

James Joseph Wall

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Education

Ph.D., Materials Science and Engineering The University of Tennessee	2007
M.Sc., Mechanical and Aerospace Engineering The University of Missouri <i>-Minor in Materials Science</i>	2003
B.Sc., Mechanical and Aerospace Engineering The University of Missouri <i>-Minor in Mathematics</i>	2001

Relevant Experience

- **2010-Current: Adjunct Assistant Professor, GWW School of Mechanical Engineering, Georgia Institute of Technology**
(Jointly held position while with EPRI)
 - Developed methodology for characterizing radiation damage in irradiation damaged reactor pressure vessel steel and vessel internals using nonlinear ultrasound.
 - Developed methodology for detection of incipient stage stress corrosion cracking using nonlinear ultrasound.
 - Developed testing protocol for large posttensioned civil structure mock-ups.
 - Characterization of ferritic and austenitic steels undergoing stress corrosion cracking.
 - Co-advised four PhD students.
- **2008-Current: Technical Leader, Electric Power Research Institute (EPRI)**

Project(s): Neutron and synchrotron x-ray diffraction residual stress measurements, studying incipient stage damage in iron and nickel-based superalloys, aging related degradation of concrete and steels, radiation damage in metals and nonmetals.

 - Developed a methodology for degradation research of civil infrastructure in collaboration with US, French and Japanese Utilities in concert with the US DOE.
 - Research on augmented inspection of commercial nuclear containment structures.
 - Research on radiation damage in metals and concrete.
 - Use of neutron and x-ray diffraction to characterize residual stress in welded and stress corrosion cracked components for the nuclear industry.
 - Use of fiber optic strain gages to detect incipient stage cracking in austenitic stainless steel piping welds.
 - Built a laboratory to explore the incipient stages of combined mechanical/thermal/environmental damage in steels and nickel-based superalloys.
 - EPRI Innovation Scout (2012 – Current)
- **2006-2008: Technical Research Staff, LANSCE-LC, Los Alamos National Laboratory**

Project(s): Novel sample environments for neutron diffraction studies, nucleation and phase transitions, in-situ deformation studies, weld residual stress characterization.

 - Design of an ultra-high temperature graphite tube furnace for neutron scattering studies of phase transitions on

the High Pressure Preferred Orientation (HIPPO) neutron diffractometer.

-Conducted in-situ neutron scattering studies on transformation-induced plasticity and deformation texture development in 304L stainless steel at cryogenic temperatures on a materials testing rig.

-Conducted synchrotron x-ray investigations of phase formation in supercooled liquid alloys.

-Assisted instrument scientists with national/international user experiments on the HIPPO and SMARTS neutron diffractometers.

- **2004-2006: GRA, Dept. of Materials Science and Engineering, University of Tennessee**

Project(s): Processing and mechanical and thermal characterization of Zr-based bulk metallic glass (BMG) materials.

-Designed a versatile machine to produce amorphous metal alloys.

-Devised a doping method to neutralize contamination in zirconium-based glass forming alloys based on metallurgical thermodynamics.

-Demonstrated the viability of processing metallic glasses using aerodynamic levitation.

-Mechanical testing on brittle metallic glass materials.

-Collaborated with NASA Marshall Space Flight Center to study the creep deformation behavior of niobium near its melting point.

Awards/Honors/Grants

US DOE NEUP grant (2012)

EPRI Discovery Award (2012).

EPRI Discovery Award (2011).

EPRI Performance Recognition Award (2009).

NASA Marshall Space Flight Center research grant (2005).

National Science Foundation IMI Fellowship (2004 - 2007).

Sigma Xi Interdisciplinary Science Research Presentation Competition, UT (2005).

Committees

US Nuclear Regulatory Commission EMDA Subcommittee (2012)

Los Alamos National Laboratory Materials Program Advisory Committee (2009-2013)

International Committee on Irradiated Concrete in Nuclear Applications (2013 – Current)

Certifications

PMI Project Management Professional certification (in progress)

US Department of Energy Radiological Worker certification

Patents

US Patent no. 8,953,153 “System and Method for Post-Tensioned Tendon Monitoring”

Publications

Book Chapter

1. J. J. Wall, "Bulk Metallic Glass: The Theory and Practice of Fabrication", in *The World of Bulk Metallic Glasses and their Composites*, C. Fan Editor, Research Signpost, Kerala ISBN: 978-81-308-0196-4 (2008), *invited*.

Peer-Reviewed Journal Articles (including those currently under review)

2. T. M. Rosseel, J. J. Wall, K. G. Field, Y. Le Pape, D. J. Naus, I. Remec, J. T. Busby, P. Bruck, “Dommages d’irradiation du béton des puits de cuve des réacteurs“, *Revue Generale Nuclaire*, **Under Review** (2015).
3. K. H. Matlack, H. Bradley, S. Thiele, J-Y. Kim, J. J. Wall, J. Qu and L. J. Jacobs, “Nonlinear Ultrasonic Characterization of Precipitation in 17-4PH Stainless Steel”, *NDT&E International* **71**, 8 (2015).

4. J. Lee, J. J. Wall, J. R. Rogers, T. J. Rathz, H. Choo, P. K. Liaw and R. W. Hyers, "Non-Contact Measurement of Creep Properties of Niobium at 1985 C" *Measurement Science and Technology*, **26**, 015901 (2015).
5. B. J. Hohmann, J. P. Crosson, T. C. Esselman, J. J. Wall, M. Quarry and L. Breon, "Flaw Detection Capability and Sensitivity in the Inspection of Nuclear Containment Liner and Shell Mock-Ups Utilizing a Magnetostrictive Sensor (MsS) Guided Wave UT Technique" *Journal of Modern Physics*, **5**, 13 (2014)
6. K. H. Matlack, J.-Y. Kim, J. J. Wall, J. Qu, L. J. Jacobs and M. A. Sokolov, "Sensitivity of Ultrasonic Nonlinearity to Irradiated, Annealed and Re-irradiated Microstructure Changes in RPV Steels", *Journal of Nuclear Materials* **448**, 26 (2014).
7. K. H. Matlack, J. J. Wall, J.-Y. Kim, J. Qu, L. J. Jacobs, and H.-W. Viehrig, "Evaluation of Radiation Damage Using Nonlinear Ultrasound", *Journal of Applied Physics*, **111**, 054911 (2012).
8. R. Barabash, E. W. Huang, J. J. Wall, J. Wilkerson, Y. Ren, W. Lu, S. C. Vogel, G. E. Ice, L. M. Pike and P. K. Liaw, "Texture Crossover: Trace From Multiple Grains to a Subgrain," *Materials Science and Engineering A* **528**, 3 (2010).
9. J. J. Wall, J. D. Almer, S. C. Vogel, P. K. Liaw, H. Choo and C. T. Liu, "Synchrotron X-Ray Scattering Investigations of Oxygen-Induced Nucleation in a Zr-Based Glass Forming Alloy", *Scripta Materialia*, **61**, 293 (2009).
10. J. J. Wall, C. T. Liu, W.-K. Rhim, J. J. Z. Li, P. K. Liaw, H. Choo, and W. L. Johnson, "Heterogeneous Nucleation in a Glass Forming Alloy," *Applied Physics Letters* **92**, 244106 (2008).
11. J. J. Wall, C. Fan, P. K. Liaw, and H. Choo, "Processing $Zr_{52.5}Cu_{17.9}Ni_{14.6}Al_{10}Ti_5$ metallic glass containing high levels of oxygen by microalloying with erbium," *Materials Science & Engineering A* **472**, 125 (2008).
12. E. A. Juarez-Arellano, B. Winkler, A. Friedrich, D. J. Wilson, M. Koch-Müller, K. Knorr, S. C. Vogel, J. J. Wall, H. Reiche, W. Crichton, M. Ortega-Aviles and M. Avalos-Borja, "Reaction of Rhenium and Carbon at High Pressures and Temperatures," *Zeitschrift für Kristallographie* **223**, 492 (2008).
13. C. C. Aydiner, D. W. Brown, A. Misra, Y.-C. Wang, J. J. Wall, N. Mara, and J. D. Almer, Residual Strain in Free-Standing Cu-Nb Nanoscale Multilayers With High-Energy X-rays," *Journal of Applied Physics* **102**, 083514 (2007).
14. J. Lee, R. C. Bradshaw, R. W. Hyers, J. R. Rogers, T. J. Rathz, J. J. Wall, H. Choo and P. K. Liaw, "Non-contact measurement of creep resistance of ultra-high-temperature materials", *Materials Science & Engineering A* **463**, 185 (2007).
15. K. X. Tao, J. J. Wall, D. W. Brown, S. C. Vogel, M. A. M. Bourke, H. Q. Li, and H. Choo, "In-Situ Neutron Diffraction Study of Grain Orientation Dependent Phase Transformation in 304L Stainless Steel at a Cryogenic Temperature," *Journal of Applied Physics* **100**, 123515 (2007).
16. J. J. Wall, R. Weber, J. Kim, P. K. Liaw, and H. Choo, "Aerodynamic Levitation Processing of a Zr-based Bulk Metallic Glass," *Materials Science & Engineering A* **445-446**, 219 (2007).
17. C. Fan, P. K. Liaw, V. Haas, J. J. Wall, H. Choo, A. Inoue and C. T. Liu, "Structures and Mechanical Behaviors of $Zr_{55}Cu_{35}Al_{10}$ Bulk Amorphous Alloys at Ambient and Cryogenic Temperatures," *Physical Review B* **74**, 014205 (2006).
18. J. J. Wall, C. Fan, P. K. Liaw, C. T. Liu, and H. Choo, "A Combined Drop / Suction Casting Machine for the Manufacture of Bulk Metallic Glass Materials," *Review of Scientific Instruments* **77**, 033902 (2006).
19. J. J. Wall, H. Choo, T. N. Tiegs, and P. K. Liaw, "Thermal Residual Stress Evolution in a TiC-50 vol.% Ni_3Al Cermet," *Materials Science & Engineering A* **412**, 40 (2006).
20. K. Morsi, S. O. Moussa and J. Wall "Reactive Extrusion and High Temperature Oxidation of Ni_3Al " *Journal of Materials Science* **41**, 1027 (2006).
21. K. Morsi, S. O. Moussa, and J. J. Wall, "Simultaneous Combustion Synthesis (Thermal Explosion Mode) and Extrusion of Nickel Aluminides," *Journal of Materials Science* **40**, 1027 (2005).
22. K. Morsi, J. Wall, S. O. Moussa, and J. Rodriguez, "Reactive Thermomechanical Processing of Aluminide Intermetallics," *Journal of Materials Engineering and Performance* **12**, 147 (2003), invited.

23. J. Rodriguez, S. O. Moussa, J. Wall, and K. Morsi, “Low Energy Forging of Aluminide Intermetallics,” *Scripta Materialia* **48**, 707 (2003).

Other

24. H. Graves, Y. LePape, D. J. Naus, J. Rashid, V. Saouma, A. Sheikh and J. J. Wall, “Expanded Materials Degradation Assessment – Volume 4: Aging of Concrete and Civil Structures”, *Nuclear Regulatory Commission Document NUREG/CR-7153*, **Public Document** (2014)

- **Numerous Proprietary Technical Reports for the Commercial Nuclear Industry**
- **Numerous Conference Papers and Presentations**