Vita

Brandon R. Grogan

Biography
Brandon Grogan is a staff researcher in the Nuclear Security Modeling group at the Oak Ridge National Laboratory, where he has worked since 2011. Prior to his current position, he worked as a postdoctoral researcher and a graduate research assistant in the Nuclear Material Detection and Characterization group at ORNL. He holds a BS in Physics from West Point and a PhD in Nuclear Engineering from the University of Tennessee. His current research interests include nuclear forensics, international safeguards, non-destructive measurements, and inverse methods.

Education
2010 Ph.D. in Nuclear Engineering, University of Tennessee, Knoxville, TN
Dissertation: *The Development of a Parameterized Scatter Removal Algorithm for Nuclear Materials Identification System Imaging*
Chair: John T. Mihalczo
Committee: Thomas Handler, Laurence Miller, Lawrence Townsend

2008 M.S. in Nuclear Engineering, University of Tennessee, Knoxville, TN

1995 B.S. in Engineering Physics, West Point, West Point, NY

Professional Experience
2011-Present Nuclear Chemical Engineer, Nuclear Security Modeling Group, Nuclear Security and Isotope Technology Division, Oak Ridge National Lab, Oak Ridge, TN

- Principal investigator of the ORNL Rapid Gamma Exploitation project. The purpose of this DTRA project is to determine if very early gamma spectra of nuclear fallout can be used to produce an actionable determination of the device characteristics.
- Project lead for Inverse Depletion Theory (INDEPTH) code development. This code is being developed for the International Atomic Energy Agency (IAEA) to reconstruct initial enrichment, cooling time, and burnup of spent fuel from environmental sample isotopic data.
- Host and mentor for summer students performing research under the INDEPTH program

2010-2011 Postdoctoral Researcher, Nuclear Materials Detection & Characterization group, Global Nuclear Security Technology Division, Oak Ridge National Lab, Oak Ridge, TN

- Performed active neutron interrogation measurements of shielded highly-enriched uranium (HEU) at the Y-12 National Security Complex to test proposed hardware for detecting weapons-grade nuclear material inside shipping containers
- Developed methods for identifying light isotopes using fast neutron scattering measurements
- Simulated neutron-induced gamma spectroscopy measurements of shielded materials using MCNP and GADRAS.

2006-2010 Graduate Research Assistant, Nuclear Materials Detection & Characterization group, Global Nuclear Security Technology Division, Oak Ridge National Lab, Oak Ridge, TN

- Participated in active neutron interrogation measurement campaigns of special nuclear material at Oak Ridge, Idaho, and Los Alamos National Laboratories

- Simulated the effects of neutron scattering in a fast neutron radiography system using MCNP-PoliMi
- Developed algorithms for determining the mass and enrichment of UO_3 powder held up in a uranium-processing facility using active neutron interrogation

Honors and Awards

Adjunct faculty member in the Department of Nuclear Engineering, University of Tennessee; and the Department of Nuclear Engineering, North Carolina State University.

2018 World Nuclear University Summer Institute Fellow

2018 National Nuclear Security Administration (NNSA) Nonproliferation and Arms Control (NPAC) Joule Award winner

2017 Nuclear Fuels Experience – United Kingdom participant

2007 J. D. Williams Best Student Paper Award, 48th Annual meeting of the Institute of Nuclear Materials Management

2006-2010 Graduate Research Assistantship, Nuclear Engineering, Oak Ridge National Laboratory, Oak Ridge, TN

1991-1995 Dean's List (8 consecutive semesters), West Point, West Point, NY

1994 Summer Internship, Nuclear Accident Response Group, Los Alamos National Laboratory, Los Alamos, NM

Publications

Brandon R. Grogan

Articles published in refereed journals:

S. Vaccaro, S.J. Tobin, A. Favalli, **B. Grogan**, P. Jansson, H. Liljenfeldt, V. Mozin, J. Hu, P. Schwalbach, A. Sjöland, H. Trellue, D. Vo, "PWR and BWR spent fuel assembly gamma spectra measurements," *Nuclear Instruments and Methods in Physics Research A* 833 (2016) 208-225.

D. Vo, A. Favalli, **B. Grogan**, P. Jansson, H. Liljenfeldt, V. Mozin, P. Schwalbach, A. Sjöland, S. Tobin, H. Trellue, and S. Vaccaro, "Passive Gamma Analysis of the Boiling-Water-Reactor Assemblies," *Nuclear Instruments and Methods in Physics Research A* 830 (2016) 325–337.

A. Favalli, D. Vo, **B. Grogan**, P. Jansson, H. Liljenfeldt, V. Mozin, P. Schwalbach, A. Sjöland, S.J Tobin, H. Trellue, S. Vaccaro, "Determining initial enrichment, burnup, and cooling time of pressurized-water-reactor spent fuel assemblies by analyzing passive gamma spectra measured at the Clab interim-fuel storage facility in Sweden," *Nuclear Instruments and Methods in Physics Research A* 820 (2016) 102–111.

B. R. Grogan, J. J. Henkel, J. O. Johnson, J. T. Mihalczo, T. M. Miller, B. W. Patton "Investigation of Active Interrogation Techniques to Detect Special Nuclear Material in Maritime Environments: Boarded Search of a Cargo Container Ship," *Nuclear Instruments and Methods in Physics Research B* 316 (2013) 62–70.

T. M. Miller, B. W. Patton, **B. R. Grogan**, J. J. Henkel, B. D. Murphy, J. O. Johnson, J. T. Mihalczo, "Investigations of Active Interrogation Techniques to Detect Special Nuclear Material In Maritime Environments: Standoff Interrogation of Small- and Medium-Sized Cargo Ships," *Nuclear Instruments and Methods in Physics Research* B 316 (2013) 94–104.

B. R. Grogan, J. T. Mihalczo, J. A. Mullens, "MCNP-PoliMi Simulation of Neutron Radiography Measurements for Mass Determination for a Trough of UO_3," *Journal of Nuclear Materials Management*, XXXVI (2007) 27-32.

Papers presented at conferences:

B. R. Grogan, M. H. Purves, and J. P. Lefebvre, "Reconstructing Reactor Operating Histories Using the INDEPTH Code," *Proceedings of the 59th Annual Meeting of the INMM*, Baltimore, MD, July 2018.

B. R. Grogan, S. M. Richards, "Verifying Safeguards Declarations with INDEPTH: A Sensitivity Study," *Proceedings of M&C 2017 - International Conference on Mathematics & Computational Methods Applied to Nuclear Science & Engineering*, Jeju, Korea, April 2017

B. R. Grogan, A. Favalli, P. Jansson, H. Liljenfeldt, V. Mozin, P. Schwalbach, A. Sjöland, S. J. Tobin, H. Trellue, S. Vaccaro, D. Vo, "NDA Measurement Analysis of Spent Nuclear Fuel Assemblies at the Swedish Clab Facility Using the INDEPTH Code", *Proceedings of the 57th Annual Meeting of the INMM*, Atlanta, GA, July 2016.

B. R. Grogan, J. T. Mihalczo, Identification of Lithium Isotopes Using Time-Tagged Neutron Scattering, *Proceedings of the 53rd Annual Meeting of the INMM*, Orlando, FL, July 2012.

B. R. Grogan, S. M. McConchie, J. T. Mihalczo, J. A. Mullens, "Identification of Shielding Material Configurations Using NMIS Imaging," *Proceedings of the 52nd Annual Meeting of the INMM*, Palm Desert, CA, July 2011.

B. R. Grogan, J. T. Mihalczo, "Simulating NMIS Imaging and Fission-Mapping Measurements," *Proceedings of the 52nd Annual Meeting of the INMM*, Palm Desert, CA, July 2011.

B. R. Grogan, J. T. Mihalczo, "The Development of a Parameterized Scatter Removal Algorithm for NMIS Imaging," *Proceedings of the 51st Annual Meeting of the INMM*, Baltimore, MD, July 2010.

B. R. Grogan, J. T. Mihalczo, "Simulated Verification of Fuel Element Inventory in a Small Reactor Core Using the Nuclear Materials Identification System," *Proceedings of the 50th Annual Meeting of the INMM*, Tucson, AZ, July 2009.

B. R. Grogan, J. T. Mihalczo, "Simulated Verification of Fuel Element Inventory in a Small Reactor Core Using the Nuclear Materials Identification System," *Proceedings of the 31st Annual ESARDA Meeting*, Vilnius, Lithuania, May 2009.

J. T. Mullens, **B. R. Grogan**, D. E. Archer, J. T. Mihalczo, "Shipping Anomaly from NMIS Imaging," *Proceedings of the 49th Annual Meeting of the INMM*, Nashville, TN, July 2009.

B. R. Grogan, P. A. Hausladen, S. M. McConchie, J. T. Mihalczo, J. A. Mullens, "Alpha Detector Pixelization Effects on NMIS Imaging," *Proceedings of the 49th Annual Meeting of the INMM*, Nashville, TN, July 2009.

B. R. Grogan, S. M. McConchie, J. T. Mihalczo, J. A. Mullens, "Measurements of 14.1 MeV Neutron Reflection and Transmission for Carbon, Polyethylene, and Steel," *Proceedings of the PHYSOR 2008 conference*, Interlaken, Switzerland, September 2008.

B. R. Grogan, J. T. Mihalczo, J. A. Mullens, "MCNP-PoliMi Simulation of Neutron Radiography Measurements for Mass Determination for a Trough of UO_3," *Proceedings of the 48th Annual Meeting of the INMM*, Tucson, AZ, July 2007.

Research reports submitted to sponsors:

B. R. Grogan, M. H. Purves, and J. P. Lefebvre, *INDEPTH Development for IAEA Environmental Sampling Analysis: FY 2017 Project Summary*, ORNL/TM-2017/472, Oak Ridge National Laboratory, Oak Ridge, TN, 2017.

B. R. Grogan, *INDEPTH Analysis of BWR Assemblies at the SKB Clab Facility*, ORNL/SR-2015/686, Oak Ridge National Laboratory, Oak Ridge, TN, 2016.

B. R. Grogan and K. E. Ottinger, *Fiscal Year 2014 INDEPTH Analysis of Clab PWR Assemblies*, ORNL/LTR-2014/391, Oak Ridge National Laboratory, Oak Ridge, TN, 2014.

B. R. Grogan and K. E. Ottinger, *Fiscal Year 2014 Modifications to the INDEPTH Code in Support of the NGSI-SF Project*, ORNL/LTR-2014/390, Oak Ridge National Laboratory, Oak Ridge, TN, 2014.

B. R. Grogan, K. E. Ottinger, and C. F. Weber, *Inverse Depletion Theory (INDEPTH) Analysis of*

Three Mile Island Spent Fuel Measurements, ORNL/LTR-2014/235, Oak Ridge National Laboratory, Oak Ridge, TN, 2014.

B. R. Grogan, *The Development of a Parameterized Scatter Removal Algorithm for Nuclear Materials Identification System Imaging*, ORNL/TM-2010/65, Oak Ridge National Laboratory, Oak Ridge, TN, 2010.

J. T. Mihalczo, S. M. McConchie, J. A. Mullens, J. J. Henkel, J. F. Henkel, **B. R. Grogan**, *Status of Unclassified Assessment of What NMIS with Imaging Adds to the Render Safe Pallet NA-42 2009 Yearly Report*, ORNL/TM-2009/306, Prepared for NA-42.