

Kevin G. Field, Ph.D.

CONTACT INFORMATION

Research Associate - Weinberg Fellow
Materials Science and Technology Division
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in Kevin-Field
🔗 K.G. Field

QUALIFICATIONS

Accomplished research scientist with extensive experience in conducting and managing research and development (R&D) projects on radiation effects in materials for nuclear systems for a range of sponsors. Excels at utilization of analytical microscopy for advanced materials characterization, leading multidisciplinary teams through synergistic activities, mentoring early career professionals, and developing new research initiatives through successful proposal writing. Established record of being an effective communicator through internationally attended presentations and publications in peer-reviewed journals. U.S. citizen with international research experience.

EDUCATION

University of Wisconsin - Madison, Madison, WI 2007 to 2012
Ph.D., Materials Science, 2012
– Graduate Advisor: Dr. Todd R. Allen
M.S., Materials Science, 2009
– Graduate Advisor: Dr. Todd R. Allen
Michigan Technological University, Houghton, MI 2003 to 2007
B.S., Materials Science and Engineering, 2007
– Honors: *Magna cum laude*

RESEARCH EXPERIENCE

Research Associate - Weinberg Fellow 2013 to present
Materials Science and Technology Division, Oak Ridge National Laboratory
Line Supervisor: Dr. Keith Leonard, Group Leader, NMST

Highlights:

- Developed new research initiatives through DOE FOA calls including successful acceptance under the Nuclear Energy Enabling Technologies (NEET) Reactor Materials effort
- Investigated post-irradiation microstructure of neutron irradiated model Fe-Cr-Al alloys using a suite of characterization tools to assist in down selection of experimental alloys
- Established the weldability of model and engineering grade Fe-Cr-Al alloys
- Used a multi-scale characterization scheme to understand segregation processes and localized deformation in irradiated 300 series stainless steels
- Identified possible degradation mechanisms in concrete biological shields of nuclear power plants by establishing a state-of-the-art database on irradiated concrete performance
- Mentored and trained a variety of personnel and staff on research based tasks and goals including mentoring of undergraduate and graduate students

Research Assistant 2007 to 2012

Materials Science Program, University of Wisconsin - Madison
Graduate Advisor: Dr. Todd R. Allen, Professor and INL Deputy Laboratory Director
Thesis Topic: *Radiation Induced Segregation in High Chromium Ferritic/Martensitic Steels*

Highlights:

- Developed theories on segregation phenomena at specific grain boundary structures in irradiated ferritic/martensitic steels
- Coordinated operations at the University of Wisconsin Ion Beam Laboratory including safety documentation implementation, critical hardware and software updates, and personnel training

- [1] Y. Yang, **K.G. Field**, T.R. Allen, J.T. Busby, Roles of vacancy/interstitial diffusion and segregation in the microchemistry at grain boundaries of irradiated Fe-Cr-Ni alloys, *Journal of Nuclear Materials*, Volume 473, May 2016, Pages 35-53, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2016.02.007>.
- [2] P.D. Edmondson, S.A. Briggs, Y. Yamamoto, R.H. Howard, K. Sridharan, K.A. Terrani, **K.G. Field**, Irradiation-enhanced α' precipitation in model FeCrAl alloys, *Scripta Materialia*, April 2016, Pages 112-116, ISSN 1359-6462, <http://dx.doi.org/10.1016/j.scriptamat.2016.02.002>.
- [3] I. Pignatelli, A. Kumar, **K.G. Field**, B. Wang, Y. Yu, Y. Le Pape, M. Bauchy, G. Sant, Direct experimental evidence for differing reactivity alterations of minerals following irradiation: The case of calcite and quartz, *Scientific Reports*, Article Number: 20155, January 2016, <http://dx.doi.org/10.1038/srep20155>.
- [4] L. Tan, R.E. Stoller, **K.G. Field**, Y. Yang, H. Ham, D. Morgan, B.D. Wirth, M.N. Gussev, J.T. Busby, Microstructural evolution of Type 304 and 316 stainless steels under neutron irradiation at LWR relevant conditions, *JOM: Journal of the Minerals, Metals & Materials Society*, December 2015, Pages 1-13, ISSN 1047-4838, <http://dx.doi.org/10.1007/s11837-015-1753-5>.
- [5] Y. Yamamoto, B.A. Pint, K.A. Terrani, **K.G. Field**, Y. Yang, L.L. Snead, Development and property evaluation of nuclear grade wrought FeCrAl fuel cladding for light water reactors, *Journal of Nuclear Materials*, Volume 467, December 2015, Pages 703-716, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2015.10.019>.
- [6] **K.G. Field**, X. Hu, K.C. Littrell, Y. Yamamoto, L.L. Snead, Radiation tolerance of neutron-irradiated model Fe-Cr-Al alloys, *Journal of Nuclear Materials*, Volume 465, October 2015, Pages 746-755, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2015.06.023>.
- [7] T.M. Rosseel, J.J. Wall, **K.G. Field**, Y. Le Pape, D.J. Naus, I. Remec, J.T. Busby, P. Bruck, Dommage d'irradiation du béton des puits de cuve des réacteurs, *Revue Générale Nucléaire*, Number 1, January-February 2015, Pages 21-27, ISSN 0298-7783, (in-French).
- [8] D. Kaoumi, T.R. Allen, J. Wharry, Z. Jiao, C. Topbasi, L. Barnard, A. Kohnert, A. Certain, **K.G. Field**, A. Motta, G. Was, D. Morgan, B. Wirth, Y. Yang, Characterization of microstructure and property evolution in advanced cladding and duct: Materials exposed to high dose and elevated temperature, *Journal of Materials Research*, Volume 30, Issue 9, 20 May 2015, Pages 1275-1289, ISSN 2044-5326, <http://dx.doi.org/10.1557/jmr.2015.99>.
- [9] C.M. Parish, **K.G. Field**, A.G. Certain, J.P. Wharry, Application of STEM characterization for investigating radiation effects in BCC Fe-based alloys, *Journal of Materials Research*, Volume 30, Issue 9, 20 April 2015, Pages 1246-1274, ISSN 2044-5326, <http://dx.doi.org/10.1557/jmr.2015.32>.
- [10] **K.G. Field**, Y. Yang, T.R. Allen, J.T. Busby, Defect sink characteristics of specific grain boundary types in 304 stainless steels under high dose neutron environments, *Acta Materialia*, Volume 89, 1 May 2015, Pages 438-449, ISSN 1359-6454, <http://dx.doi.org/10.1016/j.actamat.2015.01.064>.
- [11] M.N. Gussev, **K.G. Field**, J.T. Busby, Deformation localization and dislocation channel dynamics in neutron-irradiated austenitic stainless steels, *Journal of Nuclear Materials*, Volume 460, May 2015, Pages 139-152, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2015.02.008>.

- [12] **K.G. Field**, I. Remec, Y. Le Pape, Radiation effects in concrete for nuclear power plants - Part I: Quantification of radiation exposure and radiation effects, *Nuclear Engineering and Design*, Volume 282, February 2015, Pages 126-143, ISSN 0029-5493, <http://dx.doi.org/10.1016/j.nucengdes.2014.10.003>.
- [13] Y. Le Pape, **K.G. Field**, I. Remec, Radiation effects in concrete for nuclear power plants, Part II: Perspective from micromechanical modeling, *Nuclear Engineering and Design*, Volume 282, February 2015, Pages 144-157, ISSN 0029-5493, <http://dx.doi.org/10.1016/j.nucengdes.2014.10.014>.
- [14] T.J. Gerczak, G. Zheng, **K.G. Field**, T.R. Allen, Effect of exposure environment on surface decomposition of SiC-Silver ion implantation diffusion couples, *Journal of Nuclear Materials*, Volume 456, Issue 1, January 2015, Pages 281-286, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2014.09.063>.
- [15] **K.G. Field**, M.N. Gussev, Y. Yamamoto, L.L. Snead, Deformation behavior of laser welds in high temperature oxidation resistant Fe-Cr-Al Alloys for fuel cladding applications, *Journal of Nuclear Materials*, Volume 454, Issues 1-3, November 2014, Pages 352-358, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2014.08.013>.
- [16] **K.G. Field**, M.N. Gussev, J.T. Busby, Microstructural characterization of deformation localization at small strains in a neutron-irradiated 304 stainless steel, *Journal of Nuclear Materials*, Volume 452, Issues 1-3, September 2014, Pages 500-508, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2014.05.053>.
- [17] M.N. Gussev, **K.G. Field**, J.T. Busby, Strain-induced phase transformation at the surface of an AISI-304 stainless steel irradiated to 4.4 dpa and deformed to 0.8% strain, *Journal of Nuclear Materials*, Volume 446, Issues 1-3, March 2014, Pages 187-192, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2013.11.041>.
- [18] **K.G. Field**, B.D. Miller, H.J.M. Chichester, K. Sridharan, T.R. Allen, Relationship between lath boundary structure and radiation induced segregation in a neutron irradiated 9 wt.% Cr model ferritic/martensitic steel, *Journal of Nuclear Materials*, Volume 445, Issues 1-3, February 2014, Pages 143-148, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2013.10.056>.
- [19] **K.G. Field**, L.M. Barnard, C.M. Parish, J.T. Busby, D. Morgan, T.R. Allen, Dependence on grain boundary structure of radiation induced segregation in a 9 wt.% Cr model ferritic/martensitic steel, *Journal of Nuclear Materials*, Volume 435, Issues 1-3, April 2013, Pages 172-180, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2012.12.026>.
- [20] A.G. Certain, **K.G. Field**, T.R. Allen, M.K. Miller, J. Bentley, J.T. Busby, Response of nanoclusters in a 9Cr ODS steel to 1 dpa, 525°C proton irradiation, *Journal of Nuclear Materials*, Volume 407, Issue 1, December 2010, Pages 2-9, ISSN 0022-3115, <http://dx.doi.org/10.1016/j.jnucmat.2010.07.002>.
- [21] M.N. Gussev, J.T. Busby, **K.G. Field**, M.A. Sokolov, S.C. Gray, Role of scale factor during tensile testing of small specimens. *Small Specimen Test Techniques*, Volume 6, August 2014, Pages 1-19, <http://dx.doi.org/10.1520/stp157620140013>.
- [22] L. Tan, **K.G. Field**, M.N. Gussev, J.T. Busby, Microstructural evolution of type 304 variants and 316 stainless steels under neutron irradiation. Accepted In: *16th International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors*, Asheville, NC, USA, August 11-15, 2013.

- [23] **K.G. Field**, C.J. Wetteland, G. Cao, B.R. Maier, C. Dickerson, T.J. Gerczak, C.R. Field, K. Kriewaldt, K. Sridharan, T.R. Allen, University of Wisconsin Ion Beam Laboratory: A facility for irradiated materials and ion beam analysis. In: *22nd International Conference on Application of Accelerators in Research and Industry*, Fort Worth TX, USA, August 5-10, 2012, <http://dx.doi.org/10.1063/1.4802311>.
- [24] C.J. Wetteland, **K.G. Field**, T.J. Eiden, T.J. Gerczak, B.R. Maier, G. Cao, O. Albakri, K. Sridharan, T.R. Allen, Optimal conditions for high current proton irradiations at the University of Wisconsin's ion beam laboratory. In: *22nd International Conference on Application of Accelerators in Research and Industry*, Fort Worth TX, USA, August 5-10, 2012, <http://dx.doi.org/10.1063/1.4802407>.
- [25] J. Drellich and **K.G. Field**, Formation of Biomimetic Porous Calcium Phosphate Coatings on Surfaces of Polyethylene/Zinc Stearate Blends. In: *Materials Science and Technology (MS&T) 2007*, Detroit MI, USA, September 16-20, 2007.
- [26] **K.G. Field**, Y. Yamamoto, B.A. Pint, R.H. Howard, L.L. Snead, Current Status of FeCrAl Alloys as an Accident Tolerant Cladding Alloy Class for Commercial Light Water Reactors, ANS Transactions, Volume 113, Number 1, October 2015, Pages 551-552, <http://epubs.ans.org/?a=37884>.
- [27] K.J. Leonard, **K.G. Field**, C.M. Parish, P.D. Edmondson, M.N. Gussev, X. Hu, C.M. Silva, A.A. Campbell, N.A.P. K. Kumar, K.A. Terrani, J.T. Busby, Y. Katoh, LAMDA: A Facility for Advanced Characterization of Irradiated Materials at Oak Ridge National Laboratory, ANS Transactions, Volume 113, Number 1, October 2015, Pages 581-582, <http://epubs.ans.org/?a=37897>.
- [28] C.M. Parish, N.A.P. Kumar, L.L. Snead, P.D. Edmondson, **K.G. Field**, C. Silva, A.M. Williams, K. Linton, K.J. Leonard, LAMDA: Irradiated-materials microscopy at Oak Ridge National Laboratory, Microscopy and Microanalysis, Volume 21, Supplement S3, August 2015, Pages 1003-1004, <http://dx.doi.org/10.1017/S1431927615005814>.
- [29] **K.G. Field**, Y. Yamamoto, L.L. Snead, Phase Stability and Mechanical Properties of Nuclear Grade FeCrAl Under LWR-Relevant Neutron Irradiation, ANS Transactions, Volume 110, Number 1, June 2014, Pages 896-897, <http://epubs.ans.org/?a=35987>.
- [30] **K.G. Field**, M.N. Gussev, J.T. Busby, Alloying and grain boundary structure effects on the radiation induced segregation response in Type 304 variants under neutron irradiation, ANS Transactions, Volume 110, Number 1, June 2014, Pages 896-897, <http://epubs.ans.org/?a=36034>.
- [31] L.L. Snead, K.A. Terrani, Y. Yamamoto, B.A. Pint, **K.G. Field**, Development of Advanced Oxidation Resistant Steel for ATF Clad Application, ANS Transactions, Volume 110, Number 1, June 2014, Pages 731-732, <http://epubs.ans.org/?a=35927>.
- [32] Y. Le Pape **K.G. Field**, J.T. Busby, Degradation of Concrete for Nuclear Structures: Identified Mechanisms and Knowledge Gaps, ANS Transactions, Volume 110, Number 1, June 2014, Pages 1019-1020, <http://epubs.ans.org/?a=36032>.
- [33] I. Remec **K.G. Field**, D.J. Naus, T.M. Roses, J.T. Busby, Concrete Aging and Degradation in NPPs: LWRs Program R&D Progress Report, ANS Transactions, Volume 109, Number 1, November 2013, Pages 403-406, <http://epubs.ans.org/?a=21669>.
- [34] **K.G. Field**, C.M. Parish, J.T. Busby, T.R. Allen, Relationship Between Grain Boundary Structure and Radiation Induced Segregation in Ferritic/Martensitic Steels, ANS Transactions, Volume 102, Number 1, June 2012, Pages 1163-1164, <http://epubs.ans.org/?a=13964>.

- [35] **K.G. Field**, J. Bentley, T.R. Allen, Variability in chromium segregation at lath boundaries in proton-irradiated 9 wt.% Cr model steel determined by quantitative X-ray mapping, *Microscopy and Microanalysis*, Volume 16, Supplement S2, July 2010, Pages 1596-1597, <http://dx.doi.org/10.1017/S1431927610054620>.
- [36] **K.G. Field**, J. Bentley, T.R. Allen, Microchemical Variations in Proton Irradiated 9 wt.% Chromium BCC Steels, *ANS Transactions*, Volume 102, Number 1, June 2010, Pages 800-801, <http://epubs.ans.org/?a=10701>.
- [37] A.G. Certain, **K.G. Field**, T.R. Allen, M.K. Miller, J. Bentley, Response of Nanoclusters in Nanostructured Ferritic Alloys to Low-Dose Proton Irradiation, *ANS Transactions*, Volume 102, Number 1, June 2010, Pages 846-847, <http://epubs.ans.org/?a=10725>.
- [38] S. Choudhury, L. Barnard, D. Morgan, **K.G. Field**, T.R. Allen, J.P. Wharry, Z. Jiao, G. Was, B.D. Wirth, Radiation Induced Segregation in Ferritic-Martensitic Steels, *ANS Transactions*, Volume 102, Number 1, June 2010, Pages 715-716, <http://epubs.ans.org/?a=10654>.
- [39] **K.G. Field**, R.H. Howard, Status report on irradiation capsules containing welded FeCrAl specimens for radiation tolerance evaluation, FY-16 DOE-NE NEET Report: *ORNL/TM-2016/78*, February 2016.
- [40] **K.G. Field**, S.A. Briggs, P.D. Edmondson, X. Hu, K.C. Littrell, R.H. Howard, C.M. Parish, Y. Yamamoto, Evaluation on the effect of composition on radiation hardening and embrittlement in model FeCrAl alloys, FY-15 DOE-NE FCRD Report: *ORNL/TM-2015/518*, September 2015.
- [41] M.N. Gussev, **K.G. Field**, J.T. Busby, Post-irradiation examination and localized deformation studies on key specimens, FY-15 DOE-NE LWRS Report: *ORNL/TM-2015/547*, September 2015.
- [42] Y. Yang, **K.G. Field**, T.R. Allen, J.T. Busby, Development of a robust modeling tool for radiation-induced segregation in austenitic stainless steels, FY-15 DOE-NE LWRS Report: *ORNL/TM-2015/479*, September 2015.
- [43] R. Howard, T. Leonhardt, **K.G. Field**, Status report on the fabrication of coated molybdenum clad test articles for ATR irradiations, FY-15 DOE-NE FCRD Report: *ORNL/TM-2015/436*, August 2015.
- [44] **K.G. Field**, R. Howard, Y. Yamamoto, Design of experiment for irradiation of welded candidate Fe-Cr-Al alloys, FY-15 DOE-NE NEET Report: *ORNL/TM-2015/375*, July 2015.
- [45] **K.G. Field**, R. Howard, Y. Yamamoto, Experimental plan and irradiation target design for FeCrAl embrittlement screening tests conducted using the High Flux Isotope Reactor, FY-15 DOE-NE FCRD Report: *ORNL/TM-2015/311*, June 2015.
- [46] M. Snead, L. Snead, K. Terrani, **K.G. Field**, A. Worrall, K. Robb, Y. Yamamoto, J. Powers, S. Dryepondt, B. Pint, X. Hu, Technology Implementation Plan: ATF FeCrAl cladding for LWR applications, FY-15 DOE-NE FCRD Report: *ORNL/TM-2014/353*, May 2015.
- [47] **K.G. Field**, M.N. Gussev, Y. Yamamoto, X. Hu, R.H. Howard, Preliminary studies on the fabrication and characterization of Fe-Cr-Al alloys designed to have enhanced weldability and radiation tolerance, FY-15 DOE-NE NEET Report: *ORNL/TM-2015/192*, May 2015.
- [48] **K.G. Field**, X. Hu, K. Littrell, Y. Yamamoto, R.H. Howard, L.L. Snead, Stability of model Fe-Cr-Al alloys under the presence of neutron radiation, FY-14 DOE-NE FCRD Report: *ORNL/LTR-2014/451*, September 2014.

- [49] Y. Yang, **K.G. Field**, J.T. Busby, Integrating computational thermodynamics with radiation induced segregation modeling in austenitic stainless steels, FY-14 DOE-NE NEET Report: *ORNL/TM-2014/51697*, September 2014.
- [50] Y. Yamamoto, Y. Yang, **K.G. Field**, K. Terrani, B.A. Pint, L.L. Snead, Report on the development of 2nd generation ATF FeCrAl alloys, FY-14 DOE-NE FCRD Report: *ORNL/LTR-2014/527*, September 2014.
- [51] M.N. Gussev, **K.G. Field**, J.T. Busby, Initial results on the correlation between localized deformation and irradiation-assisted stress corrosion cracking response using bend tests, FY-14 DOE-NE LWRS Report: *ORNL/TM-2014/385*, August 2014.
- [52] L. Tan, **K.G. Field**, J.T. Busby, Analysis of phase transformation studies in solute addition alloys, FY-14 DOE-NE LWRS Report: *ORNL/TM-2014/303*, August 2014.
- [53] Y. Yamamoto, Y. Yang, **K.G. Field**, K. Terrani, B.A. Pint, L.L. Snead, Letter report documenting progress of second generation ATF FeCrAl alloy fabrication, FY-14 DOE-NE FCRD Report: *ORNL/LTR-2014/219*, June 2014, <http://dx.doi.org/10.2172/1134712>.
- [54] **K.G. Field**, M.N. Gussev, Y. Yamamoto, Weldability of ORNL accident tolerant fuel cladding model alloys for thick walled tubes, FY-13 DOE-NE FCRD Report: *ORNL/LTR-2013/357*, August 2013. <http://www.osti.gov/scitech/biblio/1149392>.
- [55] Y. Yamamoto, B.A. Pint, K. Terrani, **K.G. Field**, L.L. Snead, Letter report documenting identifying billets and alloys fabricated for distribution to program, FY-13 DOE-NE FCRD Report: *ORNL/LTR-2013/322*, August 2013.
- PUBLISHED SOFTWARE
- [56] C.R. Field, **K.G. Field**, Advanced Beam Line Electronics (ABLE), *LabVIEW*, <https://code.google.com/p/advanced-beam-line-electronics/>.
- [57] C.R. Field, **K.G. Field**, Keithley 6485 LabVIEW Driver and Application, *LabVIEW*, <https://code.google.com/p/keithley-6485/>.
- PAPERS IN SUBMISSION
- [58] M.N. Gussev, R.H. Howard, C. Daily, K.A. Terrani, **K.G. Field**, Sub-size specimen design for in-reactor irradiation and post-irradiation testing, In preparation to *Journal of Nuclear Materials*, 2016.
- TECHNICAL PRESENTATIONS
- [1] **K.G. Field**, Y. Yamamoto, S.A. Briggs, M. Gussev, K.C. Littrell, X. Hu, R. Howard, P.D. Edmondson, K. Sridharan, B.A. Pint, K.A. Terrani, Optimization of the composition of FeCrAl alloys for radiation environments at *TMS 2016*, Nashville, TN USA, February 2016.
- [2] **K.G. Field**, Designing advanced FeCrAl alloys for accident tolerant fuel cladding through accelerated irradiation testing, Invited presentation at *ANS Winter Meeting 2015*, Washington, DC USA, November 2015.
- [3] Y. Yamamoto, **K.G. Field**, X. Hu, K.C. Littrell, Y. Yamamoto, L.L. Snead, Optimization of nuclear grade FeCrAl fuel cladding for light water reactors, Contributed presentation at *IAEA Technical Meeting on Accident Tolerant Fuel Concepts for Light Water Reactors*, Oak Ridge, TN USA, October 2014.
- [4] **K.G. Field**, X. Hu, K.C. Littrell, Y. Yamamoto, L.L. Snead, Mechanical properties and microstructural evolution of model accident tolerant FeCrAl alloys after LWR-relevant neutron irradiation, Contributed presentation at *NuMat 2014: The Nuclear Materials Conference*, Clearwater, FL USA, October 2014.
- [5] **K.G. Field**, M.N. Gussev, J.T. Busby, Systematic multi-scale characterization of radiation effects using small sub-sized specimens, Contributed presentation at *Sixth International Symposium on Small Specimen Test Techniques*, Houston, TX USA, January 2013.

- [6] **K.G. Field**, L.M. Barnard, C.M. Parish, J.T. Busby, D.D. Morgan, T.R. Allen, Role of grain boundary structure on radiation induced segregation in a model ferritic/martensitic steel, Contributed presentation at *MRS Spring 2012*, San Francisco, CA USA, April 2012.
- [7] **K.G. Field**, J. Bentley, C.M. Parish, J.T. Busby, T.R. Allen. Dependence of radiation induced segregation on grain boundary structure in a 9 wt. % Cr model ferritic/martensitic steel, Contributed presentation at *TMS 2011*, San Diego, CA USA, March 2011.
- [8] **K.G. Field**, J. Bentley, T.R. Allen. Microchemical variations and lath-boundary structure in proton-irradiated 9 wt.% Cr model steel, Contributed presentation at *NuMat 2010: The Nuclear Materials Conference*, Karlsruhe, Germany, October 2011.
chromium segregation at lath boundaries in proton-irradiated 9 wt.% Cr model steel determined by quantitative X-ray mapping, Contributed presentation at *Microscopy and Microanalysis*, Portland, OR USA, July 2010.

GRANTS

Awaiting Decision

- [1] Principle PI, "Radiation-induced microstructural and micro chemical effects in FeCrAl alloys", DOE, *DE-FOA-0001281: NEET-NSUF-2*, 2015. Access request to Nuclear Science User Facilities, Submitted for FY17-19.
- [2] Co-PI, "Correlative Atom Probe and Electron Microscopy Study of Radiation Induced Segregation at Low and High Angle Grain Boundaries in Steels", DOE, *DE-FOA-0001281: NEET-NSUF-2*, 2015. Access request to Nuclear Science User Facilities, Submitted for FY17-19.
- [3] Co-PI, "Effect of Cr and Mo on thermal/radiation-induced segregation and precipitation of Fe-Ni-Si alloys", DOE, *DE-FOA-0001281: NEET-NSUF 1.1A*, 2015. Access request to Nuclear Science User Facilities, Submitted for FY17-19.

Awarded

- [4] PI, "Characterization of Precipitation Behavior in HFIR Irradiated FeCrAl Alloys for Nuclear Applications", DOE, *NSUF-RTE*, Project Number - IPTS-13692, Accepted 2015, Programmatic proposal for GP-SANS (neutron scattering) facility access, 2015 to 2017.
- [5] Co-PI, "Mechanistic determination of dislocation loop formation in irradiated FeCrAl alloys through systematic in situ experimentation", *ANL IVEM Tandem*, IVEM user access, 2015.
- [6] Co-PI, "Investigation of precipitate formation kinetics and interactions in FeCrAl alloys", DOE, *NSUF-RTE*, Project Number - 15-556, Atom Probe Tomography Access, 2015.
- [7] Principle PI, "Radiation Tolerance of Controlled Fusion Welds in High Temperature Oxidation Resistant FeCrAl Alloys for Enhanced Accident Tolerant Fuel Cladding Applications", DOE, *DE-FOA-0000998: NEET-3 Reactor Materials*, 2014. \$1M, October 1, 2014 to September 30, 2017.
- [8] Principle PI, "Mechanical Testing and Characterization of Irradiated Concrete Structures for Light Water Reactor Life Extension Analysis", *ORNL-LDRD*, Project Number - 7088, \$180K, July 15, 2013 to July 15, 2015.
- [9] Principle PI, "Examining the variations in microchemistry of irradiated ferritic-martensitic steels for the next generation of nuclear power plants", NSF, Project Number - 1107424, \$5,700, June 1, 2011 to August 31, 2011.

Not Awarded

- [10] Principle PI, "Novel M3-characterization concept for irradiated materials: Multi-spectral, Multi-field, Multi-scale", DOE, *DE-FOA-0001281: NEET-3: Reactor Materials*, 2015. \$1M, Pre-proposal submitted for 2016.

- [11] Principle PI, “Elimination of Detrimental α' Precipitation in Irradiated *bcc* Fe-Cr Based Alloys For Nuclear Applications Through Solute Additions”, DOE, *DE-FOA-0001129: NEET-3 Reactor Materials*, Full proposal submitted in 2015.
- [12] Co-PI, “Pellet Cladding Interaction of ATF FeCrAl Clad Alloys”, DOE, *DE-FOA-0001129: FC-2.1: Advanced Nuclear Fuel, Cladding, and Core Components*, Full proposal submitted in 2015.
- [13] Co-PI, “Enhanced Micro-analytical Capabilities of Irradiated Materials”, DOE, *DE-FOA-0001130: General Scientific Infrastructure Support*, Proposal submitted in 2015.
- [14] Co-PI, “Study of ultra-durable concrete subjected to combined exposures in used fuel structures”, DOE, *DE-FOA-0000998: FC-4.1 Storage*, Project Number - RPA-14-6549, February 2014.
- [15] Co-PI, “Advanced Joining Techniques for High Sink Strength Ferritic-Martensitic Steels”, DOE, *DE-FOA-0000998: NEET-3 Reactor Materials*, 2014. \$800K, over 2 years.

CURRENT

COLLABORATORS (PAST 5 YEARS)

Todd R. Allen (UW-Madison/INL), Kumar Sridharan (UW-Madison), Dane Morgan (UW-Madison), Leland Barnard (Bechtel Corporation), Tyler J. Gerczak (ORNL), Jeremy T. Busby (ORNL), Lance L. Snead (ORNL), Michael K. Miller (ORNL), Kurt Terrani (ORNL), Yukinori Yamamoto (ORNL), Maxim Gushev (ORNL), Chad M. Parish (ORNL), Ying Yang (ORNL), Roger G. Miller (ORNL), Richard Howard (ORNL), Yann Le Pape (ORNL), Igor Remec (ORNL), Thomas M. Rosseel (ORNL), James Bentley (ORNL-retired), Heather J.M. Chichester (INL), Brandon D. Miller (INL), Kristine Barrett (INL), Chris Wetteland (UTK), Xunxiang Hu (ORNL), Mark Blackford (ANSTO), Greg Lumpkin (ANSTO), Dhriti Bhattacharyya (ANSTO), Daniel Perea (PNNL), Arun Devaraj (PNNL), Alicia G. Certain (former-PNNL), Christopher R. Field (Field R&D Services, LLC), Janelle Wharrey (BSU), Gary Was (UM-Ann Arbor), Arthur T. Motta (PSU), Djamel Kaoumi (USC)

PROFESSIONAL EXPERIENCE

Corporate Research Internship **Caterpillar, Inc.**

2005 and 2007

Supervisor: Dr. Michael L. Johnson

Engineering Topics:

- *Evaluation of Induction Heating as a Viable Process for Curing of Corrosion Resistant Manganese Phosphate Surface Treatment*
- *Investigation of Corrosion Product Formation on On-Highway Diesel Engine Exhaust Valves*

Corporate Research Internship

2006

Mittal Steel USA (now ArcelorMittal)

Supervisor: Don Freese

Engineering Topics:

- *Determining Root Cause of Cinch Mark Defects on Hot Rolled and Cold Mill Sheet Steel Product*

TEACHING EXPERIENCE

University of Wisconsin - Madison, Madison, WI

Guest Lecturer for NE 541: “Radiation Damage in Metals”

Fall 2011

- Lecture: “*Microstructure Fundamentals.*”

Lecturer for MSE 250: “Introduction to Modern Materials.”

2010

- Overview course on applications and design of modern materials for non-materials science majors
- Course taught via lectures and hands-on laboratory experiences

Guest Lecturer for NE 541: “Radiation Damage in Metals”

Fall 2009

- Lecture: “*Microstructure Fundamentals.*”

STUDENT
ADVISING

Samuel Briggs

Graduate student in Nuclear Engineering, University of Wisconsin - Madison. Microchemical processes in Fe-Cr-Al simple alloys for nuclear applications. Primary advisor: Dr. Todd R. Allen. 2014 to present.

Zachary Thompson

Undergraduate student in Materials Science and Engineering, University of Alabama. Aging of Fe-Cr-Al simple alloys for nuclear applications. Primary advisor: Dr. Kurt Terrani. Summer 2015.

Sean Gray

Undergraduate student in Nuclear Engineering, University of Michigan. Design and evaluation of an *in-situ* tensile holder for TEM investigations. 1 publication produced. Primary advisor: Dr. Jeremy T. Busby. Summer 2013.

Todd Sherman

Graduate student in Nuclear Engineering, Idaho State University. Literature search and laboratory support on radiation effects in concrete. Primary advisor: Dr. Jeremy T. Busby. Summer 2013.

Gordon Dale

Undergraduate student in Electrical Engineering, University of Wisconsin - Madison. Design and implementation of experiments using ion beam facilities. Now at National Electrostatics Corporation. Primary advisor: Dr. Todd R. Allen. 2007 academic year.

PROFESSIONAL
SERVICE

Committee Service

- Executive Committee Member, Materials Science and Technology Division of ANS (elected)

Referee Service

- *Journal of Nuclear Materials* (~3 reviews/year)
- *Nuclear Fuels and Structural Materials for Next Generation Nuclear Reactors Embedded Topical Meeting at the 2014 American Nuclear Society Annual Meeting*
- *Sixth International Symposium on Small Specimen Testing Techniques*
- *2013 American Nuclear Society Winter Meeting*
- *16th International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors*

CONTINUING
EDUCATION

Courses Taken:

- Concrete Microscopy Course 2014, Delft University of Technology, 2014
- Mastering Work Flow - Getting Things Done, David Allen Company, 2013
- Materials Degradation Course for Engineers in the Nuclear Industry, The Materials Aging Institute, 2013
- High Resolution TEM Workshop, Microscopy & Microanalysis 2010, 2010

PROFESSIONAL
MEMBERSHIPS

American Nuclear Society (ANS), Member, 2009 - Present

Material Advantage (ACerS, AIST, ASM, TMS), Member, 2011 - Present

Microscopy Society of America, Member, 2010 - Present

HARDWARE AND
SOFTWARE SKILLS

Analytical Microscopy:

- TEM, STEM, HREM, EDS, EELS on JEOL and FEI suite of transmission electron microscopes
- SEM, FIB, EDS, EBSD on FEI and JEOL suite of scanning electron microscopes
- Optical light microscopy, polarized light microscopy, laser confocal light microscopy
- Digital Micrograph (including custom scripting)
- ImageJ

Instrumentation, Control, Data Acquisition, Test, and Measurement:

- [LabVIEW](#) and other [National Instruments](#) control and data acquisition hardware and software, Arduino, small electronics

Numerical Analysis:

- [MATLAB](#), [R](#), [Mathcad](#), [Mathematica](#)

Desktop Editing and Productivity Software:

- [T_EX](#) ([L^AT_EX](#), [BIBT_EX](#), [Lyx](#)),
- Microsoft Office, [OpenOffice.org](#), [Google Docs](#)
- [GIMP](#), [InkScape](#)

Operating Systems:

- Microsoft Windows family, Apple OS X, Linux, Unix, Android, Mac iOS

AWARDS, HONORS, AND RECOGNITION

- Department of Energy Nuclear Energy Fuel Cycle R&D Excellence Award, Presented at the American Nuclear Society Winter Meeting, Washington D.C., 2015
- Best Distinguished Fellowship Poster, Office of the Laboratory Director's 2015 LDRD Poster Session, Oak Ridge National Laboratory, Oak Ridge, TN, 2015
- Certificate of Appreciation presented to Advanced Steel Cladding Team, by U.S. Department of Energy at the Fuel Cycle Research & Development Meeting, Washington D.C., 2014
- [Alvin M. Weinberg Fellowship](#), Oak Ridge National Laboratory, 2013 - 2015
- Fuel Cycle Research and Development Student Poster Award, Fuel Cycle Research & Development Meeting, Washington D.C., 2010
- [Raymond G and Anne W. Herb Wisconsin Distinguished Graduate Fellow in Materials Science](#), University of Wisconsin - Madison, 2007 - 2008
- Undergraduate Scholarship Awards from the American Foundry Society (AFS), Foundry Educational Foundation (FEF), ASM Detroit Chapter, and ASM Toledo Ohio Chapter, 2007 - 2008
- McArthur Research Internship Grant for Undergraduate Research in Materials Science, Michigan Technological University, 2007
- [AFS Detroit Windsor Scholarship](#) honoring George Booth, Foundry Education Foundation, 2006
- [Ferrous Metallurgy Education Today Scholarship Award](#), Association for Iron & Steel Technology (AIST), 2005 - 2006