Nick Garabedian, Ph.D.

full name: Nikolay T. Garabedian

Welcome to my CV!

Currently, I am leading a research group at the Karlsruhe Institute of Technology (KIT) called "Linked Tribological Data". My research interests lie at the intersection of linked data engineering, materials science, machine learning, experimental nanotribology, research data management, FAIR data, and Open Science & Reproducibility. Our diverse team actively integrates knowledge from multiple scientific avenues in order to develop the most applicable, reliable and sustainable solutions for FAIR data collection within tribology and materials science.

Topics of Interest:

Linked Data and Metadata · Machine Learning · Materials Science · Tribology · Nanotribology · FAIR Data · Open Science & Reproducibility

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Online Engagement:	LinkedIn
	Twitter
	nick-garabedian.com
	YouTube

Professional Experiences:

Karlsruhe Institute of Technology (KIT) **Karlsruhe, Germany** **June 2019 - Present**
IAM-ZM Materials Tribology Group, *Prof. Christian Greiner, Prof. Peter Gumbsch*

Group Leader of "Linked Tribological Data" December 2021 – Present

- Supervising a research group of 9 scientists at the bachelor's, master's, doctoral and postdoctoral levels
- Focused on data-intensive experimental methods, software development, tribotesting and machine learning

Alexander von Humboldt Research Fellow January 2021 – December 2022

- Machine learning analysis techniques for experimental tribology and material science
- Metals tribology and microstructural evolution under industrially-relevant conditions

Postdoctoral Researcher June 2019 – December 2020

- Full digitalization, data management of scientific lab activities for the age of data science
- *In-situ* XRD measurements of copper under tribological loads and machine learning analysis thereof

University of Delaware **Newark, Delaware, USA** **August 2014 – June 2019**

Graduate Research Assistant *Doctoral Advisor: David L. Burris, Ph.D.*

Doctoral research: ***A direct experimental link between atomic-scale and macroscale friction***

- End-to-end design, evaluation and application of laboratory measurement equipment
- Traceable lateral force calibration techniques for AFM and tribometry across all scales
- AFM at the macroscale: methods to fabricate and calibrate probes for millinewton force measurements
- Quantifying, locating, and following asperity scale wear within macroscale contact areas

Collaborative projects:

- Predicting bearing loads in wind turbine drivetrains (Argonne National Laboratories)
- In-situ observations of DLC transfer film formation (Carpick group at University of Pennsylvania)
- Mechanical characterization of hydrogel scaffolds for tissue engineering (Jia group at Uni. Delaware)
- QCM-integrated microtribometry for characterization of MoS2 (Borowski group at St. Olaf College)
- Mechanical characterization of hydrogel spheres for drug delivery (Kloxin group at Uni. Delaware)
- Durability of PEDOT coatings for biodevices (Martin group at Uni. Delaware)
- Tribology of polymer blend coatings (Epps group *at Uni. Delaware)*

Graduate Teaching Assistant: *Materials Engineering (a 3rd-year Class)* August – December 2014

IBM India Research Laboratory **New Delhi, India** **June – August 2013**

Research Assistant - Intern

- Trained algorithms to extract features from audio-visual data in real time
- Project: Artificial intelligence for mobile sensing in *Smarter Cities*

Union College **Schenectady, NY, USA** **June 2012 – March 2013**

Research Assistant

- Effect of posterior curvature on the bending strength of maxillary canines in cercopithecoid monkeys
- Effect of head-carrying on cranial deformation and morphology

Education:

University of Delaware — 2014 - 2019
Ph.D. in Mechanical Engineering — Newark, DE, USA
Topic: A direct experimental link between atomic-scale and macroscale friction
Advisor: David L. Burris, Ph.D.

Union College — 2010 - 2014
B.S. in Mechanical Engineering (Hon.) — Schenectady, NY, USA
Economics Minor
Union Scholars Program, Cum Laude
Pi Tau Sigma Mechanical Engineering Honorary Society

Plovdiv Language High School — 2005 - 2010
English and German Language Program — Plovdiv, Bulgaria

Refereed Publications:

1. **Waviness Affects Friction and Abrasive Wear,** Yulong Li, Nikolay T Garabedian, Johannes Schneider, Christian Greiner, *Tribology Letters*, **2023**, 71:64, DOI: 10.1007/s11249-023-01736-1

2. **Generating FAIR research data in tribology,** Nikolay T. Garabedian (co-lead author), Paul J. Schreiber (co-lead author), Nico Brandt, Philipp Zschumme, Ines L. Blatter, Antje Dollmann, Christian Haug, Daniel Kümmel, Yulong Li, Franziska Meyer, Carina E. Morstein, Julia S. Rau, Manfred Weber, Johannes Schneider, Peter Gumbsch, Michael Selzer, Christian Greiner, *Sci Data* ***9*****,** 315 (**2022**) DOI: 10.1038/s41597-022-01429-9

3. **Managing FAIR Tribological Data Using Kadi4Mat,** Nico Brandt, Nikolay T Garabedian, Ephraim Schoof, Paul J. Schreiber, Philipp Zschumme, Christian Greiner, Michael Selzer, *Data*, **2022**, *7*, 15 DOI: 10.3390/data7020015

    - ***Selected Journal Cover Story***

4. **Traceable lateral force calibration (TLFC) for atomic force microscopy**, Arnab Bhattacharjee (co-lead author), Nikolay T. Garabedian (co-lead author), Christopher L. Evans, David L. Burris, *Tribology Letters*, **2020**, 68:111, DOI: 10.1007/s11249-020-01349-y

5. **Integrated QCM-microtribometry: friction of single-crystal MoS_2 and gold from μm/s to m/s,** Brian P Borovsky (co-lead author), Nikolay T Garabedian (co-lead author), Gabriel R McAndrews, Raymond J Wieser, David L Burris, *ACS Applied Materials & Interfaces*, **2019**, *11* (43), 40961-40969 DOI: 10.1021/acsami.9b15764

6. **Durability of Poly(3,4-ethylene dioxythiophene) (PEDOT) films on metallic substrates for bioelectronics and the dominant role of relative shear strength**, Jing Qu, Nikolay T Garabedian, David L Burris, David C Martin, *Journal of Mechanical Behavior of Biomedical Materials*, **2019**, 100, pp 103376, DOI: 10.1016/j.jmbbm.2019.103376

7. **Quantifying, locating, and following asperity scale wear within macroscale contact areas**, Nikolay T Garabedian, Arnab Bhattacharjee, Martin N. Webster, Gary L. Hunter, Peter W. Jacobs, Andrew R. Konicek, David L. Burris, *Tribology Letters,* **2019**, 67:89, DOI: 10.1007/s11249-019-1203-6

8. **Spatial patterning of molecular cues and vascular cells in fully integrated hydrogel channels via interfacial bioorthogonal crosslinking**, Kevin. T. Dicker, Axel. C. Moore, Nikolay T. Garabedian, Han Zhang, Samuel L. Scinto, Robert E. Akins, David L. Burris, Joseph M. Fox, and Xinqiao Jia, *ACS Appl. Mater. Interface,* **2019**, *11* (18), 16402-16411, DOI: 10.1021/acsami.9b04383

9. **Mechanical and compositional characterization of thick tribofilms formed from silicon- and oxygen-containing hydrogenated amorphous carbon**, J.B. McClimon, A.C. Lang, Z. Milne, N.T. Garabedian, A.C. Moore, J. Hilbert, F. Mangolini, J.R. Lukes, D.L. Burris, M.L. Taheri, J. Fontaine, R.W. Carpick, *Tribology Letters*, **2019**, 67(2), DOI: 10.1007/s11249-019-1155-x

10. **AFM at the macroscale: methods to fabricate and calibrate probes for millinewton force measurements**, Nikolay T Garabedian, Harman S Khare, Robert W Carpick, David L Burris, *Tribology Letters,* **2019** 67: 21, DOI: 10.1007/s11249-019-1134-2

11. **The cause of premature wind turbine bearing failures: overloading or underloading?,** Nikolay T Garabedian, Benjamin J Gould, Gary L Doll, David L Burris, *Tribology Transactions*, 61:5, 850-860, **2018**, DOI: 10.1080/10402004.2018.1433345
    - ***2020 Wilbur Deutsch Memorial Award***, STLE Awards Committee, May 2020
    - ***Editor's Choice paper in Tribology & Lubrication Technology***, July 2018, pp 60-74

12. **Exploiting feedstock diversity to tune the chemical and tribological properties of lignin-inspired polymer coatings,** Jillian A Emerson, Nikolay T Garabedian, Axel C Moore, David L Burris, Eric M Furst, Thomas H Epps III, *ACS Sustainable Chem. Eng.*, **2018**, *6* (5), pp 6856–6866, DOI: 10.1021/acssuschemeng.8b00667

13. **Unexpected tribological synergy in polymer blend coatings: leveraging phase separation to isolate domain size effects and reduce friction,** Jillian A Emerson, Nikolay T Garabedian, Axel C Moore, David L Burris, Eric M Furst, Thomas H Epps III, *ACS Appl. Mater. Interfaces*, **2017**, 9 (39), pp 34480–34488, DOI: 10.1021/acsami.7b10170

14. *Under Review:* **Case study: the potential for significant savings thanks to FAIR data in one materials science PhD project,** Michael Seitz, Nikolay T Garabedian, Ilia Bagov, Christian Greiner, *International Journal of Materials Research*

15. *Under Review:* **Robust vibration-activated lubricity,** Arnab Bhattacharjee, Nikolay T Garabedian, Brian P Borovsky, David L Burris, *Tribology Letters*

Datasets and Software:

1. **FAIR Data Package of a Tribological Showcase Pin-on-Disk Experiment**. Nikolay Garabedian, Paul Schreiber, Yulong Li, Ines Blatter, Antje Dollmann, Christian Haug, Daniel Kümmel, Franziska Meyer, Carina Morstein, Julia Rau, Christian Greiner. (2021). Zenodo. 10.5281/zenodo.5720625

2. **Vocabulary of Materials Tribology Lab at KIT**. Ilia Bagov, Malte Flachmann, Nikolay Garabedian, Torben Tiezema, Yulong Li, Julia Rau, Ines Blatter, Antje Dollmann, Michael Seitz, Christian Greiner. (2023). Zenodo. 10.5281/zenodo.7709546

3. **Tribological Experiments - Sapphire on Copper - FAIR Dataset**. Malte Flachmann, Jakob Biesinger, Max Gorenflo, Ilia Bagov, Christian Greiner, Nikolay Garabedian. (2023). Zenodo. 10.5281/zenodo.7923127

4. **VocPopuli** (0.0.1) [Software]. Ilia Bagov, Miłosz Meller, Floriane Bresser, Nuoyao Ye, Nikolay Garabedian. (2023). Zenodo. 10.5281/zenodo.7923729

5. **TriboDataFAIR Ontology**. Nikolay Garabedian, Ilia Bagov. (2023). Zenodo. 10.5281/zenodo.205720197

6. **SurfTheOWL.** Manfred Weber, Nikolay Garabedian. (2021). Zenodo. 10.5281/zenodo.5720217

Other Archival Publications:

1. **A Framework to Generate, Store, and Publish FAIR Data in Experimental Sciences,** Nick Garabedian, Ilia Bagov, Malte Flachmann, Nuoyao Ye, Miłosz Meller, Floriane Bresser, Christian Greiner, *SEMANTICS 2023, Leipzig, Germany*

2. **Workshop: An End-to-End Framework for FAIR Data in Experimental Materials Tribology,** N.T. Garabedian, I.T. Bagov, F. Bresser, M.L. Flachmann, N. Ye, C. Greiner, M. Meller, *NFDI-MatWerk Conference 2023, Siegburg, Germany*

3. **Elevator Pitch: VocPopuli: Collaborative FAIR Data Vocabularies,** N.T. Garabedian, I.T. Bagov, F. Bresser, M.L. Flachmann, N. Ye, C. Greiner, M. Meller, *NFDI-MatWerk Conference 2023, Siegburg, Germany*

4. **Collaborative Metadata Definition using Controlled Vocabularies, and Ontologies,** Ilia Bagov, Christian Greiner, Nikolay Garabedian, *FAIR Digital Object Conference, October 2022, Leiden, the Netherlands*, 10.3897/rio.8.e94931

5. **Collaborative Metadata Definition using Controlled Vocabularies, and Ontologies - FAIR Data Showcase in Experimental Tribology,** Nikolay Garabedian, *NFDI4Ing Conference 2022*

6. **Tribological experiments in the age of big data,** Nikolay T Garabedian, Paul J. Schreiber, Christian Greiner, *23rd International Colloquium Tribology 2022 - TAE*

7. **Data science techniques applied to *in-situ* XRD measurements of copper under tribological load,** Nikolay Garabedian, Patric Gruber, Christian Greiner, *World Tribology Congress 2022*

8. **Measuring friction at a single interface with two independent microtribometers: A model study with alumina spheres on gold or single-crystal MoS_2,** Brian P Borovsky, Nikolay T Garabedian, Gabriel R McAndrews, Raymond J Wieser, David L Burris, *Tribology Frontiers Conference 2019*

9. **Bridging the tribometry gap**, Nikolay Garabedian and David Burris, *Tribology & Lubrication Technology*, March 2019

10. **The cause of premature wind turbine bearing failures: overloading or underloading?,** Nikolay T Garabedian, Benjamin J Gould, Gary L Doll, David L Burris, *Tribology & Lubrication Technology*, pp 60-74, July 2018

11. **Effect of posterior curvature on the bending strength of maxillary canines in cercopithecoid monkeys,** Andrew J Rapoff, Nikolay T Garabedian, Scott Mcgraw, David J Daegling, *American Journal of Physical Anthropology*, 2013, 150 p. 229

Patents:

1. **Frictionless wedge and reference spring** for Lateral Force AFM Calibration, David L Burris and Nikolay T Garabedian, US 62/674,042, 21 May 2018, *Provisional*

Oral Presentations:

As a presenter:

1. **FAIR Vocabularies could well be the Nucleus for FAIR Data and Beyond**, Nick Garabedian, Malte Flachmann, Ilia Bagov, Nuoyao Ye, Miłosz Meller, Benedikt Stoll, Christian Greiner, *SciDataCon-IDW*, Salzburg, Austria, November 2023

2. **T-shaped data in tribology: the synergy between broad FAIR data and a deep set of experiments**, Nick Garabedian, Malte Flachmann, Ilia Bagov, Jakob Biesinger, Max Gorenflo, Yulong Li, Michael Seitz, Nuoyao Ye, Floriane Bresser, Benedikt Stoll, Christian Greiner, *ITC Fukuoka 2023,* Fukuoka, Japan, September 2023

3. **VocPopuli and Kadi4Mat for FAIR data collection in experimental sciences**, N.T. Garabedian, N. Brandt, I.T. Bagov, M.L. Flachmann, N. Ye, F. Bresser, M. Meller, C. Greiner, M. Selzer, *NFDI4ING Conference 2023*, September 2023

4. **A Framework to Generate, Store, and Publish FAIR Data in Experimental Sciences,** Nick Garabedian, Ilia Bagov, Malte Flachmann, Nuoyao Ye, Miłosz Meller, Floriane Bresser, Christian Greiner, *SEMANTICS 2023,* Leipzig, Germany, September 2023

5. **(Do) We Produce FAIR Data,** Nick Garabedian, Ilia Bagov, Malte Flachmann, Nuoyao Ye, Miłosz Meller, Floriane Bresser, Christian Greiner, *CoRDI 2023*, Karlsruhe, Germany, September 2023

6. **Tribology in the Age of Big Data**, Nick Garabedian, *Swiss Tribology Symposium*, Winterthur, Switzerland, August 2023

7. **Workshop: An End-to-End Framework for FAIR Data in Experimental Materials Tribology,** N.T. Garabedian, I.T. Bagov, F. Bresser, M.L. Flachmann, N. Ye, C. Greiner, M. Meller, *NFDI-MatWerk Conference 2023,* Siegburg, Germany

8. **Elevator Pitch: VocPopuli: Collaborative FAIR Data Vocabularies,** N.T. Garabedian, I.T. Bagov, F. Bresser, M.L. Flachmann, N. Ye, C. Greiner, M. Meller, *NFDI-MatWerk Conference 2023,* Siegburg, Germany

9. **Inevitable Deviations in Surface Profile and System Vibration Determine Tribological Behavior**, Nick Garabedian, Yulong Li, Johannes Schneider, Christian Greiner, *2023 STLE Annual Meeting*, Long Beach CA, May 2023

10. **How to Get to Big Data in Tribology? A Hands-on Example**, Nick Garabedian, Ilia Bagov, Christian Greiner *2023 STLE Annual Meeting*, Long Beach CA, May 2023

11. **HMC Project MetaCook - start your FAIR journey with VocPopuli,** Nikolay Garabedian, *Helmholtz Metadata Collaboration, 2022*. Recording: 10.5446/60349

12. **Collaborative Metadata Definition using Controlled Vocabularies, and Ontologies,** Ilia Bagov, Christian Greiner, Nikolay Garabedian, *FAIR Digital Object Conference, October 2022, Leiden, the Netherlands*, 10.3897/rio.8.e94931

13. **Metadata Definition using Controlled Vocabularies, and Ontologies - FAIR Data Showcase in Experimental Tribology,** Nikolay Garabedian, *NFDI4Ing Conference, October 2022*

14. **Does atomic stick-slip contribute to practical friction?,** Nick Garabedian (presenting), Arnab Bhattacharjee, Brian Borovsky, David Burris, *Friction and Wear across Scales*, August 2022, Ascona, Switzerland

15. **Data science techniques applied to *in-situ* XRD measurements of copper under tribological load,** Nikolay Garabedian, Patric Gruber, Christian Greiner, *World Tribology Congress 2022*, July 2022, Lyon, France

16. **Linked experimental data in tribology for machine learning applications,** Nikolay T Garabedian, Christian Greiner, *2022 STLE Annual Meeting*, Orlando FL, May 2022

17. **Tribological experiments in the age of big data,** Nikolay T Garabedian, Paul J. Schreiber, Christian Greiner, *23rd International Colloquium Tribology 2022 - TAE*, Esslingen, Germany, January 2022

18. **Data science techniques applied to *in-situ* XRD measurements of copper under tribological load,** Nikolay T Garabedian, Patric Gruber, Christian Greiner, *2021 STLE Annual Meeting*, New Orleans LA (online), May 2021

19. **Tribological experiments in the age of big data,** Nikolay T Garabedian, Paul Schreiber, Christian Greiner, *2021 STLE Annual Meeting*, New Orleans LA (online), May 2021

20. **Data science techniques applied to *in-situ* XRD measurements of copper under tribological load,** Nikolay T Garabedian, Patric Gruber, Christian Greiner, *MSE 2020*, Darmstadt (online), September 2020

21. **Sliding over 10,000 Times Faster: QCM-integrated microtribometry to probe friction fundamentals via gold and single-crystal MoS_2**, Nikolay T Garabedian, R.J. Wieser, G.R. McAndrews, Brian P. Borovsky, David L Burris, *2019 STLE Annual Meeting*, Nashville TN, May 2019

22. **Linking macro-scale and atomic-scale friction**, Nikolay T Garabedian and David L Burris, *2019 STLE Annual Meeting*, Nashville TN, May 2019

23. **Sliding over 10,000 times faster: QCM-integrated microtribometry to probe friction fundamentals via gold and single-crystal MoS_2**, Nikolay T Garabedian, Brian P. Borovsky, David L Burris, *2019 MRS Spring Meeting*, Phoenix AZ, April 2019

24. **How to Mitigate Friction and Wear?,** Nikolay T Garabedian and David L Burris, *University of Delaware Graduate Student Forum*, Newark DE, April 2019

25. **Sliding over 10,000 Times Faster: QCM-integrated microtribometry to probe friction fundamentals via gold and single-crystal MoS_2**, Nikolay T Garabedian, R.J. Wieser, G.R. McAndrews, Brian P. Borovsky, David L Burris, *2019 MRS Spring Meeting*, Phoenix AZ, April 2019

26. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian, David L Burris, *Tribology Frontiers Conference*, October 2018

27. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian, Harman S Khare, Robert W Carpick, David L Burris, *Tribology Gordon Research Seminar*, Lewiston ME, June 2018

28. **Linking macro-scale and atomic-scale friction**, Nikolay T Garabedian and David L Burris, *2018 STLE Annual Meeting*, Minneapolis MN, May 2018

29. **Challenges in developing more efficient and reliable tribological systems,** Nikolay T Garabedian and David L Burris, *University of Delaware Graduate Student Forum*, Newark DE, April 2018

30. **A direct experimental link between atomic-scale and macro-scale,** Nikolay T Garabedian and David L Burris, *University of Delaware Graduate Student Forum*, Newark DE, April 2017

31. **Relating wear uncertainties to material characteristics through interrupted topography measurements**, Nikolay T Garabedian and David L Burris, *2016 STLE Annual Meeting*, Las Vegas NV, May 2016

32. **Analysis of planetary bearing under-loading in wind turbines,** Nikolay T Garabedian, Benjamin J Gould, David L Burris, *University of Delaware Graduate Student Forum*, Newark DE, April 2016

33. **Quantifying wear volume uncertainty based on interrupted topography measurements,** Nikolay T Garabedian, Harman S Khare, David L Burris, *Tribology Frontiers Conference*, Denver CO, October 2015

34. **Analysis of planetary bearing under-loading in wind turbines,** Nikolay T Garabedian, Benjamin J Gould, David L Burris, *Tribology Frontiers Conference*, Denver CO, October 2015

35. **Quantifying wear volume uncertainty based on interrupted topography measurements,** Nikolay T Garabedian, Harman S Khare, David L Burris, *University of Delaware Graduate Student Forum*, Newark DE, April 2015

As a co-author:

36. **Collecting FAIR data as a base for machine learning in tribology,** N.T. Garabedian, M.L. Flachmann (Speaker), I.T. Bagov, J. Biesinger, M. Gorenflo, N. Ye, F. Bresser, M. Meller, C. Greiner, *AI MSE 2023*, Saarbrücken, Germanz, November 2023

37. **Normal force dependent tribo-oxidation and friction of copper,** M. L. Flachmann, M. Gorenflo, J. Biesinger, N. T. Garabedian, C. Greiner, *EuroMAT 2023,* Frankfurt, Germany, September 2023

38. **Give Tribological Data a Meaning: VocPopuli and PIDs**, Ilia Bagov, Nikolay Garabedian, Christian Greiner, *WeSSTribo 2022*, September 2022

39. **Is abrasive wear positively correlated with particle size?,** Yulong Li, Nikolay T Garabedian, Christian Greiner, Johannes Schneider, *2022 MSE*, Darmstadt, Germany, September 2022

40. **3D Metamaterials for Mimicking Cartilage Response,** Patrick Ziemke, Nikolay Garabedian, Ombeline Juteau, Abhinav Bairathi, Peter Gumbsch, David Burris, *2022 STLE Annual Meeting*, Orlando FL, May 2022

41. **Robust Vibration Induced Lubricity,** Arnab Bhattacharjee, Nikolay T Garabedian, Brian P Borovsky, David L Burris, *2021 STLE Annual Meeting*, New Orleans LA (online), May 2019

42. **Quantifying and tracking the life of an asperity subject to tribological contact**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *2019 STLE Annual Meeting*, Nashville TN, May 2019

43. **Quantifying and tracking asperity scale wear during microscale wear measurements**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *Tribology Frontiers Conference*, October 2018

44. **Methods to study the life of an asperity subject to tribological contact**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *2019 STLE Annual Meeting*, Nashville TN, May 2019

45. **Methods to study the life of an asperity subject to tribological contact**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *2018 STLE Annual Meeting*, Minneapolis MN, May 2018

46. **Evaluating transfer film wear rates of polymeric solid lubricants**, Kazi I Alam, Diana R Haidar, Jiaxin Ye, Nikolay T Garabedian, David L Burris, 2017 STLE Annual Meeting, Atlanta, GA, May 2017

Invited Presentations, Live Interviews, Magazine Articles

47. **Plenary Talk: The Data Science Frontier in Tribology,** Nick Garabedian, Malte Flachmann, Ilia Bagov, Jakob Biesinger, Max Gorenflo, Nuoyao Ye, Floriane Bresser, Miłosz Meller, Christian Greiner, *International Colloquium Tribology: TAE*, Esslingen, Germany, January 2024

48. **Data Science in Tribology,** a lecturer at *Tribology Today, a French-German-Tunisian Winter School*, Monastir, Tunisia, October 2023

49. **Why waviness worsens wear** by Wilfred Tysoe and Nicholas Spencer

50. A review in *TLT Magazine in August 2023* of our article called *Waviness Affects Friction and Abrasive Wear*

51. **How to get to Big Data in Tribology? A hands-on example,** Nick Garabedian, Ilia Bagov, Christian Greiner, *2023 STLE Annual Meeting*, Long Beach CA, May 2023

52. **Big (Open) Data in Tribology. Big (Open) Data in Experimental Science,** Nick Garabedian, Ilia Bagov, Christian Greiner, *WeSSTribo 2022*, September 2022, youtu.be/ts1LeM2hVpQ

53. **Interview at the FAIR Data Podcast,** August 2022, youtu.be/zIHggnGvIWs

54. **AI applications in tribology research for mechanical components,** by Nancy McGuire
    - An interview with Nikolay T Garabedian, *TLT Magazine*, *February 2022 Link to Story*

55. **Launch on a long-term digital path**, Nikolay Garabedian, Christian Greiner, *Fraunhofer IWM Wissenschaftstag*, online, April 2022

56. **Tribological experiments in the age of big data**, Nikolay Garabedian, Christian Greiner, *Fraunhofer IWM Geschäftsrunde*, online, March 2022

57. **FAIR data in tribology: the key to scalable machine learning,** Nikolay T Garabedian, Christian Greiner, *AI and Machine Learning in Tribology Session, 2022 STLE Annual Meeting*, Orlando FL, May 2022

58. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian, David L Burris, *Philadelphia STLE Section Meeting*, Oreland PA, September 2018

Poster Presentations:

As a presenter:

59. **Tribology in the Age of Big Data**, Nikolay T. Garabedian, *H^3 Helmholtz Herbst Hackathon*, Gummersbach, Germany, September 2021

60. **Sliding over 10,000 Times Faster: QCM Integrated Microtribometry to Probe Friction Fundamentals via Gold and Single-Crystal MoS_2,** Nikolay T Garabedian, R.J. Wieser, G.R. McAndrews, Brian P. Borovsky, David L Burris, *Tribology Frontiers Conference*, Chicago IL, October 2018

61. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian, Harman S Khare, Robert W Carpick, David L Burris, *Tribology Gordon Research Conference,* Lewiston ME, June 2018

62. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian, Harman S Khare, Robert W Carpick, David L Burris, *Tribology Gordon Research Seminar*, Lewiston ME, June 2018

63. **A direct experimental link between atomic-scale and macroscale friction,** Nikolay T Garabedian and David L Burris, *2018 STLE Annual Meeting*, Minneapolis MN, May 2018 – ***Gold Poster Presentation Award Winner***

64. **A new experimental approach to study micro and nano-scale friction**, Nikolay T Garabedian and David L Burris, *2017 STLE Annual Meeting*, Atlanta GA, May 2017

65. **Low wind speed as a paradoxical driver of premature bearing failure in wind turbines**, Nikolay T Garabedian, Benjamin J Gould, David L Burris, *2017 STLE Annual Meeting*, Atlanta GA, May 2017

66. **Quantifying wear volume uncertainty based on interrupted topography measurements,** Nikolay T Garabedian, Harman S Khare, David L Burris, *Tribology Frontiers Conference*, Denver CO, October 2015

67. **Quantifying wear volume uncertainty based on interrupted topography measurements,** Nikolay T Garabedian, Harman S Khare, David L Burris, *2015 STLE Annual Meeting*, Dallas TX, May 2015

As a co-author:

1. **Managing FAIR Tribological Data Using a Generic Research Data Infrastructure,** Nico Brandt, Nikolay T. Garabedian, Ephraim Schoof, Paul J. Schreiber, Philipp Zschumme, Christian Greiner, Michael Selzer, *MSE Congress 2022*, Darmstadt

2. **Does atomic stick-slip contribute to practical friction?,** Nikolay T Garabedian, Arnab Bhattacharjee, Brian Borovski, David L Burris, *Tribology Gordon Research Conference,* Lewiston ME, June 2022

3. **Traceable Lateral Force Calibration (TLFC) for Atomic Force Microscopy**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *Tribology Frontiers Conference*, Chicago IL, November 2020 (online)

4. **Measuring friction at a single interface with two independent microtribometers: A model study with alumina spheres on gold or single-crystal MoS_2,** Brian P Borovsky, Nikolay T Garabedian, Gabriel R McAndrews, Raymond J Wieser, David L Burris, *Tribology Frontiers Conference 2019*, Chicago IL, October 2019

5. **Methods to study the life of an asperity subject to tribological contact**, Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *2019 STLE Annual Meeting*, Nashville TN, May 2019

6. **A Microscale Study of Friction on Single-Crystal Molybdenum Disulfide Using a Combined Indenter Probe and Quartz Crystal Microbalance**, Gabriel McAndrews, Raymond Wieser, Nikolay T Garabedian, David L Burris, Brian Borovsky, *Tribology Frontiers Conference*, Chicago IL, October 2018

7. **Investigating Microscale Friction at High Sliding Speeds Using a Combined Indenter Probe and Quartz Crystal Microbalance** Brian Borovsky, Gabriel McAndrews, Raymond Wieser, Nikolay T Garabedian, David L Burris, *Tribology Frontiers Conference*, Chicago IL, October 2018

8. **Quantifying and Tracking Asperity Scale Wear During Microscale Wear Measurements,** Arnab Bhattacharjee, Nikolay T Garabedian, David L Burris, *Tribology Frontiers Conference*, Chicago IL, October 2018

9. **Investigating Microscale Friction at High Sliding Speeds Using a Combined Indenter Probe and Quartz Crystal Microbalance** Brian Borovsky, Gabriel McAndrews, Raymond Wieser, Nikolay T Garabedian, David L Burris*, AVS 65th International Symposium & Exhibition*, Long Beach CA, October 2018

10. **Lubricity of SiOx-containing hydrogenated amorphous carbon (a-C:H:Si:O) probed at several lengthscales,** J.B. McClimon, A.C. Lang, Z. Milne, N. T. Garabedian, A.C. Moore, F. Mangolini, J.R. Lukes, D.L. Burris , J. Fontaine, R.W. Carpick**,** *Tribology Gordon Research Conference,* Lewiston ME, June 2018

11. **Quantifying the relationship between durability and adhesion of PEDOT on metallic substrates**, Jing Qu, Nikolay T Garabedian, David L Burris, David C Martin, *BioInterface Workshop & Symposium*, San Diego CA, October 2017

Awards and Fellowships:

1. **DAAD Kongressreisenprogramm, Travel Award to Attend the International Tribology Conference in Fukuoka Japan, 2023**

2. **Early Career Award, Postdoctoral Researcher, 2022**, STLE: *Tribology in the age of big data*

3. **Goethe Institut German Language Fellowship, September 2020 – December 2020,** Alexander von Humboldt Foundation, declined due to COVID-19 related amendments

4. **Robert W. Gore Fellowship, September 2018 – May 2019,** Dissertation Research Fellowship, College of Engineering, University of Delaware

5. **Philadelphia STLE Scholarship, July 2018,** STLE Local Chapter Award, *A direct experimental link between atomic-scale and macroscale friction*

6. **Elmer E. Klaus Fellowship, May 2018,** STLE Presidential Award, *A direct experimental link between atomic-scale and macroscale friction*

7. **Gold Poster Presentation Award, STLE Annual Meeting, May 2018,** *A direct experimental link between atomic-scale and macroscale friction*

8. **Professional Development Award, March 2018,** University of Delaware, Office of Graduate and Professional Education, *A direct experimental link between atomic-scale and macroscale friction*

9. **Poster Presentation Award, STLE Annual Meeting, May 2015,** *Quantifying Wear Volume Uncertainty Based on Interrupted Topography Measurements*

10. **Union College Presidential Scholarship, August 2010 – June 2014,** Union College

11. **Donald C. Brate '45 Scholarship, August 2010 – June 2014,** Union College

12. **International Scholarship, August 2010 – June 2014,** Union College

Awarded Project Funding:

1. **MetaCook: The Metadata Cookbook**, Helmholtz Metadata Collaboration, 400,000€ over 2 years

2. **Alexander von Humboldt Postdoctoral Fellowship, January 2021 – December 2022,** Research Fellowship, Alexander von Humboldt Foundation, *Topic: Metals Tribology Revisited*

Academic Involvement:

- **Graduate Teaching**
  - Assistant Instructor for *Tribology Practicum* — KIT (Karlsruhe, Germany)
    - SS2021
  - Lectured in *Data Science and Scientific Workflows* — KIT (Karlsruhe, Germany)
    - SS2022
    - SS2023
  - Advisor in *Computational Materials Science* Seminar — KIT (Karlsruhe, Germany)
    - WS2022/23
- **Undergraduate Teaching**
  - Substitute Instructor for *Materials Engineering* — University of Delaware
    - Fall 2014
- **Research Supervisor**
  - Postdoctoral research assistants:
    - Michael Seitz, Ph.D.
      - Topic: *Non-destructive testing of metals*
  - Doctoral thesis adviser:

- Yulong Li, M.Sc.
  - Topic: *Abrasive wear of laser-textured surfaces*

- Master's thesis adviser: KIT (Karlsruhe, Germany)
  - Julius Heinrich, M.Sc.
    - Topic: *Development of a reciprocating tribometer for studying in-situ wear and microstructural evolution of copper under a variable load*
  - Max Gorenflo, M.Sc.
    - Topic: *Plastic deformation of copper under variable tribological load*
  - Ombeline Juteau, M.Sc.
    - Topic: *Designing a metamaterial mimicking the mechanics of cartilage*
  - Malte Flachmann, M.Sc.
    - Topic: *Copper tribology under a variety of loading conditions and oxidation regimes: the case for efficient analysis via FAIR data*

- Bachelor's thesis adviser: KIT (Karlsruhe, Germany)
  - Jakob Biesinger
    - Topic: *Systematic study of copper under industrially-relevant tribological load conditions*
  - Benedikt Stoll
    - Topic: *Semi-automatic conversion of SKOS vocabularies into OWL ontologies for FAIR data collection*
  - Torben Tiezema
    - Topic: *Creating controlled vocabularies for enabling FAIR data sharing: the case for methanol synthesis*

- Research assistant supervisor: KIT (Karlsruhe, Germany)
  - Ilia Bagov (full-time employee)
    - Topic: *Software development lead*
  - Qi Liang
    - Topic: *FAIR data systems*
  - Mauriz Poggemann
    - Topic: *Software development*
  - Nuoyao Ye
    - Topic: *Software development*
  - Floriane Bresser, B.Sc.
    - Topic: *Software development*
  - Jakob Biesinger
    - Topic: *Metals tribology*
  - Malte Flachmann, B.Sc.
    - Topic: *Tribometer digitalization*
  - Manfred Weber, M.Sc.
    - Topic: *Software development for ontology-to-ELN conversion*
  - Abhinav Bairathi, B.Sc.

- Topic: *Numerical investigations for cartilage-inspired metamaterials*

- Moritz Götz
  - Topic: *Numerical investigations for cartilage-inspired metamaterials*

- Brian Bell, B.Sc. University of Delaware
  - Topic: *Precision mechanical design of tribometers*

Outreach and Other Professional Involvements:

- STLE AI in Tribology Committee
  - Education Course Chair
  - Education Course Lecturer
- Round Table Leader: **Big Data in Tribology - A Valuable Resource** May 2023
  STLE Annual Meeting 2023
- STLE Early Career Award Committee 2022 – Current
- H^3: Helmholtz Herbst Hackathon Gummersbach, Germany September 2021
  - Was accepted to a coding event where "Young Helmholtz researchers solve scientific data challenges and start filling the pandemic communication vacuum" (Link)
- GO FAIR Initiative
  - Partner in GO Inter Implementation Network (Link)
- Journal Reviewer for:

MDPI Metals	2022 – Current
MDPI Machines	2021 – Current
Extreme Mechanics Letters	2021 – Current
MDPI Symmetry	2021 – Current
MDPI Lubricants	2021 – Current
MDPI Applied Sciences	2021 – Current
MDPI Materials	2021 – Current
MDPI Energies	2021 – Current
MDPI Measurement	2020 – Current
Journal of Materials Engineering and Performance	2020 – Current
ASTM Journal of Testing and Evaluation	2019 – Current
Tribology Letters	2018 – Current
Tribology Transactions	2018 – Current
Tribology International	2022 – Current

- STLE Nanotribology Committee 2017 – Current
  - Chair
  - Vice-Chair
  - Paper Solicitation Chair
    - My tasks included organizing the marketing, presentation decisioning along with scheduling, and communication with invited speakers for the nanotribology session at the 2022 STLE Annual Meeting in Orlando, Florida.

- Vice Paper Solicitation Chair
  - Collaborated in organizing the joint sessions with the Materials Tribology track in Tribochemistry and 2D Materials/Superlubricity.
- Volunteer

- SAE Aero at Union College — Schenectady, NY, USA — 2013 - 2014
  - Team Captain

- Academic Opportunity Program — Schenectady, NY, USA — 2011 - 2013

  Engineering Tutor

  - The Academic Opportunity Program at Union College is aimed at supporting students who otherwise would not attend college. I tutored and advised in all engineering-related subjects for two years. Becoming a tutor in the program is based on recommendations and academic achievements.

- Engineers Without Borders — Schenectady, NY, USA — 2011 - 2013
  - Event Coordinator
    - Scheduled, promoted and coordinated volunteering trips aimed at servicing the local community.

- ASME at Union College — Schenectady, NY, USA — 2012 - 2013
  - Help Center Manager