

Anne A. Campbell



Research Staff

Nuclear Materials Science & Technology Group

Nuclear Graphite

Materials Science & Technology Division

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Education:

- Ph.D., Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, Michigan
Thesis Advisor: *Professor Gary S. Was*
Thesis Title: *The Mechanism of Proton Irradiation-Induced Creep in Ultra-Fine Grain Graphite*
Thesis Defended: November, 2013, GPA 4.0/4.0.
- M.S.E., Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, Michigan, (May 2009), GPA 4.0/4.0
- B.S.E., Nuclear Engineering, Purdue University, West Lafayette, Indiana (December 2006), GPA 3.59/4.0

Research Experience:

Current Research:

Mentor: Yutai Katoh

Changes in physical and mechanical properties of nuclear graphite, resulting from irradiation in HFIR.

Systematic analysis of passive SiC thermometry to determine irradiation temperature of non-instrumented neutron irradiation capsules.

Microstructure analysis of graphite to understand the microstructure on multiple scales.

Neutron irradiation effects on MAX phase materials

Ph.D. Research:

Advisor: Professor Gary S. Was

Proton irradiation effects in graphite, including changes in dimensions, mechanical properties, crystal structure, and anisotropy during unrestrained irradiation, and changes in dimensions, mechanical properties, crystal structure, and anisotropy during stressed

irradiation.

Design and validation of a high temperature proton irradiation stage for performing proton irradiation-induced creep experiments on for graphite and other materials.

Oak Ridge National Laboratory – HERE Summer Internship

Develop a method for producing pyrolytic carbon strip samples that can be used for irradiation-induced creep experiments.

- Materials Science Technology Division, Nuclear Materials Science and Technology Group

B.S. Research:

Modeling of Atucha II reactor fuel assemblies in MCNP5 and DRAGON

- School of Nuclear Engineering, Purdue University, *Supervisor: Thomas Downar*
Slow neutron modeling research in MCNP5 for use in boron neutron capture therapy
- School of Nuclear Engineering, Purdue University, *Supervisor: Tatjana Jevremovic*

Employment:

Oak Ridge Associated Universities – Oak Ridge, Tennessee (03/2014 – Present)

Post-Doctoral Research Associate at Oak Ridge National Laboratory in Fusion Materials and Nuclear Structures group.

Mentor: Yutai Katoh

University of Michigan – Ann Arbor, Michigan (01/2007 – 02/2014)

Nuclear Engineering and Radiological Sciences Graduate Student

Ph.D. advisor: Gary S. Was

Oak Ridge National Laboratory Oak Ridge, Tennessee (06/2010 – 08/2010)

Higher Education Research Experiences (HERE) Summer Internship

Purdue University – West Lafayette, Indiana

Undergraduate Research Assistant (Thomas Downar) (01/2006 – 08/2006)

Assisted graduate students in writing input files for reactor analysis

Undergraduate Laboratory Assistant (Sean McDeavitt) (01/2004 – 05/2004)

Worked with other students in setup of a new research laboratory

North Carolina State University – Raleigh, North Carolina (06/2005 – 08/2005)

Undergraduate Assistant at PULSTAR Nuclear Reactor (Ayman Hawari)

Assisted with setup of the Neutron Imaging Facility

Designed experiment for neutron absorption standard for Neutron Imaging Facility

Assisted with setup of the Neutron Powder Diffractometer

Design and build of a pressurized air supply for experiments in the reactor room

Performed a flux map of one of the PULSTAR beam tube

Teaching Experience:

University of Michigan:

Graduate Student Instructor (NERS 421 – Nuclear Engineering Materials)

Professor Michael Atzmon - University of Michigan (Fall 2012)

- Hold office hours and answer questions about homework and exams
- Teach about radiation effects in materials
- Responsible for solving and writing senior/graduate level problem solutions
- Grading homework and exams

Graduate Student Instructor (NERS 484 – Radiation Health Effects) (Fall 2011)

Professor Kimberlee Kearfott

- Lead recitation and teach about radiation health effects
- Responsible for solving and writing senior/graduate level problem solutions
- Grading homework and term projects

Graduate Course Assistant (NERS 522 – Nuclear Fuels) (Winter 2010)

Professor Gary Was

- Substitute lecturer
- Responsible for solving and writing graduate level problem solutions
- Grading homework

Purdue University

Grader for Undergraduate and Graduate Radiation Laboratory Classes (Fall 2006, Winter 2005)

Instructor Jere Jenkins

- Grading reports for understanding of concepts
- Wrote grading rubric for laboratory reports

Honors and Awards:

Awards and Scholarships:

Outstanding Student Oral Presentation, Microstructural Processes in Irradiated Materials Symposia, 2011 TMS annual meeting (2011)

Rackham Predoctoral Fellowship Nominee (2011)

American Nuclear Society John Randal Memorial Scholarship Recipient (2010)

Susan Lipschutz Award Nominee (2010)

Marian Sarah Parker Prize Nominee (2010)

Rackham Travel Fellowship (2008, 2010, 2011, 2012)

Dean's List (2005, 2006)

Academic Achievement Award (2002)

Fraternal Order of Vikings Scholarship (2002)

Societies and Organizations:

The Minerals, Metals, and Materials Society (2007 – present)

The American Ceramic Society (2007 – present)

Materials Research Society (2008 – present)

American Nuclear Society National member (2003 – present)

- Michigan section member (2007 – 2014)

- Purdue University Chapter President (05/2005 – 05/2006)
- Purdue University Chapter Vice President (01/2005 – 05/2005)
- Alpha Nu Sigma National Honors Society (ANSHS) (2005 – present)
- University of Michigan Chapter President (04/2008 – 04/2010)
 - Responsible for recruiting new members and planning weekly tutoring sessions for undergraduate students.
- Tau Beta Pi (2006 – present)
- Michigan Gamma Graduate Coordinator (01/2009 – 12/2009)
 - Responsible for recruiting new graduate students and planning social events for graduate members.
- Distinguished active (winter 2009 & fall 2009)
- The Epeians – Engineering Leadership Honor Society (2009 – present)
- Tau Beta Sigma (2003 – present)
- Purdue University Chapter Treasurer (01/2004 – 12/2004)

Departmental, College, and Extracurricular Activities:

Co-chair of University of Michigan Department of Nuclear Engineering NERS@50 poster session
November 2008

Responsible for recruiting graduate and undergraduate students to create research posters for display during the NERS 50th anniversary celebration.

Responsible for determining room layout, design and printing of announcement displays, assisting students with setup, and assisting students with poster removal.

Co-author of University of Michigan chapter of the American Nuclear Society student conference proposals submitted in 2007, 2008, and 2009

Assisted with writing of the 50-page proposal to host the ANS student conference at the University of Michigan. Proposal submitted in 2009 was accepted and the conference was hosted at the University of Michigan in April 2010.

General Editor of program and print documents for the conference hosted in April 2010.

Recruiter for University of Michigan College of Engineering at Purdue University 2008 Big-10 Graduate School Expo 2008

Represented University of Michigan College of Engineering at a 100+ school-recruiting event held every year at Purdue University. Duties included working at an information table during the 6 hours fair, luncheon round-table with undergraduates at the fair discussing graduate school, and hosting a 1 hour University information session for interested students.

University of Michigan College of Engineering prospective graduate student visit volunteer
2007-2013

Involved with giving visiting students laboratory tours, being on panel for informational panel session, and involved with social activities after the visit.

University of Michigan College of Engineering "Lunch with a Graduate Student" participant
2010, 2011, 2012

Judge for the Southeast Michigan Science Fair, 2009, 2010

Publications:

A.A. Campbell, and G.S. Was, "Proton Irradiation-Induced Creep of Ultra-Fine Grain Graphite", *Carbon*, 77 (2014), 993-1010.

A.A. Campbell, K.B. Campbell, and G.S. Was, "Anisotropy Analysis of Ultra-Fine Grain Graphite and Pyrolytic Carbon", *Carbon*, 60 (2013) 410.

A.A. Campbell and G.S. Was, "In-Situ Proton Irradiation-Induced Creep at Very High Temperature", *Journal of Nuclear Materials*, 433, (2013), 86-94.

A.A. Campbell, K.B. Campbell, and G.S. Was, "A Methodology for Quantitative Determination of Anisotropy of Pyrolytic Carbon", Transactions of the American Nuclear Society and Embedded Topical Meeting Nuclear Fuels and Structural Materials for the Next Generation Nuclear Reactors (NFSM), Vol. 102, June 13-17, 2010, San Diego, CA, p 843-844.

Presentations:

A.A. Campbell, G.S. Was, "Mechanism of Proton Irradiation-Induced Creep of Ultra-Fine Grain Graphite ZXF-5Q", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014.

A.A. Campbell, M. Snead, Y. Katoh, K. Takizawa, "Effect of Neutron Fluence and Irradiation Temperature on the Properties of Tokai Carbon Graphite Grades G347A and G458A", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014. E. Kunimoto, M. Yamaji, T. Konishi, Y. Katoh, M. Snead, **A.A. Campbell**, J. Sumita, T. Shibata, "Irradiation Program for IG-110 and IG-430 Graphite for Evaluation of High Fluence Behavior", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014.

K. Takizawa, A. Kondo, Y. Katoh, G.E. Jellison, **A.A. Campbell**, "Microstructural Analysis of Nuclear-Grade Graphite Materials after Neutron Irradiation", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014.

M. Snead, **A.A. Campbell**, Y. Katoh, H. Kato, T. Takagi, "Irradiation Effects Study for IBIDEN ETU-10 Nuclear Grade Graphite", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014.

Y. Katoh, M. Snead, **A.A. Campbell**, E. Kunimoto, M. Yamaji, T. Konishi, "Effects of Neutron Irradiation in IG-110", 15th International Nuclear Graphite Specialists' Meeting, Hangzhou, China, September 15-18, 2014.

A.A. Campbell, "Irradiation-Induced Creep of Graphite: Why Understanding the Mechanism is "Critical" for Nuclear Reactors", 2nd Annual ORNL Postdoc Research Symposium, Oak Ridge, TN, July 10, 2014. (podium presentation).

A.A. Campbell, G.S. Was, "Mechanism of Irradiation-Induced Creep in Ultra-Fine Grain Graphite", TMS Annual Meeting, San Diego, CA, February 16-20, 2014. (podium presentation).

- A.A. Campbell**, G.S. Was, "Investigation of Proton Irradiation-Induced Creep of Ultra-Fine Grain Graphite", 14th International Nuclear Graphite Specialists' Meeting, Seattle, Washington, September 15-18, 2013. (podium presentation).
2. **A.A. Campbell**, G.S. Was, "Mechanism of Proton Irradiation-Induced Creep of Pyrolytic Carbon", TMS Annual Meeting, Orlando, FL, March 11-15, 2012. (podium presentation).
 1. **A.A. Campbell**, G.S. Was, "Proton Irradiation-Induced Creep of Graphite and Pyrolytic Carbon for High Temperature Gas Reactors", MI-ANS section meeting, January 24, 2012 (Student research presentation).
 2. **A.A. Campbell**, G.S. Was, "Pyrolytic Carbon Depositions for Proton Irradiation Creep Experiments", VHTR R&D FY-11 Technical Review Meeting, Albuquerque NM, April 26-28, 2010. (invited poster presentation).
 3. **A.A. Campbell**, G.S. Was, "Proton Irradiation-Induced Creep Effects in Pyrolytic Carbon and Graphite", TMS Annual Meeting, San Diego, CA, February 27 – March 3, 2011. (podium presentation).
 4. **A.A. Campbell**, G.S. Was, Y. Katoh, "*In-situ* Study of Proton Irradiation-Induced Creep in Graphite", 11th International Nuclear Graphite Specialists' Meeting, Eastbourne, United Kingdom, September 12-15, 2010. (poster presentation).
 5. **A.A. Campbell**, K.B. Campbell, G.S. Was, "A Methodology for Quantitative Determination of Anisotropy of Pyrolytic Carbon", 2010 ANS Annual Meeting, San Diego, CA, June 13-17, 2010. (poster presentation).
 5. **A.A. Campbell**, G.S. Was, "Proton Irradiation-Induced Creep Studies for the VHTR Reactor", VHTR R&D FY-10 Technical Review Meeting, Denver, CO, April 27-29, 2010. (invited podium presentation).
 7. **A.A. Campbell**, G.S. Was, "Proton Beam Irradiation Creep Behavior of POCO Graphite", American Nuclear Society Student Conference, Ann Arbor, MI, April 8-10 2010. (podium presentation).
 3. **A.A. Campbell**, G.S. Was, "*In-Situ* Measurements of Proton Irradiation-Induced Creep of Pyrolytic Carbon", VHTR R&D FY-09 Technical Review Meeting, Las Vegas, NV, May 12-14, 2009. (podium presentation).
 2. **A.A. Campbell**, R. Zhou, L. Wang and G.S. Was, "Anisotropy Changes in Pyrolytic Carbon Resulting from Proton Irradiation-Induced Creep", TMS Annual Meeting, San Francisco, CA, February 15-19, 2009. (poster presentation).
 2. **A.A. Campbell**, Z. Jiao, R. Zhou, L. Wang, G.S. Was, "*In-situ* Proton Irradiation Induced Creep Experiments", NERS@50 Student Research Poster Session, Ann Arbor, MI, November 2-4, 2008. (poster presentation).
 1. **A.A. Campbell**, Z. Jiao, R. Zhou, L. Wang, G.S. Was, "Proton Irradiation Creep of Pyrolytic Carbon", TMS Annual Meeting, New Orleans, LA, March 9-13, 2008. (podium presentation).
 2. **A.A. Davis**, S.D. Clarke, T. Jevremovic, "Cell Irradiation with Low-Energy Neutrons", ANS Student Conference, Columbus, OH, April 2005. (podium presentation) (Davis is maiden name).