

Kinga A. Unocic, Ph.D.

Senior R&D Staff Scientist
Materials MicroAnalysis Group
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Oak Ridge National Laboratory
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Education:

Ph.D. (2008) The Ohio State University, Columbus, OH
Materials Science and Engineering

M.S. (2006) The Ohio State University, Columbus, OH
Materials Science and Engineering

M.S. (2002) AGH University of Science and Technology,
Krakow, Poland
Metallurgical Engineering

B.S. (2000) AGH University of Science and Technology,
Krakow, Poland
Metallurgical Engineering

Research Expertise:

- Expertise in aberration-corrected STEM, analytical microscopy (EELS/EDS), and *in situ/operando* STEM
- Expertise in high-temperature oxidation testing and environmental effects on material properties.
- Materials in Extreme Environments, High-Temperature Structural Materials, Physical and Mechanical Metallurgy, Ferrous and Non-ferrous metallurgy, High-Temperature Oxidation, Corrosion, Radiation Effects, Catalysis.
- Additive Manufacturing and Alloy Development.

Research and Professional Experience:

2021- Present	Senior R&D Staff Scientist	Oak Ridge National Laboratory
2014- 2021	R&D Staff Scientist	Oak Ridge National Laboratory
2009-2014	R&D Associate	Oak Ridge National Laboratory
2008-2009	Postdoctoral Researcher	The Ohio State University (Advisors: Rudy G. Buchheit/Gerald S. Frankel)
2003-2008	Graduate Research Associate	The Ohio State University (Advisors: Glenn S. Daehn & Michael J. Mills)

Honors and Awards:

2023	UT-Battelle Award - Technology Transfer
2023	TMS Brimacombe Medalist Award
2019	ORNL finalist in YWCA Tribute to Women
2017	TMS Young Leaders International Scholar – Japan Institute of Metals and Materials Award
2014	Women in Materials Science and Engineering Committee Travel Grant
2010	TMS Young Leader Professional Development Award – Structural Materials Division
2007	Best in Show, Jacque-Lucas Award, International Metallographic Contest
2002	1 st in Class Honors in Metallurgical Engineering, AGH University of Science and Technology, Krakow, Poland
1999	1998/1999 Academic Scholar and Sportswoman of the Year Award, AGH University of Science and Technology, Krakow, Poland

Career Highlights

Research: >100 Peer-Reviewed Journal Articles, 2 U.S. Patents, ~14 Invited Talks, h-index = 39

Awards: TMS Brimacombe Medalist, ORNL Finalist in YWCA Tribute to Women; TMS Young Leaders International Scholar – JIM Award; TMS Young Leader Professional Development Award; Jacque-Lucas Award (IMC)

Funding: DOE BETO, DOE EERE VTO, DOE EERE AMO

ORNL Service: PSD Strategic Planning Working Group for Accelerating Analysis, Discovery, and Innovation through Facilities, Instrumentation and Labs of the Future, ORNL 2022. **ORNL LDRD** Panel reviewer for the Initiative Review Committee (IRC) (The Materials Innovation: Structural Materials)

Scientific Service: TMS Symposia Organizer, and **MS&T** Symposia Organizer, **MM** Symposia Organizer, Chair (TMS Corrosion and Environmental Effects Committee 2019-present); Workshop organizer, Microscopy & Microanalysis 2022, Public and Governmental Affairs Committee Representative to the Functional Materials Division Council at TMS 2020 -2022), Guest Editor for special topics in JOM (April 2022), Guest Editor MDPI Metals Superalloys (2021-2022)

Principal Investigator on multi-lab project under Chemical Catalysis for Bioenergy Consortium (ChemCatBio) under the Bioenergy Technologies Office (BETO) and Vehicle Technology Office.

ORNL Internal Program Collaboration: developed leadership in materials characterization between Manufacturing Demonstration Facility, Corrosion Sciences and Nuclear Fuel Materials groups.

Mentoring:
7 Postdoctoral Researchers and 7 Students Supervised

Professional Activities: (Society Leadership Positions, International Conference/Workshop Organizer)

- Symposium Organizer, High-Temperature Corrosion and Degradation of Structural Materials, MS&T23, October 1-4, 2023, Columbus, OH.
- Symposium Organizer, P01: Revealing the Working Morphology of Energy Materials and Its Impact on Performance, *Microscopy and Microanalysis 2023 Annual Meeting – July 23-27, 2023, Minneapolis, MN.*
- Symposium Organizer, P07. Prof. Wilbur C Bigelow Centenary Symposium, *Microscopy and Microanalysis 2023 Annual Meeting – July 23-27, 2023, Minneapolis, MN.*
- Session Chair, Prof. Wilbur C Bigelow Centenary Symposium: *Microscopy and Microanalysis 2023 Annual Meeting – July 23-27, 2023, Minneapolis, MN.*
- Session Chair, P01: Revealing the Working Morphology of Energy Materials and Its Impact on Performance: *Microscopy and Microanalysis 2023 Annual Meeting – July 23-27, 2023, Minneapolis, MN.*
- Committee Chair, for Corrosion and Environmental Effects Committee (CEEC) (organized and lead the meeting). TMS2023, March 19-23, 2023, San Diego, CA.
- Symposium Organizer, Environmental Degradation of Additively Manufactured Alloys: Sponsored by: TMS Structural Materials Division, TMS: Corrosion and Environmental Effects Committee Program Organizers: K. Unocic, J. Locke, S. Dryepondt, B. Rincon Troconis, Andrew Hoffman, Xiaoyuan Lou. TMS2023, March 19-23, 2023, San Diego, CA.
- Symposium co-organizer, *Phase Stability in Extreme Environments: Corrosion and Oxidation in Extreme Environments*, March 19-23, 2023, San Diego, CA.
- Session Chair, *Environmental Degradation of Additively Manufactured Alloys: Environmental Degradation of Additively Manufactured Materials at High Temperatures and Radiation Environments*. March 19-23, 2023, San Diego, CA.
- Session Chair, *Environmental Degradation of Additively Manufactured Alloys: Environmentally Assisted Cracking (Hydrogen Embrittlement and SCC) / Bio-Corrosion*. March 19-23, 2023, San Diego, CA.
- Session chair for *Phase Stability in Extreme Environments: Corrosion and Oxidation in Extreme Environments*, March 19-23, 2023, San Diego, CA.
- CEEC Representative, TMS Structural Materials Division Council Meeting, March 19-23, 2023, San Diego, CA.
- Chair, TMS Corrosion and Environmental Effects Committee (March 2021-March 2023).
- Committee Chair, Leading the TMS Corrosion and Environmental Effects Committee meeting as a chair for the committee, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA.
- Symposium co-organizer: High Temperature Oxidation of Metals and Ceramics, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA.
- Session Chair, High Temperature Oxidation of Metals and Ceramics — Environmental Barrier Coatings, Thermal Barrier, Coatings, and Hypersonics, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA.
- Symposium organizer, Additive Manufacturing: Mechanisms and Mitigation of Aqueous Corrosion and High-temperature Oxidation — Corrosion Behavior of Additively Manufactured Metals and Alloys, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA.
- Workshop organizer, Pre-Congress Meeting X62 — Real-World Data Analytics & Quantitative Liquid and Gas Environmental Electron Microscopy, *Microscopy & Microanalysis 2022*, July 31st, 2022, Portland, OR.
- Symposium Organizer: Environmental Degradation of Additively Manufactured Alloys, TMS 2022, February 27-March 3 (2022)
- Guest editor for special topic on “Environmental degradation of additively manufactured alloys” April 2022 *JOM* issue, the member journal of The Minerals, Metals & Materials Society.
- Guest editor for special issue “Superalloy - Microstructural Characterization of Ni-based Superalloys” in *MDPI Metals* (July 2022)
- Public and Governmental Affairs Committee Representative to the Functional Materials Division Council at TMS (2020 - 2022)
- Vice-chair, TMS Corrosion and Environmental Effects Committee (2019-2021).
- Poster judge at M&M 2020, Portland, OR (Session ID: P02.P1, P06.P2, P08.P2, A09.P1)
- Symposium co-organizer: Advancing Current and State-of-the-Art Application of Ni- and Co-based Superalloys. TMS2020, San Diego, CA, February 23-27 (2020)
- Session Chair: Advancing Current and State-of-the-Art Application of Ni- and Co-based Superalloys: *Environmental Damage and Protection*; TMS2020, San Diego, CA, February 23-27 (2020)
- Symposium Organizer: Environmental Degradation of Additively Manufactured Alloys, TMS2020, San Diego, CA, February 23-27 (2020)

- Session Chair Environmental Degradation of Additively Manufactured Alloys: *Perspective, Challenges and Opportunities of Additively Manufactured Alloys in Corrosive Environments / High Temperature Oxidation and Corrosion*, TMS2020, San Diego, CA, February 23-27, 2020.
- Poster judge at M&M 2019, Portland, OR (Session ID: P01.P3, P03.P2, P08.P3)
- A webinar panelist for ChemCatBio Webinar Series, “Accelerating the Catalyst Development Cycle”, S. Habas, K.A. Unocic, T. Krause, Wednesday, June 27th, 2018.
- Guest editor for JOM August issue: The Corrosion and Environmental Effects Committee is seeking papers on the topic of Nuclear Materials, Oxidation, Supercritical CO₂, and Corrosion Behavior.
- Symposium organizer and chair for symposium: Deformation and Damage Mechanisms in High Temperature Ni, Co and Fe-based Superalloys, TMS 2018, Phoenix, AZ.
- Symposium co-organizer for symposium: High temperature corrosion of structural materials, TMS 2018, Phoenix, AZ.
- Symposium organizer for symposium: “Diversity in STEM and Best Practices to Improve It,” MS&T 2017, Pittsburgh, PA.
- Symposium Co-organizer for Symposium: “Additive Manufacturing of Metals: Establishing Location Specific, Processing-Microstructure-Property-Relationships,” TMS 2017, San Diego, CA (event under the TMS High Temperature Alloys Committee)
- Symposium Organizer for Symposium: “High Temperature Corrosion of Structural Materials,” MS&T 2016, Salt Lake City, UT (event under the Corrosion and Environmental Effects Committee (CEEC))
- Chair, TMS Diversity Committee (2016-2018)
- Member, TMS Professional Development Committee (2016-present)
- Symposium Co-organizer and Session Chair, "Materials in Clean Power Systems IX: Durability of Materials: Corrosion, Coating Protection and Lifetime Prediction," TMS 2016 Annual Meeting & Exhibition, Nashville, TN, February 14-18 (2016).
- Vice-chair, TMS Women In Science Committee (2014-2016)
- Session Co-organizer and Chair, “Thermal and Environmental Barrier Coatings (A2)” at the Coatings for Use at High Temperature Symposium, International Conference of Metallurgical Coatings and Thin Films (ICMCTF), San Diego, CA, April 25-29 (2015)
- Member, TMS High Temperature Alloys Committee (2015-present)
- Session Co-organizer and Chair, “Thermal and Environmental Barrier Coatings (A2)” at the Coatings for Use at High Temperature Symposium, International Conference of Metallurgical Coatings and Thin Films (ICMCTF), San Diego, CA, April 28-May 2 (2014)
- Symposium Organizer and Session Chair, “High Temperature Issues and Materials for the Process Industry symposium, NACE, San Antonio, March 9-13 (2014)
- Sub-committee Chair and Organizer, “Young Professionals Tutorial Luncheon and Lecture,” MS&T 2014, Pittsburgh, PA, October 12-16 (2014)
- JOM Advisor, Corrosion and Environmental Effects Committee (2014-2015)
- Presenter, TMS Honors and Awards Banquet, TMS 2014 Annual Meeting, with Chair of TMS Foundation, Rob Wagoner, San Diego, CA, February 16-20 (2014)
- 3-year Appointment to the TMS Director of Membership and Student Development Committee, approved by TMS Board at TMS 2014 Annual Meeting, San Diego, CA, February 16-20 (2014)
- Co-chair and Co-organizer, “Meet the Candidate Poster Session,” TMS 2014 Annual Meeting, San Diego, CA, February 16-20 (2014)
- Co-organizer and Session Chair, “High-Temperature Issues and Materials for the Process Industry”, CORROSION 2013, NACE 2013 International, Orlando, FL, March 17-21 (2013)
- Symposium Co-organizer and Session Chair, "Materials in Clean Power Systems VIII: Durability of Materials: Corrosion, Coating Protection and Lifetime Prediction" at TMS 2013 Annual Meeting, San Antonio, TX, March 3-7, 2013
- Invited Committee Member, “Young Professionals Program Development Group,” TMS 2013 Annual Meeting, San Antonio, TX, March 3-7 (2013)
- Symposium Co-organizer and Session Chair, "Materials in Clean Power Systems VIII: Durability of Materials: Corrosion, Coating Protection and Lifetime Prediction," TMS 2013 Annual Meeting, San Antonio, TX, March 3-7 (2013)
- Chair and Organizer, “Meet the Candidates Poster Session,” TMS 2013 Annual Meeting, San Antonio, TX, March 3-7 (2013)
- Chair, TMS Young Leader Committee (2012-2013)
- Organizer, “Meet the Candidate Poster Session,” TMS 2012 Annual Meeting, Orlando, FL, March 11- 15, (2012)
- Co-organizer/Vice-chair, Symposium “High-Temperature Issues and Materials for the Process Industry,” CORROSION 2012, NACE International’s Conference and Exhibition, Salt Lake City, UT, March 11-15 (2012)
- Vice-chair, Technology Exchange Group (TEG) 123X Committee: Materials, Advanced, for High Temperature Service in the CPI ASSIGNMENT: Exchange, collect, and disseminate information on intermetallic aluminides and silicides, oxide dispersion-strengthened (ODS) alloys, ceramic composites, refractories, and thermal-spray coatings (2011-2013)

- Vice-chair, High-Temperature Issues and Materials for the Process Industry Committee, NACE International's Conference and Exhibition – CORROSION 2012, Salt Lake City, UT, March 11-15 (2012)
- Member, Focus Interest Group on Aberration Corrected Electron Microscopy (2012-present)
- Vice-chair, TMS Young Leader Committee (2011-2012)
- Judge, IMS Poster Competition, Microscopy & Microanalysis 2011, Nashville, TN, August 7-11(2011)
- Member, TMS High Temperature Alloys Committee (2014-present)
- Member, TMS Corrosion and Environmental Effects Committee (2010-present)
- Secretary, TMS Young Leader Committee (2010-2011)
- Secretary, ASM Oak Ridge Local Chapter (2010-2011)
- Member, TMS Diversity Committee (2009-present)
- Member, Microscopy Society of America (MSA) (2007-present)

U.S. Patents (2 Total):

1. C.L. Cramer, R.A. Lowden, K.A. **Unocic**, J.W. McMurray, A.M. Elliott, Indirect Additive Manufacturing Process for Producing SiC-B₄C-Si Composites, US Patent 11364654 (June 2022).
2. P.J. Maziasz, G. Muralidharan, B.A. Pint, K.A. **Unocic**, Y. Yang, Low-cost cast creep-resistant austenitic stainless steels that form alumina for high temperature oxidation resistance, US Patent 11193190 (December 2021).

Peer Reviewed Journal Articles: [Citations: 5229, h-index: 40, i10-index 109 as of 11/11/2023 (Google Scholar)]

1. M.M. Yung, C. Mukarakate, K. Iisa, A.N. Wilson, M.R. Nimlos, S.E. Habas, A. Dutta, K.A. Unocic, J.A. Schaidle, and M.B. Griffin, Advancements and challenges in the production of low-carbon fuels via catalytic fast pyrolysis of biomass through refinery integration and coproduct generation, *Green Chem.*, 2023, 25,6809.
2. G. Zhou, K.A. Unocic, C. Wang, Z. Shan, S.J. Haigh, J.C. Yang: Revealing Atomic-to-Nanoscale Oxidation Mechanisms of Metallic Materials, *MRS Bulletin*, 48(8), 2023.
3. R. Kannan, Y. Lee, D. Pierce, K.A. Unocic, B. Fillingim, T. Feldhausen, A. Marquez Rossy, H. Wang, P. Nandwana, Additive manufacturing as a processing route for steel-aluminum bimetallic structures, *Materials & Design* 231, 2023 p. 112003, ISSN 0264-1275.
4. JVA Requena, G.R. Hafenstine, X. Huo, Y. Guan, J. Stunkel, F.G. Baddour, K.A. Unocic, B.C. Klein, R. E. Davis, R.S. Paton, D.R. Vardon, S. Kim, Experimental and computational studies of the production of 1,3-butadiene from 2,3-butanediol using SiO₂-supported H₃PO₄ derivatives, *Chemical Engineering Journal* 466 (2023) 143346.
5. C.L. Cramer, E. Cakmak, K.A. Unocic, Hardness Measurements and Interface Behavior of SiC-B₄C-Si Multiple Phase Particulate Composites Made with Melt Infiltration and Additive Manufacturing, *Journal of Composites Science* 7 (4), 172 (2023).
6. N.J. LiBretto, S.A. Tacey, M. Zubair, T.V. Bui, K.A. Unocic, F.G. Baddour, M.B. Griffin, J.A. Schaidle, C.A. Farberow, D.A. Ruddy, N.M. Bedford, S.E. Habas, Compositional dependence of hydrodeoxygenation pathway selectivity for Ni_{2-x}Rh_xP nanoparticle catalysts, *Journal of Materials Chemistry A* 11 (31), 16788-16802 2023.
7. C.A. Downes, K.M. Van Allsburg, S.A. Tacey, K.A. **Unocic**, F.G. Baddour, D.A. Ruddy, N.J. LiBretto, M.M. O'Connor, C.A. Farberow, J.A. Schaidle, S.E. Habas, Controlled Synthesis of Transition Metal Phosphide Nanoparticles to Establish Composition-Dependent Trends in Electrocatalytic Activity, *Chem. Mater.* 2022, 34, 14, 6255–6267 (2022).
8. D.A. McClintock, M.N. Gushev, C. Campbell, K. Mao, T.G. Lach, W. Lu, D.A. McClintock, M.N. Gushev, C. Campbell, K. Mao, T.G. Lach, W. Lu, J.A. Hachtel, K.A. **Unocic**, Observations of radiation-enhanced ductility in irradiated Inconel 718: Tensile properties, deformation behavior, and microstructure, *Acta Materialia* 231, 117889 (2022).
9. K.S. Mao, C.P. Massey, Y. Yamamoto, K.A. **Unocic**, M.N. Gushev, D. Zhang, S.A. Briggs, O. Karakoc, A.T. Nelson, K.G. Field, P.D. Edmondson, Improved irradiation resistance of accident-tolerant high-strength FeCrAl alloys with heterogeneous structures, *Acta Materialia* 231, 117843 (2022).
10. S. Dryepondt, P. Nandwana, K.A. **Unocic**, R. Kannan, P.F. Zelaia, F.A. List III, High temperature high strength austenitic steel fabricated by laser powder-bed fusion, *Acta Materialia* 231, 117876 (2022).
11. M.J. Cordon, J. Zhang, N.R. Samad, J.W. Harris, K.A. **Unocic**, M. Li, D. Liu, Z. Li, Ethanol Conversion to C₄₊ Olefins over Bimetallic Copper- And Lanthanum-Containing Beta Zeolite Catalysts, *ACS Sustainable Chemistry & Engineering* 10 (18), 5702-5707 (2022).
12. H. Nguyen, N.A. Huq, D. Stück, S.M. Tiffit, D.R. Conklin, A.J. Koehler, W.W. McNeary, G.M. Fioroni, C. Hays, E.D. Christensen, I. McNamara, A. Bartling, R. Davis, K.A. **Unocic**, D.R. Vardon, Supercritical Methanol Solvolysis and Catalysis for the Conversion of Delignified Woody Biomass into Light Alcohol Gasoline Bioblendstock, *Advanced Sustainable Systems* 6 (4), 2100310 (2022).
13. Q. Guo, T. Feng, M.J. Lance, K.A. **Unocic**, S.T. Pantelides, E. Lara-Curzio, Evolution of the structure and chemical composition of the interface between multi-component silicate glasses and yttria-stabilized zirconia after 40,000 h exposure in air at 800 °C, *Journal of the European Ceramic Society* 42 (4) 1576-1584 (2022).

14. C.P. Nash, D.P. Dupuis, A. Kumar, C.A. Farberow, A.T. To, C. Yang, E.C. Wegener, J.T. Miller, K.A. Unocic, E. Christensen, J.E. Hensley, J.A. Schaidle, S.E. Habas, D.A. Ruddy, Catalyst design to direct high-octane gasoline fuel properties for improved engine efficiency, *Applied Catalysis B Environmental* 301 120801 (2022).
15. S. Adhikari, J. Zhang, K.A. **Unocic**, E.C. Wegener, P. Kunal, D.J. Deka, T. Toops, S.S. Majumdar, T.R. Krause, D. Liu, Z. Li. Direct 2,3-Butanediol Conversion to Butene-Rich C₃₊ Olefins over Copper-Modified 2D Pillared MFI: Consequence of Reduced Diffusion Length. *ACS Sustainable Chem. Eng.* 2022, 10, 4, 1664–1674.
16. H. Nguyen, N.A. Huq, D. Stück, S.M. Tifft, D.R. Conklin, A.J. Koehler, W. Wilson McNeary, G.M. Fioroni, C. Hays, E.D. Christensen, I. McNamara, A. Bartling, R. Davis, K.A. **Unocic**, D.R. Vardon. Supercritical Methanol Solvolysis and Catalysis for the Conversion of Delignified Woody Biomass into Light Alcohol Gasoline Bioblendstock, *Advanced Sustainable Systems* (2022) 2100310.
17. F. Lin, Y. Lu, K.A. **Unocic**, S.E. Habas, M.B. Griffin, J.A. Schaidle, H.M. Meyer III, Y. Wang, H. Wang, Deactivation by Potassium Accumulation on a Pt/TiO₂ Bifunctional Catalyst for Biomass Catalytic Fast Pyrolysis. *ACS Catalysis* 12 (2021) 465-480.
18. L. Wang, K. Mao, P.F. Tortorelli, P.J. Maziasz, M. Thangirala, K.A. **Unocic**, X. F. Chen, “Effect of heterogeneous microstructure on the tensile and creep performances of cast Haynes 282 alloy,” *Materials Science and Engineering: A* 828 142099 (2021).
19. T.R. Watkins, K.A. **Unocic**, A. Peralta, M. Megahed, J.R. Bunn, C.M. Fancher, C.R. D’Elia, M.R. Hill, J.F. Neumann, Residual stresses and microstructure within Allvac 718Plus laser powder bed fusion bars, *Additive Manufacturing* 47 102334 (2021).
20. B. Fuchs, J. Qu, J.Y. Kim, K.A. **Unocic**, Q. Guo, P. Ramuhalli, L.J. Jacobs, Analytical modeling of the evolution of the nonlinearity parameter of sensitized stainless steel, *Journal of Applied Physics* 130 (16) 165102 (2021).
21. X. Huo, D.R. Conklin, M. Zhou, V. Vorotnikov, R.S. Assary, S.C. Purdy, K. Page, Z. Li, K.A. **Unocic**, R.I. Balderas, R.M. Richards, D.R. Vardon, “Catalytic Activity and Water Stability of MgO(111) Nanoparticles for 2-Pentanone Condensation,” *Applied Catalysis B: Environmental* 294, 120234 (2021).
22. M. Boebinger, O. Yarema, M. Yarema, K.A. **Unocic**, R.R. Unocic, V. Wood, M. McDowell, In Situ TEM Investigation of the Spontaneous Hollowing of Alloy Anode Nanocrystals, *Microscopy and Microanalysis* 27 (S1), 1972-1973 (2021).
23. K.A. **Unocic**, M. Griffin, J. Schaidle, S. Habas, F. Walden, R.R. Unocic, L.F. Allard, Practical Aspects of Performing Quantitative EELS Measurements of Gas Compositions in Closed-Cell Gas Reaction S/TEM *Microscopy and Microanalysis* 27 (S1), 796-798 (2021).
24. Q. Guo, T.R. Watkins, A. Trofimov, H. Wang, G. Cola, T.R. Muth, D. Singh, J. Thomas, S.S. Babu, K.A. **Unocic**, Microstructure Evolution of Low Carbon Steel via Flash Processing, *Microscopy and Microanalysis* 27 (S1), 156-158 (2021).
25. J. Cavin, A. Ahmadiparidari, L. Majidi, A. Singh Thind, S.N. Misal, A. Prajapati, Z. Hemmat, S. Rastegar, A. Beukelman, M.R. Singh, K.A. **Unocic**, A. Salehi-Khojin, and R. Mishra, “2D High-Entropy Transition Metal Dichalcogenides for Carbon Dioxide Electrocatalysis,” *Advanced Materials* 33 2100347 (1-19).
26. K.A. **Unocic**, D.K. Hensley, F.S. Walden, W.C. Bigelow, M.B. Griffin, S.E. Habas, R.R. Unocic, L.F. Allard, “Performing In Situ Closed-Cell Gas Reactions in the Transmission Electron Microscope,” *J. Vis. Exp.* (173), e62174, doi:10.3791/62174 (2021).
27. J. Zhang, E. C. Wegener, N. River Samad, J.W. Harris, K.A. **Unocic**, L.F. Allard, S. Purdy, S. Adhikari, M.J. Cordon, J.T. Miller, T.R. Krause, S. Cheng, D. Liu, M. Li, X. Jiang, Z. Wu, Z. Li, “Isolated Metal Sites in Cu–Zn–Y/Beta for Direct and Selective Butene-Rich C₃₊ Olefin Formation from Ethanol,” *ACS Catal.* 11, 9885 (2021).
28. W.W. McNeary, S.A. Tacey, G.D. Lahti, D.R. Conklin, K.A. **Unocic**, E.C.D. Tan, E.C. Wegener, T. Eralp Erden, S. Moulton, C. Gump, J. Burger, M.B. Griffin, C.A. Farberow, M.J. Watson, L. Tuxworth, K.M. Van Allsburg, A.A. Dameron, K. Buechler, D.R. Vardon, “Atomic Layer Deposition with TiO₂ for Enhanced Reactivity and Stability of Aromatic Hydrogenation Catalysts,” *ACS Catal.* 11, 8538 (2021).
29. M.J. Cordon, J. Zhang, S.C. Purdy, E.C. Wegener, K.A. **Unocic**, L.F. Allard, M. Zhou, R.S. Assary, J.T. Miller, T.R. Krause, F. Lin, H. Wang, A.J. Kropf, C. Yang, D. Liu, Z. Li, “Selective Butene Formation in Direct Ethanol-to-C₃₊-Olefin Valorization over Zn–Y/Beta and Single-Atom Alloy Composite Catalysts Using In Situ-Generated Hydrogen,” *ACS Catal.* 11, 7193 (2021).
30. K.A. Kane, E. Garcia, S. Uwanyuze, M. Lance, K.A. **Unocic**, S. Sampath, B.A. Pint, “Steam oxidation of ytterbium disilicate environmental barrier coatings with and without a silicon bond coat,” *Journal of the Am. Ceramic Society*, 104(5) 2285-2300 (2021).
31. N.A. Huq, G.R. Hafenstine, X. Huo, H. Nguyen, S.M. Tifft, D.R. Conklin, D. Stück, J. Stunkel, Z. Yang, J.S. Heyne, M.R. Wiatrowski, Y. Zhang, L. Tao, J. Zhu, C.S. McEnally, E.D. Christensen, C. Hays, K.M. Van Allsburg, K.A. **Unocic**, H.M. Meyer, Z. Abdullah, D.R. Vardon, “Toward net-zero sustainable aviation fuel with wet waste-derived volatile fatty acids,” *PNAS* 118 (13) e2023008118 (2021).

32. R.K. Mudanyi, C.L. Cramer, A.M. Elliott, K.A. **Unocic**, Q. Guo, D. Kumar, “W-ZrC composites prepared by reactive melt infiltration of Zr₂Cu alloy into binder jet 3D printed WC preforms,” *International Journal of Refractory Metals and Hard Materials* 94, 105 (2021).
33. T.M. Lardinois, J.S. Bates, H.H. Lippie, C.K. Russell, J.T. Miller, H.M. Meyer III, K.A. **Unocic**, V. Prikhodko, X. Wei, C.K. Lambert, A.B. Getsoian, R. Gounder, “Structural Interconversion between Agglomerated Palladium Domains and Mononuclear Pd(II) Cations in Chabazite Zeolites,” *Chem. Mater.* 33, 5, 1698–1713 (2021).
34. L. Wang, K.A. **Unocic**, P.F. Tortorelli, M. Santella, X.F. Chen, “Precipitation behavior near shrinkage porosity in a large sand casting of Haynes 282 alloy,” *Materialia* 15, 101035 (2021).
35. K.A. **Unocic**, X. Chen, P.F. Tortorelli, Microstructural Evaluation of Welded Nickel-Based Superalloy Inconel 740H After Creep Testing, *JOM* 72 (5), 1811-1821 2020. (Invited)
36. K.A. **Unocic**, M.M. Kirka, E. Cakmak, D. Greeley, A.O. Okello, S. Dryepondt, Evaluation of additive electron beam melting of Haynes 282 alloy, *Materials Science and Engineering: A* 772, 138607 (1-9) (2020).
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9. Q. Guo, H. Meyer, A. Ievlev, A. Starace, C. Mukarakate, S. Habas, K.A. **Unocic**, Multi-scale Characterization Study Enabling Deactivation Mechanism in Formed Zeolite Catalyst. *Microscopy and Microanalysis*, 26 (S2), 1270-1271, (2020).
10. Q. Guo, M. Kirka, and K.A. **Unocic**, *In Situ* Transmission Electron Microscopy Study on the Deformation Responses of Additively Manufactured Multiphase Ni-based Superalloy. *Microscopy and Microanalysis*, 26 (S2), 1844-1846 (2020).
11. K. Mao, G. Maxim, C. Massey, K.A. **Unocic**, P. Edmondson, and K. Field (2020). In-situ Micromechanical Testing of Neutron Irradiated FeCrAl Alloys. *Microscopy and Microanalysis*, 26 (S2), 646-647 (2020).
12. B.A. Pint, K.A. **Unocic**, J. Keiser, Effect of impurities on supercritical CO₂ compatibility, *3rd European supercritical CO2 Conference*, September 19-20, 2019, Paris, France, 2019-sCO₂.eu-142 48899(1-7) (2019).
13. K.A. **Unocic**, H.M. Meyer III, F.S. Walden, N.L. Marthe, W. C. Bigelow and L.F. Allard, Controlling Water Vapor in Gas - Cell Microscopy Experiments, *Microsc. Microanal.* 24, Suppl. 1 286-287 (2018).
14. K.A. **Unocic**, J.S. Choi, D.A. Ruddy, C. Yang, J. Kropf, J. Miller, T.R. Krause, and S. Habas, *In situ* S/TEM Reduction Reaction of Ni-Mo₂C catalyst for Biomass Conversion, *Microsc. Microanal.* 24, Suppl. 1 322-323 (2018).
15. R.J. Spurling, P.F. Tortorelli, and K.A. Unocic, Microstructural Evaluation of the Thermal Stability of Inconel 740H Nickel-Based Superalloy, *Microsc. Microanal.* 24, Suppl. 1 (2018).
16. K.A. **Unocic**, A.K. Datye, W.C. Bigelow and L.F. Allard, Water Vapor in Closed-Cell *In Situ* Gas Reactions: Initial Experiments, *Microsc. Microanal.* 23, Suppl 1, 940-941 (2017).
17. K.A. **Unocic**, D.A. Ruddy, T. Krause, and S. Habas, *In situ* S/TEM Reduction Reaction of Calcined Cu/BEA-zeolite Catalyst, *Microsc. Microanal.* 23, Suppl. 1, 944-945 (2017).
18. L.F. Allard, H. M. Meyer, D.K. Hensley, W.C. Bigelow, and K.A. **Unocic** Model "Alloy" Specimens for MEMS-Based Closed-Cell Gas-Reactions, *Microsc. Microanal.* 23, Suppl. 1 908-909 (2017).
19. R.R. Unocic, R.L. Sacci, X. Sang, K.A. **Unocic**, G.M. Veith, N.J. Dudney, K.L. More, *In situ* Nanoscale Imaging and Spectroscopy of Energy Storage Materials *Microsc. Microanal.* 23, Suppl. 1 1964-1965 (2017).
20. K.A. **Unocic** and B. A. Pint, "Effect of Environment on the High Temperature Oxidation Behavior of 718 and 718Plus," *Proceedings of 8th International Symposium on Superalloy 718 and Derivatives*, TMS (The Minerals, Metals & Materials Society) Pittsburgh, PA 609-619 (2014).
21. P.F. Tortorelli, H. Wang, K.A. **Unocic**, M.L. Santella, and J.P. Shingledecker, "Long-Term Creep-Rupture Behavior of Inconel® 740 and Haynes® 282," *Proceedings of the ASME Symposium on Elevated Temperature Application of Materials for Fossil, Nuclear, and Petrochemical Industries*, March 25-27 (2014).
22. K.A. **Unocic**, L.M. Kolbus, R.R. Dehoff, Sebastien N. Dryepondt, and B.A. Pint, "High-Temperature Performance of IN718 Processed by Additive Manufacturing," *Conference Proceedings, CORROSION 2014*, NACE International, Paper No. 4478 (2014).
23. P.F. Tortorelli, K.A. **Unocic**, H. Wang, and M.L. Santella, "Creep-Rupture Behavior of Precipitation-Strengthened Ni-Based Alloys Under Advanced Ultrasupercritical Steam Conditions," *Proceedings of the 7th International Conference on Advances in Materials Technology for Fossil Power Plants* Waikoloa, Hawaii (October 22 2013) (2014).
24. B.A. Pint, K.A. **Unocic**, and J.A. Haynes, "The Effect of Water Vapor Content and CO₂ on TBC Lifetime," *Proceedings of the 7th International Conference on Advances in Materials Technology for Fossil Power Plants* Waikoloa, Hawaii (October 22, 2013) 360-370 (2014).
25. K.A. **Unocic**, D.N. Leonard, H.M. Meyer III, M.J. Lance, and B.A. Pint, "Compatibility of V/Y₂O₃/V-4Cr-4Ti Coatings with Liquid Flowing Li," *Conference Proceedings of High-Temperature Corrosion and Protection of Materials (HTCPM8)*, Les Embiez, France, 20-25 May (2012).
26. K.A. **Unocic** and B.A. Pint, "Microstructure and Chemistry of the Oxide Scale and Pt-containing Coatings Deposited on Superalloy N5," *Microscopy and Microanalysis* 18 [Suppl. 2] 1676-1677 (2012).
27. R.R. **Unocic**, L. Baggetto, K.A. Unocic, G.M. Veith, N.J. Dudney, and K.L. More, "Coupling EELS/EFTEM Imaging with

- Environmental Fluid Cell Microscopy,” *Microscopy and Microanalysis* 18 [Suppl. 2] 1104-1105 (2012).
28. D.T. Hoelzer, K.A. **Unocic**, D.W. Coffey, and Z. Feng, “Microstructural Characterization of FSW oxide Dispersion Strengthened 14YWT Ferritic Alloy and F82H tempered Martensitic Steel,” *Microscopy and Microanalysis* 18 [Suppl. 2] 1658-1659 (2012).
 29. R.R. Unocic, K.A. **Unocic**, B.A. Pint, and M.D. Lipschutz, “Characterization of Pre-and Post-Service Grain Boundary Phases in a Cast Austenitic Steel,” *Proceedings of ASME Turbo Expo*, June 2011, B&R Codes ED1905020 (2011).
 30. B.A. Pint, M.P. Brady, Y. Yamamoto, K.A. **Unocic**, and W. Matthews, “Evaluation of Commercial Alumina-Forming Austenitic Foil for Advanced Recuperators,” *Proceedings of ASME Turbo Expo*, June 2011, B&R Code ED1904032.
 31. B.A. Pint, K.A. **Unocic**, S. Dryepond, P.J. Maziasz, and M.L. Santella, “Revival of Interest in Super-Bainitic Steels for Energy Applications,” *Conference Proceedings Welding and Fabrication Technology for New Power Plants and Components: Second International EPRI Conference*, Orlando, FL, June 2011.
 32. S. Dryepondt, K.A. **Unocic**, and A. Vande Put, “Qualification of New, Commercial ODS Alloys,” *Annual Conference on Fossil Energy Materials Conference Proceedings* May 2011.
 33. A. Vande Put, K.A. **Unocic**, B.A. Pint, and M.P. Brady, “Performance of Alumina-Forming Austenitic Steels, Fe-base and Ni-base alloys exposed to metal dusting environments,” *Conference Proceedings NACE Corrosion 2011 Conference and Expo*, March 2011.
 34. K.A. **Unocic**, R.R. Unocic, B.A. Pint, and R.W. Hayes, “Effect of Microstructure and Composition on the High-Temperature Oxidation Behavior of Alloy 718Plus,” *7th International Symposium on Superalloy 718 and Derivatives*, Pittsburgh, PA, October 17, 997-991 (2010).
 35. R.R. Unocic, K.A. **Unocic**, R.W. Hayes, G.S. Hayes, and M.J. Mills, “A TEM Study of Creep Deformation Mechanisms in ALLVAC 718Plus,” *7th International Symposium on Superalloy 718 and Derivatives*, Pittsburgh, PA, October 17, 607-615 (2010).
 36. B.A. Pint, S. Dryepondt, and K.A. **Unocic**, “Oxidation of Superalloys in Extreme Environments,” *7th International Symposium on Superalloy 718 and Derivatives*, Pittsburgh, PA, October 17, 861-875 (2010).
 37. K.A. **Unocic**, B.A. Pint, and I.G. Wright, “Characterization of Reaction Products from Field Exposed Tubes,” *the EPRI 6th International Conference on Advances in Materials Technology for Fossil Power Plants*, August 31-September 3, 2010, Santa Fe, NM (2010).
 38. A.S. Sabau, I.G. Wright, W. Zhang, B.A. Pint, and K.A. **Unocic**, “Temperature Evolution and Oxide Growth in Water Wall Tubes of Supercritical Unit,” *Boiler Tube and HRSG Tube Failures and Inspections International Conference*, Baltimore, MD, April 19 (2010).
 39. K.A. **Unocic**, M.J. Mills, G.S. Daehn, and P. Kobe, “Microstructural Analysis of 5XXX Series Aluminum Alloys Modified for Optimal Strength and Corrosion Resistance,” *Microscopy and Microanalysis* 11 [Suppl. 2] 700-701 (2005).
 40. S.R. Claves, K.A. Janiszewska, W.Z. Misiolek, and W. Libura, “Metal Flow in Billets of Thin-Walled Extrudates,” *8th International Aluminum Extrusion Technology Seminar ET 2004*, Orlando, FL, The Aluminum Association & Aluminum Extruders Council, 55-67 (2004).

Webinars:

1. ChemCatBio Webinar Series: “Accelerating the Catalyst Development Cycle,” June 27th, 2018.

Selected Invited Presentations:

14. “In situ Laser Study and Multi-scale Simulations on Fe-Cr-Ni System, SS-06.3. Microstructure Analysis in Additive Manufacturing (AM) Materials”, The 20th International Microscopy Congress, 10-15 September 2023, BEXCO, Busan, Korea.
13. Insight into Materials Degradation in Extreme Environments with *in situ/operando* Electron Microscopy; Workshop: UTK Deep Learning for Microscopy Image Analysis in Nuclear Materials" Workshop, June 5-6, 2023, University of Tennessee Knoxville.
12. STEM/SEM study on the microstructural evolution and deformation mechanisms of Fe-25Cr-20Ni-1.4Nb-0.2C steel fabricated by laser powder-bed fusion, TMS2023, March 19-23, 2023, San Diego, CA.
11. “Oxidation Behavior of Model FeCrAl Steel and APMT Alloy After Exposure in Steam”, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA.
10. “From *in situ* to *operando* closed cell gas reaction STEM: challenges and opportunities,” *In-situ/Operando* TEM Techniques for Advanced Nanomaterial Characterization Workshop, CCEM McMater University, March 31 – April 1, 2022.
9. Investigation of deactivation mechanisms in Pt/TiO₂ catalyst using advanced and *operando* STEM, ACS Spring 2022, March 20-24, 2022.
8. “Practical Aspects of Performing Quantitative EELS Measurements of Gas Compositions in Closed-Cell Gas Reaction S/TEM,” *Microscopy and Microanalysis 2021 Meeting, Virtual Meeting*, August 1-5, 2021.

7. "The Effect and Stability of Oxides in ODS Ferritic Alloy modified with Y_2O_3 , HfO_2 and/or ZrO_2 for Fusion Reactor Applications," April 27, 2021, Department of Mechanical Engineering, The University of Texas at San Antonio
6. "Operando STEM - Simulating Reaction Conditions via *In Situ* Gas-cell Microscopy," Physical Sciences Directorate, ORNL, May 8th, 2019.
5. "*In Situ* TEM: Creating more realistic experimental environments for materials research by precisely controlling the introduction of humidity," Vendor Tutorial 2019 at Protochips' booth, Microscopy & Microanalysis 2018 Meeting, Seattle, USA, August 5-9, 2019.
4. "Introducing and Controlling Water Vapor in Gas-Cell Microscopy Experiments," The 4th Conference on *In-situ* and Correlative Electron Microscopy (CISCSEM 2018), Saarbrücken, Germany, October 10-12th 2018.
3. "Controlling Water Vapor in Gas -Cell Microscopy Experiments, Microscopy & Microanalysis 2018 Meeting, Baltimore, MD, USA, August 5-9, 2018.
2. "*In situ* S/TEM Closed-Cell Gas Reactions of Catalysts: capabilities and opportunities," 255th ACS National Meeting & Exposition, New Orleans Mar 18-22, 2018.
1. "Oxidation mechanisms at nano- and mesoscale using *in situ* and convectional microscopy," NASA Glenn Research Center, Cleveland, OH, USA, November 15, 2017.

Invited University Colloquium

1. "Operando STEM - Simulating Reaction Conditions via *In Situ* closed-cell gas-reaction Microscopy," November 17th, 2021, Department of Materials Science and Engineering, The Ohio State University, Columbus, Ohio. (**Invited Colloquium**)
2. "The Effect and Stability of Oxides in ODS Ferritic Alloy modified with Y_2O_3 , HfO_2 and/or ZrO_2 for Fusion Reactor Applications," April 27, 2021, Department of Mechanical Engineering, The University of Texas at San Antonio. (**Invited Colloquium**)
3. "Revealing the oxidation mechanisms at the nanoscale using *in situ* microscopy," November 14, 2017, Department of Materials Science and Engineering at Case Western Reserve University (CWRU), Cleveland, Ohio, Fall Semester Colloquia Series. (**Invited Colloquium**)

Selected Conference Presentations:

1. K.A. Unocic, S. Randolph, Y. Lee, R. Kannan, S. Jesse, . Lasseeter, S. Gellerup, P.D. Rack, "In situ Laser Study and Multi-scale Simulations on Fe-Cr-Ni System, SS-06.3. Microstructure Analysis in Additive Manufacturing (AM) Materials", The 20th International Microscopy Congress, 10-15 September 2023, BEXCO, Busan, Korea. (**Invited**)
2. KA Unocic, Insight into Materials Degradation in Extreme Environments with *in situ/operando* Electron Microscopy; Workshop: UTK Deep Learning for Microscopy Image Analysis in Nuclear Materials" Workshop, June 5-6, 2023, University of Tennessee Knoxville. (**Invited**)
3. KA Unocic, K Rangasayee, LM Debeer-Schmitt, KC Littrell, P Nandwana, and S Dryepondt STEM/SEM study on the microstructural evolution and deformation mechanisms of Fe-25Cr-20Ni-1.4Nb-0.2C steel fabricated by laser powder-bed fusion, TMS2023, March 19-23, 2023, San Diego, CA. (**Invited**)
4. KA Unocic, K Kane, Y Yamamoto, BA Pint, Oxidation Behavior of Model FeCrAl Steel and APMT Alloy After Exposure in Steam, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA. (**Invited**)
5. K.A. Unocic, K. Kane, Y. Yamamoto, B.A. Pint, Oxidation Behavior of Model FeCrAl Steel and APMT Alloy After Exposure in Steam, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA. (**Invited**)
6. K.A. Unocic, N. LiBretto, A.T. To, J.A. Kropf, D.A. Ruddy, T.R. Krause, L.F. Allard, S.E. Habas, Revealing the Reaction Behavior of $Co_{0.86}Mn_{0.14}O$ under H_2 using *in situ* Closed-Cell Gas Reaction S/TEM, Microscopy and Microanalysis 2022, July 31-August 4, 2022, Portland, OR, USA.
7. K.A. Unocic, From *in situ* to *operando* closed cell gas reaction STEM: challenges and opportunities; *In-situ/Operando* TEM Techniques for Advanced Nanomaterial Characterization Workshop, CCEM McMaster University, March 31 – April 1, 2022. (**Invited**)
8. K.A. Unocic, M. Griffin, H.M. Meyer III, H. Wang, L.F. Allard, J. Schaidle, S.E. Habas, Investigation of deactivation mechanisms in Pt/TiO₂ catalyst using advanced and operando STEM, ACS Spring 2022, March 20-24, 2022. (**Invited**)
9. K.A. Unocic, M. Griffin, J. Schaidle, S.E. Habas, F.S. Walden, R.R. Unocic and L.F. Allard, "Practical Aspects of Performing Quantitative EELS Measurements of Gas Compositions in Closed-Cell Gas Reaction S/TEM," *Microscopy and Microanalysis 2021 Meeting, Virtual Meeting*, August 1-5, 2021. (**Invited**)
10. Q. Guo, TR. Watkins, A. Trofimov, H. Wang, G. Cola, T.R. Muth, D. Singh, J. Thomas, S.S. Babu, K.A. Unocic, "Microstructure Evolution of Low Carbon Steel via Flash Processing," *Microscopy and Microanalysis 2021 Meeting, Virtual Meeting*, August 1-5, 2021.
11. K.A. Unocic, M. Romedenne, P. Nandwana, S. Dryepondt: Microstructural evolution and oxidation behavior of Fe-25Cr-20Ni-1.4Nb-0.2C steel fabricated by laser powder-bed fusion, TMS2021 Virtual, March 15-18, 2021.

12. K.A. Unocic, M. Griffin, M. Yung, E.C. Wegener, T.R. Krause, H. Wang, H.M. Meyer III, L.F. Allard, J. Schaidle, and S.E. Habbas *Operando S/TEM Reactions of Pt/TiO₂ Catalysts for Catalytic Fast Pyrolysis*, 2020 Thermal and Catalytic Sciences (TCS) Virtual Conference, October 5-8, 2020.
13. K.A. Unocic, M. Griffin, M. Yung, E.C. Wegener, T.R. Krause, H. Wang, H.M. Meyer III, L.F. Allard, J. Schaidle, S.E. Habbas, *Operando S/TEM Reactions of Pt/TiO₂ Catalysts for Catalytic Fast Pyrolysis*, *Microscopy and Microanalysis 2020 Meeting, Virtual Meeting, August 3-7, 2020*.
14. K.A. Unocic, “Current Catalyst Research using Advanced and Operando STEM Characterization”, VTO HQ team visit, February 12, 2020, at ORNL.
15. K.A. Unocic, X. Chen & P.F. Tortorelli “Microstructural Evaluation of Welded Nickel-Based Superalloy Inconel 740H with “Nimonic” 263 after Creep Testing MS&T19 Materials Science & Technology Technical Meeting and Exhibition, September 29-October 3, 2019, Portland, OR USA.
16. K.A. Unocic, “Operando STEM - Simulating Reaction Conditions for Structural Materials via *In Situ* Gas-cell Microscopy”, *Frontiers of Structural Materials Research*, ORNL, Aug. 27 - 29, 2019.
17. K.A. Unocic, F.S. Walden II and L.F. Allard, “Influence of Water Vapor on NiAl Oxidation Using *in situ* STEM,” M&M 2019, Portland, OR.
18. K.A. Unocic, V. Lebarbier Dagle, R.A. Dagle, E.C. Wegener, J. Kropf, T.R. Krause, D.A. Ruddy, L.F. Allard, and S.E. Habas, “*In situ* S/TEM Reactions of Ag/ZrO₂/SBA-16 Catalysts for Single-Step Conversion of Ethanol to Butadiene,” M&M 2019, Portland, OR.
19. K. A. Unocic, *Operando STEM - Simulating Reaction Conditions via In Situ Gas-cell Microscopy*, May 8th, 2019; Physical Sciences Directorate, ORNL. (**Invited**)
20. K.A. Unocic, J.S. Choi, D.A. Ruddy, J. Schaidle, S. Habas, T. R. Krause, *Operando STEM guide catalyst regeneration method development*, TMS 2019 148th Annual Meeting & Exhibition, March 11th, 2018, San Antonio, TX, USA.
21. K.A. Unocic, F. S. Walden, N. L. Marthe, W. C. Bigelow and L. F. Allard’ Introducing and Controlling Water Vapor in Gas-Cell Microscopy Experiments, The 4th Conference on *In-situ* and Correlative Electron Microscopy (CISCeM 2018), October 10-12th, Saarbrücken, Germany. (**Invited**)
22. K.A. Unocic and B.A. Pint, The Effect of CO₂ Pressure on Chromia Scale Microstructure at 750°C, Materials Science & Technology Conference & Exhibition - MS&T 2018, October 14-18th, 2018, Columbus, OH, USA.
23. K.A. Unocic, A. Shyam, S. Dryepondt, and P.J. Maziasz, Effects of CO₂ on Fatigue and Creep Properties of the Ni-base alloy 282, March 11-15, 2018, TMS 2018 Annual Meeting & Exhibition, Phoenix, AZ, USA.
24. K.A. Unocic, A.O. Okello, M.D. Massey, M.M. Kirka, R.R. Dehoff, “Characterization of Ni-base alloys Fabricated by Electron Beam Melting,” JIM Annual Spring Meeting March 15-17, 2017, Tokyo Metropolitan University, Minami-Osawa Campus, Japan.
25. K.A. Unocic, A.O. Okello, M.D. Massey, M.M. Kirka, R.R. Dehoff, “Characterization of Ni-base alloys Fabricated by Electron Beam Melting and addressing *in situ* STEM capability at ORNL,” National Institute for Materials Science (NIMS), March 13, 2017, Tsukuba, Japan.
26. K.A. Unocic, M.M. Kirka, R.R. Dehoff, “*In situ* TEM compression testing of IN718 fabricated by electron beam melting,” TMS 2017 Annual Meeting & Exhibition, February 26 – March 2, 2017, San Diego, California, USA.
27. K.A. Unocic, R.B. Rebak, B.A. Pint, “Evaluation of Fe-Cr Alloys in Steam and Air,” MS&T16, October 23-27, 2016, Salt Lake City, Utah.
28. K.A. Unocic, A.O. Okello, M.D. Massey, M.M. Kirka, R.R. Dehoff, “Characterization of MAR-M247 fabricated by electron beam melting,” MS&T16, October 23-27, 2016, Salt Lake City, Utah.
29. K.A. Unocic, D. Shin, R.R. Unocic, and L.F. Allard, “NiAl Oxidation Reaction Processes Studied *In Situ* using MEMS-based Closed-Cell Gas Reaction Electron Microscopy Methods,” Symposium H: Advanced Characterization Techniques Part I, HTCPM LES EMBIEZ, France, May 15-20 (2016).
30. K.A. Unocic, D.T. Hoelzer, C.P. Parish, and K.G. Field, “TEM Characterization of Irradiated and Unirradiated Fe-Cr Steels, Ni-based and ODS Fe-12Cr-5Al Alloys,” TMS 2016 145th Annual Meeting & Exhibition, Nashville, TN, February 18-14 (2016).
31. K.A. Unocic, L.F. Allard, D. Shin, and R.R. Unocic, “NiAl Oxidation Reaction Processes Studied *In Situ* using MEMS-based Closed-Cell Gas Reaction Electron Microscopy Methods,” Symposium VV: *In situ* Study of Synthesis and Phase Transformation of Materials, Fall MRS Meeting, Boston, November 30 (2015).
32. K.A. Unocic, S. Dryepondt, Y. Yamamoto, and B.A. Pint, “Effect of Al and Cr Content on Steam Oxidation of FeCrAl Alloys,” MS&T 2015, Columbus, OH (2015).
33. K.A. Unocic, H. Wang, and P.F. Tortorelli, “Stress Induced Microstructural Evolution in HAYNES 282, TMS 2015 144th Annual Meeting & Exhibition, Orlando, FL, March 15-19 (2015).
34. K.A. Unocic and B.A. Pint, “Effect of Environment on the High Temperature Oxidation Behavior of 718 and 718Plus,” 8th International Symposium on Superalloy 718 & Derivatives Pittsburgh, PA, September 28-October 1, (2014).

35. K.A. Unocic and M.P. Brady, "Understanding Protective Film Formation by Magnesium Alloys in Automotive Applications," 2013 DOE AMR Vehicle Technologies Program Presentation, Arlington, Virginia, June 16-20 (2014).
36. K.A. Unocic and B.A. Pint, "Effect of Boron on the Oxidation Behavior of NiCrAlYHfTi in H₂O and CO₂ Environments," International Conference on Metallurgical Coatings and Thin Films, San Diego, CA, April 28 (2014).
37. K.A. Unocic and B.A. Pint, "Performance of New Low Cr ODS FeCrAl," 9th International Conference on Microscopy of Oxidation, Nottingham, United Kingdom, April (2014).
38. K.A. Unocic, L.M. Kolbus, R.R. Dehoff, S.N. Dryepndt, and B.A. Pint, "High-Temperature Performance of IN718 processed by Additive Manufacturing," CORROSION 2014, NACE International (2014).
39. K.A. Unocic and P.A. Pint, "Alloying and Coating Strategies for Improved Pb-Li Compatibility," 16th International Conference on Fusion Reactor Materials (ICFRM16), Beijing, China, October 20-26 (2013).
40. K.A. Unocic and M.P. Brady, "Understanding Protective Film Formation by Magnesium Alloys in Automotive Applications," 2013 DOE AMR Vehicle Technologies Program Presentation, Arlington, Virginia, May 13-17 (2013).
41. K.A. Unocic and B.A. Pint, "Oxidation Behavior of Co-Doped NiCrAl Alloys in Dry and Wet Air," International Conference on Metallurgical Coatings and Thin Films, San Diego, CA, April 29 (2013).
42. K.A. Unocic, M.P. Brady, and B.A. Pint, "Oxidation Behavior of Alumina-Forming Austenitic Steel," CORROSION 2013, NACE International (2013).
43. K.A. Unocic and F. Balle, "Microstructural Investigation of Aluminum and Titanium Welds after Ultrasonic Torsion Welding," TMS 2013 142nd Annual Meeting & Exhibition, San Antonio, TX (Invited).
44. K.A. Unocic and B.A. Pint, "Microstructure and Chemistry of the Oxide Scale formed on Pt-containing Coatings Deposited on Superalloy N5," Microscopy & Microanalysis 2012 Phoenix, AR (Invited)
45. K.A. Unocic and B.A. Pint, "Effect of Water Vapor on Thermally Grown Alumina Scales on Bond Coatings," International Conference on Metallurgical Coatings and Thin Films (ICMCTF), San Diego, CA, USA (2012).
46. K.A. Unocic, "Characterization of the Alumina Scale Formed on Coated and Uncoated Doped Superalloys," International Conference on Metallurgical Coatings and Thin Films (ICMCTF), May (2011).
47. K.A. Unocic, "Characterization of the Alumina Scale formed on Coated and Uncoated Doped Superalloys," 8th International Conference on Microscopy of Oxidation, Liverpool, United Kingdom, April (2011).
48. K. A. Unocic, "Oxidation Behavior of Alumina-Forming Austenitic Steel in Steam," TMS 2011 Annual Meeting, San Diego, CA, February (2011).
49. K.A. Unocic, "Effect of Temperature and Water Vapor on the Oxidation of an Alumina-Forming Austenitic Steel," MS&T 2011, Houston, TX (2011).
50. K.A. Unocic, "Effect of Microstructure and Environment on the High-Temperature Oxidation Behavior of Alloy 718Plus," 7th International Symposium on Superalloy 718 & Derivatives, Pittsburgh, PA, October (2010).
51. K.A. Unocic, "A TEM Study of Creep Deformation Mechanisms in AllVac 718Plus," 7th International Symposium on Superalloy 718 & Derivatives, Pittsburgh, PA, October (2010).
52. K. A. Unocic, M. P. Brady, and B. A. Pint, "The Oxidation Behavior of a Commercial Trial Heat of Alumina-Forming Austenitic Steel," 8th Spring Meeting of the International Society of Electrochemistry, Columbus, OH, May (2010).
53. K.A. Unocic and B.A. Pint, "Characterization of the Alumina Scale Formed on a Commercial MCrAlYHfSi Coating," International Conference on Metallurgical Coatings and Thin Films, San Diego, CA, April 26-30 (2010).
54. K.A. Unocic, R.W. Hayes, and G.S. Daehn, "Microstructural Features Leading to Enhanced Resistance to Grain Boundary Cracking in Allvac 718Plus," AeroMat, Dayton, OH (2009).
55. K.A. Unocic, "Challenges in Preparing Aluminum Alloys for Grain Boundary Characterization," Microscopy & Microanalysis 2008, Albuquerque, NM (2008). (Invited)
56. K.A. Unocic, P. Kobe, M.J. Mills, and G.S. Daehn, "Effect of Grain Size and Substructure on Sensitization in 5083 Al Alloys," TMS 2008 Annual Meeting, New Orleans, LA (2008).
57. K.A. Unocic, P. Kobe, M.J. Mills, and G.S. Daehn, "Grain Boundary Precipitate Modification for Improved Intergranular Corrosion Resistance," 10th International Conference ICAA10 (2006).
58. K.A. Unocic, M.J. Mills, G.S. Daehn, and P. Kobe, "Microstructural Analysis of 5XXX Series Aluminum Alloys Modified for Optimal Strength and Corrosion Resistance," Microscopy & Microanalysis 2005, Honolulu, HI (2005).

Poster Presentations

1. K.A. Unocic, S.C. Purdy, L.F. Allard, G.B. Collinge, J. Zhang, S.N. Borate, Q. Wu, E.C. Wegener, N. "River" Samad, S. Habas, T.R. Krause, J.W. Harris, M-S Lee, V.A. Glezakou, R. Rousseau, A.D. Sutton, Z. Li, *Investigation of Cu Species in Dealuminated Beta Zeolite Studied by Operando Closed-Cell. P07.P1: Prof. Wilbur C Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences, Microscopy and Microanalysis 2023 meeting – July 23-27, 2023, Minneapolis, MN.*

2. K.A. Unocic, K. Kane, Y. Yamamoto, B.A. Pint, Oxidation Behavior of Model FeCrAl Steel and APMT Alloy After Exposure in Steam for Resisting Degradation from the Environment: A Symposium Honoring Carolyn M. Hansson's Research and Pioneering Experiences as a Woman in STEM, MS&T22, October 9-12, 2022, Pittsburgh, PA, USA. (*Invited*)
3. "Operando STEM - Simulating Reaction Conditions for Structural Materials via *In Situ* Gas-cell Microscopy", *Frontiers of Structural Materials Research*, ORNL, Aug. 27 to 29, 2019.
4. K.A. Unocic, J.S. Choi, D.A. Ruddy, C. Yang, J. Kropf, J. Miller, T.R. Krause, and S. Habas, *In situ S/TEM Reduction Reaction of Ni-Mo₂C catalyst for Biomass Conversion*, *Microscopy & Microanalysis 2018 Meeting*, August 5-9, 2018, Baltimore, MD, USA.
5. K.A. Unocic, A.K. Datye, W.C. Bigelow and L.F. Allard' Water Vapor in Closed-Cell *In Situ* Gas Reactions: Initial Experiments, *Microscopy & Microanalysis 2017 Meeting*, August 6-10, 2017, St. Louis, MO, USA.
6. K.A. Unocic, D.A. Ruddy, T. Krause, and S. Habas, *In situ S/TEM Reduction Reaction of Calcined Cu/BEA-zeolite Catalyst*, *Microscopy & Microanalysis 2017 Meeting*, August 6-10, 2017, St. Louis, MO, USA.
7. K.A. Unocic, J. Bergholz, T. Huang, D. Naumenko, B.A. Pint, R. Vaßen, W.J. Quadackers, High-temperature behavior of oxide dispersion strengthening CoNiCrAlY, 10th International Conference on Microscopy of Oxidation, 3-5 April 2017, Loughborough University, United Kingdom
8. K.A. Unocic, D. Shin, L.F. Allard, and R.R. Unocic, "NiAl Oxidation Reaction Processes Studied *In Situ* Using MEMS-Based Closed-Cell Gas Reaction Transmission Electron Microscopy, TMS 2017 Annual Meeting & Exhibition," TMS 2017 Annual Meeting & Exhibition, February 26 – March 2, 2017, San Diego, California, USA.
9. K.A. Unocic, T. Krause, and S. Habas, Accelerated catalyst development for emerging biomass conversion processes, PSD Poster night, Oak Ridge National Laboratory, February 8-10, 2017, Oak Ridge, TN, USA.
10. K.A. Unocic, Y. Yamamoto, and B.A. Pint, "Effect of Al and Cr Content on Air and Steam Oxidation of FeCrAl Alloys and Commercial APMT Alloy, Advanced Characterization Techniques Part I," HTCPM Les Embiez, France, May 15-20 (2016).
11. K.A. Unocic, D. Shin, R.R. Unocic, and L.F. Allard, "NiAl Oxidation Reaction Processes Studied *In Situ* using MEMS-based Closed-Cell Gas Reaction Electron Microscopy Methods, Symposium H: Advanced Characterization Techniques Part I," HTCPM Les Embiez, France, May 15-20 (2016).
12. K.A. Unocic, D.T. Hoelzer, P.D. Edmondson, and B.A. Pint, "Evaluation of Pb-Li Compatibility of ODS Fe-12Cr-5Al Alloys," ICFRM-17 Aachen, Germany 12-16 October (2015).
13. K.A. Unocic, L.F. Allard, D.W. Coffey, K.L. More, and R.R. Unocic, "Novel Method for Precision Controlled Heating of TEM Thin Sections to Study Reaction Processes," *Microscopy & Microanalysis 2014 Hartford, CT, August (2014)*.
14. K.A. Unocic and B.A. Pint, "Oxidation Behavior of Co-Doped NiCrAl Alloys in Dry and Wet Air, High Temperature Corrosion," Gordon Research Conference, Colby-Sawyer College July 2013.
15. K.A. Unocic, H.H. Elsentriecy, M.P. Brady, H.M. Meyer III, J.R. Keiser, L.M. Anovitz, G. Rother, J.K. Thomson, M. Fayek, Guang-Ling Song, and B. Davis, "Characterization of Film Formation on Commercial and Model Magnesium Alloys," TMS 2013 Annual Meeting, San Antonio, TX, March 2013.
16. C. Barr, G. Vetterick, K.A. Unocic, K. Hattar, and M. Taheri, "Investigation of the Anisotropic Behavior of Radiation Induced Segregation with Grain Boundary Type in 316L Stainless Steel," TMS 2013 Annual Meeting, San Antonio, TX, March 2013.
17. K.A. Unocic, D.N. Leonard, H.M. Meyer III, M.J. Lance, and B.A. Pint, "Compatibility of V/Y₂O₃/V-4Cr-4Ti Coatings with Liquid Flowing Li," 8th International Symposium on High-Temperature Corrosion and Protection of Materials (HTCPM 2012), Les Embiez, France, May 2012.
18. B.A. Pint, J.A. Haynes, K.A. Unocic, Y. Zhang, and B. Nagaraj, "The Effect of Water Vapor and Superalloy Composition on Thermal Barrier Coating Lifetime," *Superalloys 2012*, Seven Springs, PA, Sept. 2012.
19. K.A. Unocic and B.A. Pint, "Study of Elements Segregation to Oxide Scale Grain Boundaries in Single-Crystal Superalloys," *Microscopy & Microanalysis 2014*, Nashville, TN, August (2011).
20. K.A. Unocic and B. Pint, "High-Resolution Characterization of Oxide Scale Grain Boundaries," Gordon Research Conference (GRC), New London, NH, July (2011).
21. K.A. Unocic and B.A. Pint, "High-Resolution Characterization of Oxide Scale Grain Boundaries," Contractor Meeting, Annapolis, MD May (2011).
22. K.A. Unocic, S. Dryepondt, E. Essuman, and B.A. Pint, "Effect of Environment on the Scale Formed on ODS FeCrAl at 1100°C," *Microscopy of Oxidation 8*, Liverpool, United Kingdom, April (2011)
23. K.A. Unocic, B.A. Pint, and K.L. More, "Compatibility of Thermally-Grown Alumina with Pb-Li at 500°C," *Microscopy & Microanalysis 2010*, Portland, OR, August 1-5 (2010).
24. K.A. Unocic, A. Vande Put, M.P. Brady, and B.A. Pint, "Oxidation Behavior of Alumina-Forming Austenitic Steels," *Surface Stability of Materials in High-Temperature Aggressive Environments*, Vail, CO, May 16-20 (2010).
25. K.A. Unocic, L. Kovarik, P. Kobe, M.J. Mills, and G.S. Daehn, "Identification of Grain Boundary Phases in Modified AA5083," Gordon Research Conference on Physical Metallurgy, Plymouth, MA, July 23-28 (2006).

Webinars

- Panelist for a ChemCatBio Webinar Series, “Accelerating the Catalyst Development Cycle”, June 27th (2018).

ORNL Service and Committee Membership:

- 2022 PSD Strategic Planning Working Group for Accelerating Analysis, Discovery, and Innovation through Facilities, Instrumentation and Labs of the Future, ORNL.
- 2020 A member of Initiative Review Committee (IRC) for the Materials Innovation initiative as described in the Director’s Research and Development Call for Proposal.
- 2020 LDRD Panel reviewer (The Materials Innovation: Structural Materials)
- 2020 Presenter and participant (Vehicle Technology Office HQ team, Advanced Combustion Engines & Emissions Teams (including Jerry Gibbs, Technology Development Manager at U.S. Department of Energy); detail tour focused on *in situ* capabilities at ORNL.
- 2019 Interview committee team member for a Technical Associate Staff Member in Corrosion Science group
- 2018 Member for Interview committee team for Postdoctoral Research Associate - Characterization of Ni-based Alloys in This position resides in the Nuclear Structural Materials (NSM) Group in the Materials Science and Technology Division, Physical Sciences Directorate (PSD) at Oak Ridge National Laboratory (ORNL).
- 2018-2019 LDRD proposal review committee of the Initiative Review Committee (IRC) for the Materials Innovation initiative

Professional Society Membership: Microscopy Society of America (MSA), Microanalysis Society (MAS), The Minerals, Metals, and Materials Society (TMS), American Chemical Society (ACS)

Graduate and Postdoctoral Advisors:

Professor Glenn S. Daehn and Professor Michael J. Mills, The Ohio State University (PhD Advisors)

Professor Rudolph G. Buchheit and Professor Gerald S. Frenkel, The Ohio State University (Postdoc Advisors)

Postdoctoral Researcher Advised at ORNL:

- 1) Biva Talukdar (2022-August 2023)
- 2) Keyou Mao (2019-2022) Now Research Professor at Florida State University
- 3) Qianying Guo (2018-2021) Now Professor at Tianjin University, Tianjin, China
- 4) Ling Wang (2019-21) Now Technical Staff Members Covalent Metrology
- 5) Hassan H. Elsentriecy (2013-2014) Now at University of Arizona
- 6) Emmanuel K. Essuman (2011) Now Professor at Walters State Community College
- 7) Aurélie Vande Put (2010-2011) Now Professor at Paul Sabatier University, Toulouse, France.

Ph.D. Students Advised:

- 1) Noah Sargent (Visiting Student, February-April 2022)
- 2) Robert J. Spurling (Summer Student, 2018)
- 3) Robert J. Spurling (Summer Student, 2017)
- 4) Colleen Hilla (Summer Student, 2016)
- 5) Jan Bergholz (Visiting PhD Student, Spring 2016)
- 6) Aleksandra Jalowicka (Visiting Post-doctoral Researcher from Juelich, Spring, 2015)
- 7) Gabriel J. Pillitiere (Summer Student, 2014)
- 8) Christian Nordhorn (visiting PhD student, 2010)