

YU-WEI (ALEX) LIN

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SUMMARY

- Materials scientist with 5 years of hands-on experience in electron microscopy, materials characterization, surface science, nanomaterials, tribology, and corrosion
- Initiated and executed several long-term experimental and theoretical research projects at government research labs to push the boundaries of how we understand nanoscale corrosion, mechanical deformation, and wear
- Experienced in written and oral communication to various audiences through publications in peer-reviewed journals, funding and facility proposals, conference presentations, and STEM education outreach events

EDUCATION

Northwestern University September 2017 - June 2020 (expected)
PhD Candidate in Materials Science & Engineering *Evanston, IL*

Northwestern University September 2012 - December 2016
BS/MS in Materials Science & Engineering *Evanston, IL*

RESEARCH

Marks Research Group, Northwestern University January 2017 - Present
Graduate Research Assistant *Evanston, IL*

- Characterizing nanoscale tribology and corrosion mechanisms in alloys used for orthopedic implants, jet turbine blades, and naval vessels
- Applied cryo-FIB sample preparation and cryo-TEM characterization methods to observe early-stage aqueous corrosion of NiCrMo alloys
- Developed in situ TEM techniques to investigate the nanomechanical performance of crumpled 2D materials used as lubricant additives and coatings, leading to a first author publication in *Carbon*
- Collaborated with scientists at Rush University Orthopedics and designed clinically relevant electrochemical and wear testing protocols to understand the stability of surface oxide films on implant materials
- Authored proposals resulting in 150 days of instrument time at state-of-the-art facilities at National Center for Electron Microscopy (Lawrence Berkeley National Lab) and Center for Nanoscale Materials (Argonne National Lab)

Marks Research Group, Northwestern University February 2014 - December 2016
Undergraduate Researcher *Evanston, IL*

- Investigated the relationship between grain boundary sensitization and grain boundary structure in electrochemically corroded CoCrMo hip implant alloys with SEM, EBSD, and S/TEM
- Published 2 journal articles in *Corrosion* on the grain boundary segregation models in CoCrMo alloys and recommended processing parameters to improve alloy biocompatibility

Grandfield Research Group, McMaster University June 2015 - August 2015
Summer Research Fellow *Hamilton, ON*

- Analyzed the clinical efficacy of 3D-printed dental implants by characterizing and observing bone growth at the micro- and nanoscale using electron microscopy and electron tomography
- Recommended design parameters to improve biocompatibility by decreasing average healing times by 10-15%

Materials Development, Inc. March 2014 - September 2014
R&D Engineering Intern *Arlington Heights, IL*

- Implemented an automated in situ heating system for ceramic specimens at Department of Energy particle beam-lines in Argonne National Lab, IL and Oak Ridge National Lab, TN
- Optimized the system to measure the structure of borate glasses and published findings in 3 peer-reviewed journals

PUBLICATIONS

1. M. Taylor, **A.Y.W. Lin**, X.X. Yu, J.H. Perepezko, and L.D. Marks. "Oxidation of Mo₃Si: Microstructural Effects of Doping on Oxidized Molybdenum Silicides." in preparation.
2. C.A. Mizzi*, **A.Y.W. Lin***, and L.D. Marks. "Does Flexoelectricity Drive Triboelectricity?" *Physical Review Letters* 123, 116103 (2019). (* equal contribution)
3. **A.Y.W. Lin**, A. Müller, X.X. Yu, A. Minor, and L.D. Marks. "Early Stage Oxidation of NiCrMo Alloys Revealed by Cryo-Electron Microscopy." *Ultramicroscopy* 200, 6-11 (2019).
4. **A.Y.W. Lin**, X. Yu, A. Dato, G. Krauss, and L.D. Marks. "In situ Observations of Graphitic Staples in Crumpled Graphene." *Carbon* 132, 760-765 (2018).
5. O.L.G. Alderman, C.J. Benmore, **A. Lin**, A. Tamalonis, and J.K.R. Weber. "Borate Melt Structure: Temperature Dependent B-O Bondlengths and Coordination Numbers from High-Energy X-ray Diffraction." *Journal of American Ceramic Society* 101, 3357-3371 (2018).
6. J. Tedesco, B.E.J. Lee, **A.Y.W. Lin**, D.M. Binkley, K.H. Delaney, J.M. Kwiecien, and K. Grandfield. "Osseointegration of a 3D Printed Stemmed Titanium Dental Implant: A Pilot Study." *International Journal of Dentistry* 2017, 5920714 (2017).
7. **A. Lin**, E.E. Hoffman, and L.D. Marks. "Effects of Grain Boundary Misorientation and Chromium Segregation on Corrosion of CoCrMo Alloys." *Corrosion* 73, 256-267 (2017).
8. E.E. Hoffman, **A. Lin**, and L.D. Marks. "Grain Boundary Assisted Crevice Corrosion in CoCrMo Alloys." *Corrosion* 72, 1445-1461 (2016).
9. O.L.G. Alderman, M. Liska, J. Machacek, C.J. Benmore, **A. Lin**, A. Tamalonis, and J.K.R. Weber. "Temperature-Driven Structural Transitions in Molten Sodium Borates Na₂O-B₂O₃: X-Ray Diffraction, Thermodynamic Modelling and Implications for Topological Constraint Theory." *Journal of Physical Chemistry C* 120, 553-560 (2015).
10. O.L.G. Alderman, G. Ferlat, A. Baroni, M. Salanne, M. Micoulaut, C.J. Benmore, **A. Lin**, A. Tamalonis, and J.K.R. Weber. "Liquid B₂O₃ by X-ray Diffraction up to 1700K: Boroxol Ring Dissolution." *Journal of Physics: Condensed Matter* 27, 455104 (2015).

Published Proceedings

1. **A. Lin**, E. Hoffman, and L.D. Marks. "Classifying the Severity of Grain Boundary Corrosion in CoCrMo Biomedical Implants." *Microscopy & Microanalysis* 21 (S3), 773-774 (2015).

SELECTED PRESENTATIONS

Talks

1. **Contributed Talk**, "Understanding the Role of Protective Metal Oxides in Nanoscale Tribocorrosion." Society of Tribologists and Lubrication Engineers (STLE), Nashville, TN (2019).
2. **Contributed Talk**, "Is Triboelectricity Driven by the Flexoelectric Effect?" MRS Spring Meeting, Phoenix, AZ (2019).
3. **Invited Talk**, "Enhanced Mechanical Stability in Crumpled Graphene: Direct Observations of Graphitic Staples." Gordon Research Conference on Tribology, Bates College, Lewiston, ME (2018).
4. **Contributed Talk**, "Direct Observations of Nanotribology in Crumpled Layered Nanomaterials." Society of Tribologists and Lubrication Engineers (STLE), Minneapolis, MN (2018).
5. **Invited Talk**, "Corrosion at the Multiscale: Grain Boundary Sensitization in CoCrMo Hip Implants." Rush University, Orthopedics Surgery Department Seminar, Chicago, IL (2017).
6. **Contributed Talk**, "Multiscale Analysis of Localized Corrosion in CoCrMo Grain Boundaries." NACE Corrosion Research in Progress Symposia, Vancouver, BC, Canada (2016).

7. **Contributed Talk**, “Classifying the Severity of Grain Boundary Corrosion in CoCrMo Biomedical Implants.” Microscopy & Microanalysis, Portland, OR (2015).

Posters (* Best Poster Award)

1. **A. Lin**, X.X. Yu, A. Dato, G. Krauss, and L.D. Marks. “Tribology in Full View of Graphitic Materials.” APS-CNM Users Meeting. Argonne National Lab, IL (2017).
2. ***A. Lin**, E.E. Hoffman, and L.D. Marks. “Understanding Grain Boundary Corrosion in CoCrMo Orthopedic Implants.” NACE Corrosion Conference. Vancouver, BC, Canada (2016).
3. ***A. Lin**, K. Delaney, J.M. Kwiecien, and K. Grandfield. “An Electron Microscopy Approach to Characterizing Osseointegration in Ti-6Al-4V Dental Implants.” McMaster Engineering Graduate Student Conference. Hamilton, ON, Canada (2015).
4. ***A. Lin**, E. Hoffman, and L.D. Marks. “Grain Boundary Corrosion in CoCrMo Hip Replacements.” Northwestern Undergraduate Research and Arts Exposition. Evanston, IL (2015).
5. **A. Lin**, E. Hoffman, and L.D. Marks. “Classifying Grain Boundary Corrosion in CoCrMo Biomedical Implants.” Microscopical Society of Canada General Meeting. Hamilton, ON, Canada (2015).

HONORS & AWARDS

Alexander Graham Bell Canada Graduate Scholarship Natural Sciences and Engineering Research Council of Canada	2017-2020
Walter P. Murphy Fellowship Northwestern University	2018-2019
STLE Chicago Section Research Scholarship Society of Tribology and Lubrication Engineers (STLE)	2017-2018
Fletcher Undergraduate Research Award Finalist Northwestern University	2015
McMaster University Undergraduate Research Opportunities Program (UROP) McMaster University Faculty of Engineering	2015
International Summer Undergraduate Research Grant Northwestern University	2015
Academic Year Undergraduate Research Grant Northwestern University	2014-2015

TEACHING

MAT SCI 332: Mechanical Behavior of Solids, Northwestern University <i>Teaching Assistant</i> <ul style="list-style-type: none">• Led weekly office hours to discuss course concepts, including plastic deformation, fracture mechanics, stress and strain tensors, and temperature-dependent creep behavior• Developed rubrics to grade problems on homework assignments and midterm exams• Communicated student performance and outcomes to the course instructor and the Undergraduate Curriculum Committee	January 2019 - March 2019
MAT SCI 360: Electron Microscopy, Northwestern University <i>Teaching Assistant and Lab Instructor</i> <ul style="list-style-type: none">• Instructed advanced undergraduate and graduate students the technical procedures to successfully operate microscopy instruments for their own research and gave two guest lectures• Organized and delivered 2 guest lectures on TEM sample preparation and the investigation of corrosion using TEM	September 2016 - December 2016

LEADERSHIP AND OUTREACH

Society of Tribology and Lubrication Engineers (STLE) Annual Meeting

May 2018 - Present

Symposium Organizer

- Organized a symposium on Testing in Soft Tribology which was attended by 30 professionals from research institutions, medical device companies, and instrument manufacturers
- Reviewed abstracts related to the topics of tribotesting, nanotribology, and in situ TEM

Materials Science & Engineering, Northwestern University

March 2018 - March 2019

Research Mentor

- Supervised an undergraduate student conducting research on biocorrosion and communicated the principles of structure-property relationships and experimental design
- Trained student to independently operate a SEM to characterize corroded surfaces and grain boundaries

Gordon Research Seminar on Tribology

June 2018

Discussion Leader

- Chaired a symposium on Origins of Friction and Wear as a part of the Gordon Research Seminar series

Science in Your Community Center (SICC)

November 2016 - June 2018

Mentor and Workshop Leader

- Taught underrepresented minority middle school students at monthly STEM outreach workshops

PROFESSIONAL SOCIETIES

- Materials Research Society
- Microscopy Society of America
- Society of Tribologists and Lubrication Engineers