remote), content see above.

Service on Thesis Committees (major Professor in Parenthesis)

PhD Co-Advisor:	Brian Breeman (Velarde Lab)
PhD Committee member:	Austin Gilbert (Watson Lab &Cook Lab)
PhD Committee member:	Shea Myers (Benedict Lab)
PhD Committee member:	Nicholas Hazel (Ray Lab)
PhD Committee member:	Zoe Marr (Benedict Lab)
PhD Committee member:	Medini Rajapakse (Velarde Lab)
PhD Committee member:	Heshali Welgama (Cook Lab)
PhD Committee member:	Sarah Forney (Watson Lab)
PhD Committee member:	Arianna Rothfuss (Watson Lab)
PhD Committee member:	Xindi Li (Rzayev Lab)
PhD Committee member:	Xiaotong Zhang (Benedict Lab)

CURRENT RESEARCH GROUP

Former Postdoctoral Associates

Dr. Sebastian Bommel (08/2015-06/2016)
Initial Employer: Philips Medical imaging, Hamburg, Germany.

Diana Monteiro, Ph.D. (Hamburg-based, 12/2015-03/2019)
Initial Employer: Hauptmann-Woodward Medical Research Institute., Buffalo, NY

Florian Kopf, Ph.D. (Hamburg-Based, 11/2016-03/2019)
Initial Employer: University of Hamburg

Current Ph.D. Graduate Students

Lars Paulson	Ph. D. University at Buffalo (since Fall 2018)
Clayton Rumsey	Ph. D. University at Buffalo (since Fall 2018)
Sankar Raju Narayanasamy	Ph. D. University at Buffalo (since Fall 2018, currently as RA at Berkeley Lab paid by collaborator)
Kris Hoyt	Ph. D. University at Buffalo (since Fall 2020)
Alec Pitter	Ph,D, University at Buffalo (since Fall 2021)

Former Ph.D. Graduates

Mohammad Vakili, Ph.D. completed 03/2019
Thesis: *Microfluidic Sample Environments for Time-resolved Macromolecular Structure Formation Studies*
Initial Employer: European XFEL, Schenefeld, Germany

Ramakrishna Vasireddi, Ph.D. completed 03/2019
Thesis: *Fabrication of Novel Microfluidic Devices for Investigating Ultrafast Structural Dynamics*
Initial Employer: Synchrotron SOLEIL, Essonne, France

Rustam Rysov, Ph.D. completed 09/2019 (Co-Advisor)
Thesis: Probing ultra-fast dynamics with the hard X-ray delay line
Initial Employer: X-ray scientist at PETRA III synchrotron

Yunyun Gao, Ph.D. completed 09/2020 (Co-Advisor)
Thesis: New Methods for the Analysis of Small-Angle Solution X-ray Scattering Data from Biomacromolecules
Initial Employer: University of Hamburg, Coronavirus Structural Taskforce

Former M.Sc. Graduate Students

Anne Creon	M. Sc. Nanoscience, University of Hamburg (finished Summer 2017)
Vi Quint Duong	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Rafaela Fuchs	M. Sc. Nanoscience, University of Hamburg (finished Summer 2017)
Tobias Gerling	M. Sc. Nanoscience, University of Hamburg (finished Summer 2017)
Jessica Harich	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Joscha Kruse	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Konstantin Krutzke	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Stefan Merkens	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Julia Nette	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Sankar Raju	M. Sc. Engineering, Chalmers University of Technology (Summer 2018)
Christoph Thiele	M. Sc. Nanoscience, University of Hamburg (finished Summer 2018)
Christopher Swagler	M. Sc. Chemistry, University at Buffalo (finished Fall 2020)

Former Undergraduates, Students, Interns (since 10/2014)

Oliver Aust	BSc-candidate, University of Hamburg)
Tomke Glier	BSc-candidate, student research assistant, University of Hamburg)
Erik Nebelung	BSc-candidate, University of Hamburg)
Jonas Römermann	BSc-candidate, University of Hamburg)
Denis Tebelius	BSc-candidate, University of Hamburg)
Dennis Weber	BSc-candidate, University of Hamburg)
Moses Birk	Student research assistant, University of Hamburg)
Karuna Kanes	Student research assistant, University of Hamburg)
Stephan Hinrichs	Intern, University of Hamburg)
Xenia Kraus	Intern, University of Hamburg)
Felix Lauterbach	Intern, University of Hamburg)
Akhil Naidu	Intern, University of Hamburg)
Ekaterina Sakarinen	Intern, University of Hamburg)
Steffen Tietjen	Intern, University of Hamburg)
Alec Pitter	intern, University at Buffalo, now accepted to UB-CHE's Ph. D. program)

CURRENT COLLABORATIONS

SUNY-Buffalo

Luis Velarde (Chemistry)
Jason Benedict (Chemistry)
David Heppner (Chemistry)
Javid Rzayev (Chemistry)
Shenqiang Ren (Mechanical and Aerospace Engineering/Chemistry)
Thomas Grant (Medical School/Structural Biology)
Qiu-Xing Jiang (Hauptmann Woodward Medical Research Institute)
Haiqing Lin (Chemical Biological Engineering)

Other Institutions (closest collaborators during the past five years)

Luis Liz- Marzán (CIC biomaGUNE, CIBER-BBN & DIPC, San Sebastián, Spain)
Stephen Muench (University of Leeds, UK)
Richard Kirian (Arizona State University, Tempe, AZ, USA)
Jake Koralek (SLAC, Menlo Park, CA, USA)
Raymond Sierra (SLAC, Menlo Park, CA, USA)
Arwen Pearson (University of Hamburg, Germany)
Robert Blick (University of Hamburg, Germany)
Gerhard Grübel (DESY, Hamburg, Germany)
Thomas Keller (DESY, Hamburg, Germany)
Henry Chapman (CFEL, Hamburg, Germany)
Joachim Schulz (European XFEL, Schenefeld, Germany)
Stephan Förster (FZ Jülich & RWTH Aachen, Germany)
Hoi-Ying Holman (Lawrence Berkeley National Laboratory, Berkeley, CA, USA)
Matthew Coleman (Lawrence Livermore National Laboratory, Livermore, CA, USA)
Andrew Aquila (SLAC LCLS, Menlo Park, CA, USA)
Mark Hunter (SLAC LCLS, Menlo Park, CA, USA)
Abbas Ourmazd (University of Wisconsin Milwaukee, Milwaukee, WI, USA)
Peter Schwander (University of Wisconsin Milwaukee, Milwaukee, WI, USA)