

## TOMAS GREJTAK, Ph.D.

Research Staff  
(940) 228-9592  
[tgu@ornl.gov](mailto:tgu@ornl.gov)

Oak Ridge National Laboratory  
Materials Science and Technology Division  
Oak Ridge, TN 37830

## EDUCATION

Ph.D. Mechanical Engineering	Lehigh University, Bethlehem PA	01/2022
M.E. Mechanical Engineering	Lehigh University, Bethlehem PA	05/2019
B.S. Mechanical Engineering	Midwestern State University, Wichita Falls TX	05/2016

## PROFESSIONAL HISTORY

**Research Staff**, Oak Ridge National Laboratory, Oak Ridge TN 11/2023 – Present

- Characterization of graphite materials for high temperature pebble-bed nuclear reactor and continuous electric-field assisted sintering (CEFAS).
- Investigation of the wear issues and improving the damage tolerance of biomass pre-processing equipment.
- Nanoscale structural characterization of hydrogen fuel cells.
- Development of lightweight sustainable bearing materials.

**Postdoctoral Associate**, Oak Ridge National Laboratory, Oak Ridge TN 12/2021 – 11/2023

- Investigated feasibility of developing high-performance superwood for bearing applications.
- Contributed to the selection of advanced materials and identifying failure modes of critical cutting tools of biomass pre-processing equipment which resulted in 8X higher wear resistance.
- Improved the technical-economic analysis to elucidate the benefits from utilizing wear resistant advanced blade materials for biomass pre-processing.
- Designed experiments and characterized wear and friction properties of high temperature ceramic composites for piston ring-cylinder liner contact in diesel engines.
- Evaluated wear and friction performance of high temperature aluminum alloys for electric vehicle brake rotors.
- Characterized nanomechanical properties of composite surfaces and interfaces using Nanoindentation technique.
- Investigated feasibility of applying high-strength wood-based biomaterials for bearing applications.

**Research Internship**, Argonne National Laboratory, Lemont IL 01/2021 – 06/2021

- Performed tribological characterization of lubricants and materials to improve the reliability of wind turbine drivetrains.
- Contributed to the design and development of a custom-built fretting tribometer.

**Visiting Researcher**, Florida A&M University–Florida State University, Tallahassee FL 01/2020 – 11/2021

- Evaluated process-structure-property relationships of MoS<sub>2</sub> solid lubricants for space applications using high-throughput mechanical testing and electron microscopy.
- Contributed to the discovery of ultra-low wear conductive TiVN thin films made by plasma enhanced atomic layer deposition for NEMS/MEMS systems.
- Developed experimental procedure to determine nano-scratch hardness of ultra-thin films.
- Mentored undergraduate and graduate students from underrepresented minority groups.

**Graduate Research Assistant**, Lehigh University, Bethlehem PA 08/2016 – 11/2021

- Discovered anisotropy in the wear and friction performance of ceramic-polymer nanocomposites made by additive manufacturing (published in Additive Manufacturing journal – first author).

- Collaborated with the American Museum of Natural History to explore structure-property relationships of wear and fracture resistant dentitions of dinosaurs, horses, woolly mammoths, Indian elephants, cows, and beavers (Ph.D. thesis).
- Developed wear models to simulate and optimize wear of composite surfaces.

## SKILLS

### Mechanical Properties Characterization

- Tribo-system Analysis
- Fractography
- Tensile Testing
- Nanoindentation
- Microindentation
- Metallographic Sample Preparation

### Surface Morphology and Composition Characterization

- Scanning Electron Microscopy (SEM)
- Focused Ion Beam (FIB)
- Energy Dispersive Spectroscopy (EDS)
- Optical Microscopy
- White-light Interferometry (WLI)
- Atomic Force Microscopy (AFM)
- RAMAN
- Roughness Measurements

### Software

- MATLAB
- SOLIDWORKS
- Microsoft Office
- ImageJ
- Adobe Illustrator and Photoshop
- Arduino

## AWARDS

- NSF INTERN Fellowship, Research internship at Argonne National Laboratory 10/2020
- Doctoral Travel Grant for Global Opportunities, Lehigh University 03/2020
- Student Poster Competition “Silver Award”, Society of Tribologists and Lubrication Engineers (STLE) Annual Meeting, Nashville TN 05/2019
- STLE – Philadelphia Section, Graduate Student Award 05/2019
- Student Research Paper Competition, 3rd Place, Midwestern State University 04/2016
- NCAA Academic All-American, Midwestern State University 05/2014

## PUBLICATIONS

- 1) “Improving mechanical properties of carbon and tool steels via chromizing”  
*Grejtak, T.*, Qu, J., *Advances in Applied Ceramics*, 2023, **0**, 1–11  
[doi.org/10.1080/17436753.2023.2238987](https://doi.org/10.1080/17436753.2023.2238987)
- 2) “Improving knife milling performance for biomass preprocessing by using advanced blade materials”  
*Grejtak, T.*, Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Qu, J.,  
*Wear*, 2023, 523, 204731  
[doi.org/10.1016/j.wear.2023.204731](https://doi.org/10.1016/j.wear.2023.204731)
- 3) “The characterization of wear-causing particles and silica sand in particular”  
Blau, P.J., *Grejtak, T.*, Qu, J., *Wear*, 2023, 204872  
[doi.org/10.1016/j.wear.2023.204872](https://doi.org/10.1016/j.wear.2023.204872)
- 4) “Microstructurally driven self-sharpening mechanism in beaver incisor enamel facilitates their capacity to fell trees”  
Hunt, T.C., *Grejtak, T.*, Kodangal, D., Varma, S., Rinaldi, C.E., Pathak, S., Krick, B.A., Erickson, G.M.,  
*Acta Biomaterialia*, 2023, 158, 412-422  
[doi.org/10.1016/j.actbio.2022.12.051](https://doi.org/10.1016/j.actbio.2022.12.051)
- 5) “Ultralow Wear Behavior of Iron–Cobalt-Filled PTFE Composites”

Van Meter, K.E., Babuska, T.F., Junk, C.P., Campbell, K.L., Sidebottom, M.A., **Grejtak, T.**, Kustas, A.B., Krick, B.A., *Tribology Letters*, 2023, 71, 4.

[DOI.org/10.1007/s11249-022-01679-z](https://doi.org/10.1007/s11249-022-01679-z)

- 6) **“Effects of deposition temperature on the wear behavior and material properties of plasma enhanced atomic layer deposition (PEALD) titanium vanadium nitride thin films”**  
Van Meter, K.E., Chowdhury, M.I., Sowa, M., Kozen, A.C., **Grejtak, T.**, Babuska, T.F., Strandwitz, N.C., Krick, B.A., *Wear*, 2023, 523, 204731.  
[doi.org/10.1016/j.wear.2023.204731](https://doi.org/10.1016/j.wear.2023.204731)
- 7) **“Modeling of a Blast Furnace with Both CFD and Thermodynamics Principles”**  
**Grejtak, T.**, Wang, S., Shao, *Journal of Applied Mechanics*, 2022, 3, 1019–1039.  
[DOI: 10.3390/applmech3030057](https://doi.org/10.3390/applmech3030057)
- 8) **“Quality Control Metrics to Assess MoS<sub>2</sub> Sputtered Films for Tribological Applications”**  
Babuska, T.F., Curry, J.F., Dugger, M.T., Jones, J.R., DelRio, F.W., Lu, P., Xin, Y., **Grejtak, T.**, Chrostowski, R., Mangolini, F., Strandwitz, N.C., Chowdhury, M.I., Doll, G.L., Krick, B.A., *Tribology Letters*, 2022, 70, 103.  
[DOI: 10.1007/s11249-022-01642-y](https://doi.org/10.1007/s11249-022-01642-y)
- 9) **“Role of environment on the shear-induced structural evolution of MoS<sub>2</sub> and impact on oxidation and tribological properties for space applications”**  
Babuska, T.F., Curry, J.F., Dugger, M.T., Lu, P., Xin, Y., Klueter, S., Kozen, A.C., **Grejtak, T.**, Krick, B.A., *ACS Applied Materials & Interfaces*, 2022, 14, 13914-13924.  
[DOI: 10.1021/acsami.1c24931](https://doi.org/10.1021/acsami.1c24931)
- 10) **“Plasma-enhanced atomic layer deposition of titanium molybdenum nitride: influence of RF bias and substrate structure.”**  
Chowdhury, M.I., Sowa, M., Van Meter, K.E., Babuska, T.F., **Grejtak, T.**, Kozen, A.C., Krick, B.A., Strandwitz, N.C., *J. of Vacuum Science & technology A: Vacuum, Surfaces, and Films*, 2021, 39, 053408.  
[DOI: 10.1116/6.0001175](https://doi.org/10.1116/6.0001175)
- 11) **“Whiskers Orientation controls wear of 3D-printed nanocomposites”**  
**Grejtak, T.**, Jia, X., Cunniffe, A.R., Shi, Y., Babuska, T.F., Pack, R.C., Vermaak, N., Compton, B.G., Krick, B.A., *Additive Manufacturing*, 2020, 36, 101515.  
[DOI: 10.1016/j.addma.2020.101515](https://doi.org/10.1016/j.addma.2020.101515)
- 12) **“Topology optimization of tribological composites for multifunctional performance at sliding interfaces”**  
Jia, X., **Grejtak, T.**, Krick, B.A., Vermaak, N., *Composites Part B.*, 2020, 199, 108209.  
[DOI: 10.1016/j.compositesb.2020.108209](https://doi.org/10.1016/j.compositesb.2020.108209)
- 13) **“Topology optimization of composite materials for wear: a route to multifunctional materials for sliding interfaces”**  
**Grejtak, T.**, Jia, X., Feppon, F., Joynson, S.G., Cunniffe, A.R., Shi, Y., Kauffman, D.P., Vermaak, N., Krick, B.A., *Advanced Engineering Materials*, 2019, 21, 1900366.  
[DOI: 10.1002/adem.201900366](https://doi.org/10.1002/adem.201900366)
- 14) **“On leakage issues of sucker rod pumping systems”**  
Wang, S., Rowland, L., Elsharafi, M., Ermila, M.A., **Grejtak, T.**, Taylor, C.A., *Journal of Fluids*

*Engineering*, 2019, 141, 111201.

[DOI: 10.1115/1.4043500](https://doi.org/10.1115/1.4043500)

- 15) **“Experimentally Calibrated Abrasive Sliding Wear Model: Demonstrations for Rotary and Linear Wear Systems”**

Jia, X., **Grejtak, T.**, Krick, B., & Vermaak, N., *Journal of Applied Mechanics*, 2018, 85, 121011.

[DOI: 10.1115/1.4041470](https://doi.org/10.1115/1.4041470)

- 16) **“Design of Composite Systems for Rotary Wear Applications”**

Jia, X., **Grejtak, T.**, Krick, B.A., and Vermaak, N., *Materials & Design*, 2017, 134, 281-292.

[DOI: 10.1016/j.matdes.2017.08.051](https://doi.org/10.1016/j.matdes.2017.08.051)

- 17) **“Structural Designs with Considerations of both Material and Structural Failures”**

Wang, S., **Grejtak, T.**, and Moody, L.J., *ASCE Structural Design and Construction*, 2017, 22, 04016025.

[DOI: 10.1061/\(ASCE\)SC.1943-5576.0000314](https://doi.org/10.1061/(ASCE)SC.1943-5576.0000314)

## PRESENTATIONS

### Invited Presentations

- 1) **“Ultralow wear of Plasma Enhanced Atomic Layer Deposited Nitrides”**, **Grejtak, T.**, Carpick Research Group, University of Pennsylvania, March 25, 2021
- 2) **“The Role of Multiscale Organization and Structure of Dental Tissues in the Wear and Fracture of Grinding Dentitions in Grazing Animals”**, **Grejtak, T.**, Babuska, T.F., Hendricks, S.K., Norell, M.A., Lee, Y.T., Varma, S., Pathak, S., Erickson, G.M., Krick, B.A., *STLE Philadelphia Section*, Philadelphia, PA, January 16, 2020

### Conference Presentations

#### *Podium presentations presented by the first author:*

- 1) **“High Temperature Lightweight Al-alloys for EV Regenerative Brake Rotors”**, **Grejtak, T.**, Shyam, A., Meier, J., Haynes, J.A., Blau, J.P., Qu, J., *STLE Annual Meeting & Exhibition*, Long Beach, CA, May, 2023.
- 2) **“Improving knife milling performance for biomass preprocessing by using advanced blade materials”** Qu, J., **Grejtak, T.**, Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., *International Conference on Wear of Materials*, 2023, Banff, Canada, April, 2023
- 3) **“Effects of deposition temperature on the wear behavior and material properties of plasma enhanced atomic layer deposition (PEALD) titanium vanadium nitride thin films”**, Van Meter, K.E., Chowdhury, M.I., Sowa, M., Kozen, A.C., **Grejtak, T.**, Babuska, T.F., Strandwitz, N.C., Krick, B.A., *International Conference on Wear of Materials*, 2023, Banff, Canada, April, 2023
- 4) **“Improving Knife Milling Performance In Biomass Size Reduction By Using Wear-Resistant Blade Materials”**, **Grejtak, T.**, International Biomass Conference & Expo, Atlanta, GA, February 28, 2023
- 5) **“Improving Biomass Comminution Performance by Optimizing Tool Design and Using Advanced Tool Materials”**, Qu, J., **Grejtak, T.**, Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Lanning, D., McKiernan, C., Blau P.J., 7<sup>th</sup> World Tribology Congress, Lyon, France, July 15, 2022

- 6) **“Evolution-structure-property-relationships of tissues drive functionality in slicing and grinding dentitions”**, *Grejtak, T.*, Hunt, T., Babuska, T.F., Hendricks, S.K., Norell, M.A., Varma, S., Pathak, S., Erickson, G.M., Krick, B.A., *STLE Annual Meeting & Exhibition*, Orlando, FL, May 18, 2022.
- 7) **“Understanding and mitigation of knife mill wear in biomass preprocessing”**, *Grejtak, T.*, Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Blau P.J., Qu, J., *STLE Annual Meeting & Exhibition*, Orlando FL, May 16, 2022.
- 8) **“Probing process-structure-property relationship of ultralow wear plasma enhanced atomic layer deposited nitrides”**, Van Meter, K., Ramos, D., Lazarte, S., Chowdhury, I., *Grejtak, T.*, Babuska, T.F., Sowa, M.J., Kozen, A.C., Strandwitz, N.C., Krick, B.A., *STLE Annual Meeting & Exhibition*, Orlando, FL, May 18, 2022.
- 9) **“Role of Environment on the Shear Driven Structural Evolution of MoS<sub>2</sub> and Impact on Aging”**, Babuska, T.F., *Grejtak, T.*, Curry, J.F., Dugger, M.T., Kozen, A.C., Klueter, S., Ramos, D., Van Meter, K., Krick, B.A., *STLE Annual Meeting & Exhibition*, Orlando, FL, May 16, 2022
- 10) **“Enhancing performance and durability of a knife mill for biomass preprocessing by applying advanced blade materials”**, *Grejtak, T.*, Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Blau P.J., Qu, J., *10<sup>th</sup> Annual Oak Ridge Postdoctoral Association Research Symposium*, Oak Ridge, TN, May 14, 2022
- 11) **“Evolution-structure-property relationships of damage tolerant horse enamel”**, *Grejtak, T.*, Hunt, T., Babuska, T.F., Hendricks, S.K., Norell, S., Pathak, S., Erickson, G.M., Krick, B.A., *Enamel 10 Conference*, Pittsburg, PA, May 8, 2022.
- 12) **“Micromechanical and microstructural studies of a unique enamel in the grinding dentition of hadrosaurid dinosaurs”**, Varma, S., Lee, T.Y., Johnson, S., Harlow, G., Devaraj, A., *Grejtak, T.*, Krick, B.A., Hunt, T.C., Erickson, G.M., Jain, M., Casari, D., Groetsch, A., Kochetkova, t., Schwiedrzik, J., Michler, J., Remund, S., Pathak, S., *Enamel 10 Conference*, Pittsburg, PA, May 8, 2022.
- 13) **“Selected to fail: how differential fracture mechanics in beaver incisor enamel promote occlusal sharpness”**, Hunt, *Grejtak, T.*, Kodangal, D., Varma, S., Rinaldi, C.E., Pathak, S., Krick, B.A., Erickson, G.M., *Enamel 10 Conference*, Pittsburg, PA, May 8, 2022.
- 14) **“Ultralow wear of Plasma Enhanced Atomic Layer Deposited Nitrides: Exploring Processing, Structure, Properties and Mechanisms at Multiple Scales”**, *Grejtak, T.*, Babuska, T.F., Van Meter, K., Haik, J., Chowdhury, I., Sowa, M.J., Kozen, A.C., Strandwitz, N.C., Krick, B.A., *STLE Annual Meeting & Exhibition - virtual conference*, May 18, 2021,
- 15) **“Paleo-tribology: Inspiration from Fossil Grinding Dentitions; From Wear Models to Damage Tolerant Composites”**, *Grejtak, T.*, Hunt, T., Babuska, T.F., Hendricks, S.K., Norell, M.A., Varma, S., Pathak, S., Erickson, G.M., Krick, B.A., *STLE Annual Meeting & Exhibition - virtual conference*, May 18, 2021.
- 16) **“Ultralow wear of Plasma Enhanced Atomic Layer Deposited Nitrides: Exploring Processing, Structure, Properties and Mechanisms at Multiple Scales”**, *Grejtak, T.*, Babuska, T.F., Van Meter, K., Haik, J., Chowdhury, I., Sowa, M.J., Kozen, A.C., Strandwitz, N.C., Krick, B.A., *STLE Annual Meeting & Exhibition - virtual conference*, May 18, 2021
- 17) **“Probing the influence of Water and Oxygen on the Friction and Wear of MoS<sub>2</sub>”**, Babuska, T.F., Curry, J.F., *Grejtak, T.*, Krick, B.A., *STLE Annual Meeting & Exhibition - virtual conference*, May 17, 2021

- 18) **“Remarkable wear and fracture properties and unique 3D-microstructure of enamel in the dentition of the hadrosaurid dinosaur”**, *Grejtak, T.*, Babuska, T.F., Hendricks, S.K., Norell, M.A., Varma, S., Pathak, S., Erickson, G.M., Krick, B.A., *STLE Annual Meeting & Exhibition - virtual conference*, May 14, 2020
- 19) **“Complex dental structure and wear biomechanics in non-avian dinosaurs and Pleistocene mammals”**, Erickson, G.M., Hunt, T., Hendrick, S.K., Pathak, S., Varma, S., Babuska, T.F., *Grejtak, T.*, Krick, B.A., *The FASEB journal*, April 20, 2020
- 20) **“Evolutionary Routes to Damage Tolerant Materials: Dentition of Grinding Animals in the Fossil Record”**, Krick, B.A., Babuska, T.F., *Grejtak, T.*, Hendricks, S.K., Norell, M.A., Lee, Y.T., Varma, S., Pathak, S., Erickson, G.M., *STLE Frontiers*, Chicago, IL, November 19, 2019
- 21) **“Designing tribological composites for multifunctional performance at sliding interfaces”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., 2016 *ASME IMECE*, Phoenix, AZ, November 14, 2019
- 22) **“Strategies to Tune Physical Properties in 3D-Printed Biomaterials”**, Seims, K.B., Camacho, P., Schwarzenberg, P., Babuska, T.F., *Grejtak, T.*, De Long, W.G., Krick, B.A., Dailey, H.L., Chow, L.W., *Biomedical Engineering Society, BMES Annual Meeting*, Philadelphia, PA, October 16-19, 2019
- 23) **“Biomechanics of Hierarchically-Structured Enamel in Grinding Dentitions: A Route to Multifunctional Materials for Sliding Interfaces”**, *Grejtak, T.*, Babuska, T.F., Jia, X., Pathak, S., Jain, Manish., Lee, Y.T., Hendricks, S.K., Erickson, G.M., Krick, B.A., *STLE Annual Meeting & Exhibition*, Nashville, TN, May 15, 2019
- 24) **“Nanomechanics of Ultralow Wear PTFE-Based Composites: Microstructure and Mechanics of Filler Particles”**, Atkinson, C.C., Sidebottom, M.A., Babuska, T.F., *Grejtak, T.*, Balsamo, B., Campbell, K. L., Junk, C.P., Burch, H.E., Krick, B.A., *STLE Annual Meeting & Exhibition*, Nashville, TN, May 16, 2019
- 25) **“Topology Optimization of Tribological Composites for Multi-functional Applications”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., *World Congress of Structural and Multidisciplinary Optimization*, Beijing, China, May 20-24, 2019
- 26) **“Modified Winkler Model for Micro-indentation”**, *Grejtak, T.*, Babuska, T.F., Jia, X., Krick, B.A., *STLE Annual Meeting & Exhibition*, Minneapolis, MN, May 16, 2018
- 27) **“Modelling Sliding Abrasive Wear of Bi-material Composites”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., *STLE Annual Meeting & Exhibition*, Minneapolis, May 15, 2018
- 28) **“Topology Optimization for Abrasive Sliding Wear of Bi-material composites”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., *TMS 147th Annual Meeting and Exhibition*, Phoenix, March 11-15, 2018
- 29) **“Modelling Abrasive Sliding Wear for Composite Systems”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., *54th Annual Technical Meeting of the Society of Engineering Science (SES)*, Boston, MA, July 25-28, 2017
- 30) **“Design of Polymer-based Composite Systems for Wear Applications”**, Jia, X., *Grejtak, T.*, Krick, B.A., Vermaak, N., *Emulsion Polymers Institute (EPI) Annual Review Meeting*, Lehigh University, Bethlehem, PA, June 2, 2017
- 31) **“Design of Composite Systems for Rotary Wear Applications”**, *Grejtak, T.*, Jia, X., Sidebottom, M.A., Feppon, F., Krick, B.A., and Vermaak, N., *STLE Annual Meeting & Exhibition*, Atlanta, GA. May 24, 2017
- 32) **“Design of Composite Systems for Wear Performance”**, Jia, X., Sidebottom, M.A., *Grejtak, T.*, Feppon, F., Krick, B.A., Vermaak, N., *ASME IMECE*, Phoenix, AZ, November 11-17, 2016

- 33) **“Monitoring and Improving a Combustion Chamber of a Blast Furnace with Thermodynamics and Computational Fluid Dynamics”**, *Grejtak, T., Wang, S., International Conference in Computational Methods*, Berkeley, CA, August 9, 2016

## Poster Presentations

*Presented by the first author*

- 1) **“Mitigating Wear in Knife Mill for Biomass Preprocessing by Applying Wear Resistant Blade Materials”**, *Grejtak, T., Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Qu, J., STLE Annual Meeting & Exhibition*, Long Beach, CA, May, 2023.
- 2) **“Nature’s solution to wear and fracture resistance in hard and brittle enamel”**, *Grejtak, T., Hunt, T., Babuska, T.F., Hendricks, S.K., Norell, M.A., Varma, S., Pathak, S., Erickson, G.M., Krick, B.A., Gordon Research Conference*, Lewiston, ME, June 28, 2022
- 3) **“Applying advanced blade materials to improve knife milling performance for biomass preprocessing”**, *Grejtak, T., Lacey, J.A., Kuns, M.W., Hartley, D.S., Thompson, D.N., Fenske, G., Ajayi, O.O., Blau P.J., Qu, J., FCIC Annual Meeting - virtual conference*, June 9, 2022
- 4) **“Topology Optimization of Composite Materials for Wear: A Route to Multifunctional Materials for Sliding Interfaces”**, *Grejtak, T., Jia, X., Feppon, F., Joynson, S.G., Cunniffe, A.R., Shi, Y., Kauffman, D.P., Vermaak, N., Krick, B.A., STLE Annual Meeting & Exhibition*, Nashville, TN, **Student Poster Competition “Silver Award”**, May 15, 2019
- 5) **“Design of Tribological Composites for Multi-functional Applications”**, Jia, X., *Grejtak, T., Krick, B.A., Vermaak, N., 2018, ASME IMECE*, Pittsburgh, PA, November 11-14, 2018
- 6) **“Experimental Validation of Topology Optimized Composites for Wear”**, Joynson, S.G., *Grejtak, T., Jia, X., Cunniffe, A.R., Feppon, F., Krick, B.A., Vermaak, N., 2017 ASME IMECE*, Tampa, FL, November 2018
- 7) **“Design of Composite Systems for Rotary Wear Applications”**, Jia, X., *Grejtak, T., Krick, B.A., Vermaak, N., STLE Annual Meeting & Exhibition*, Atlanta, GA, May 21-25, 2017.
- 8) **“Optical In Situ Micro Tribometer for Analysis of Real Contact Area for Adhesive Contact Mechanics”**, *Grejtak, T., Sedaille, M.D., Curry, J.F., Krick, B.A., STLE Annual Meeting & Exhibition*, Atlanta, GA, May 21-25, 2017

## RESEARCH EXPERIENCE AND INTERESTS

### Area of Specialization: Surface Interactions (Materials Tribology)

Tribology is science of interacting surface in relative motion including friction, wear and lubrication. This multidisciplinary field of engineering is at the intersection of traditional mechanics, material science, chemistry, biology, and physics. Surface interactions are present in nearly every mechanical, biological, and electrical system from small scales (MEMS/NEMS, cells, and electronics) to large scales (aircraft engines, locomotives, automobiles, pumps, and orthopedic joints). Fundamental and applied studies on the interfacial interactions of materials have been a major part of my graduate and postdoctoral research. My research experience includes developing ultra-low wear coatings for space applications and nanomechanical systems, damage tolerant materials for biomass pre-processing, wear and friction characterization of additively manufactured polymer-ceramic composites, structure-property relationships of dinosaur and horse dentitions for bioinspired materials, and wear modeling

of multifunctional composites. ***Energy and material consumption due to friction and wear cost nearly a trillion dollars each year in the U.S., therefore, minimizing wear and friction has a direct impact on saving energy, resources, protecting environment, and consequently, improving the quality of human life.***

## TEACHING EXPERIENCE

**Guest Lecturer: *Materials Tribology*** (EML 5930) Fall 2020 & Fall 2021  
*Florida A&M University – Florida State University College of Engineering, Mechanical Engineering Department, Tallahassee FL*

Specialized upper level graduate course focused on the interfacial interactions of materials and energy dissipation of interacting materials which includes friction, adhesion, wetting behaviors, wear, and deformation (contact mechanics).

**Guest Lecturer: *Elementary Engineering Mechanics*** (MECH 002) Spring 2019  
*Lehigh University, Mechanical Engineering & Mechanics Department, Bethlehem PA*  
Undergraduate course focused on static equilibrium of bodies, analysis of frame and static structures.

**Teaching Assistant: *Mechanical Engineering Elements*** (ME 252) Fall 2018 & Fall 2019  
*Lehigh University, Mechanical Engineering & Mechanics Department, Bethlehem PA*  
Undergraduate course focused on the stress analysis and design of mechanical systems such as linkages, cams, and gears. Gave lectures, graded exams and prepared study materials.

**Teacher Development Series, *Lehigh University, Bethlehem PA*** 09/2016  
Obtained Level I and II teaching certification. Each level included six parts on different aspects of teaching collegiate courses. The courses are designed to help graduate students teach lectures and recitation hours. Topics included how to build a curriculum, craft an engaging presentation, and design writing assignments to facilitate learning for their students.

## PROFESSIONAL MEMBERSHIPS / SERVICE

### ***Reviewer***

- ACS Applied Nanomechanics
- Tribology Transactions
- Friction
- Journal of Tribology
- Computer Methods in Biomechanics and Biomedical Engineering
- Biotribology

### ***Professional Societies***

- Oak Ridge Postdoctoral Association FY 2023
- Society of Tribologists and Lubrication Engineers (STLE) 10/20016 – present
- The Minerals, Metals & Materials Society (TMS) 07/2023 – present
- ASTM Committee G2 on Wear and Erosion 01/2022 – 01/2023

### ***Membership Activities***



- Oak Ridge Postdoctoral Association, Outreach Chair, Oak Ridge National Laboratory FY 2023
- Society of Tribologists and Lubrication Engineers (STLE) Tribology & Lubrication Technology (TLT) Technical editor 2023
- Magnetic Materials and Spintronic, Session Chair, Oak Ridge Postdoctoral Association Research Symposium 05/2023
- Materials Tribology, Session Chair, STLE Frontiers Conference 11/2023
- Materials Tribology, Session Chair, STLE Annual Meeting 05/2021
- Materials Tribology, Session Co-chair, STLE Annual Meeting 05/2019

## SYNCHROTRON BEAMLINE PROPOSALS

### *Proposals with allocated beamtime:*

- **"Multiscale, Three-Dimensional Microstructure and Chemical Composition of Enamel in the Grinding Teeth of Equids and Hadrosaurid Dinosaurs"** 03/2021  
*Synchrotron X-ray Photoemission Electron Microscopy* ", **Grejtak T. (PI)**, Krick B.A. (co-PI)  
National Synchrotron Light Source, Brookhaven National Laboratory, Upton, NY (Beamline 21-ID)
- **"Fracture toughening mechanism in the wear and fracture resistant enamel tissues of hadrosaurid dinosaurs and modern-day grazing mammals investigated via synchrotron tomography"** 03/2021  
*Synchrotron Micro-tomography* ", **Grejtak T. (PI)**, Krick B.A. (co-PI)  
Advanced Photon Source, Argonne National Laboratory, Lemont, IL (Beamline 32-ID)
- **"Multiscale, Three-Dimensional Microstructure and Chemical Composition of Enamel in the Grinding Teeth of Equids and Hadrosaurid Dinosaurs"** 12/2020  
*Synchrotron Micro-tomography* ", **Grejtak T. (PI)**, Krick B.A. (co-PI)  
Advanced Photon Source, Argonne National Laboratory, Lemont, IL (Beamline 32-ID)