Yuxuan Zhang

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Education

2012.Jan-2016.Dec **Ph.D. Metallurgical Engineering**, *The University of Utah*, Salt Lake City, Utah, USA
Advisor: Prof. K.S. Ravi Chandran

2008.Sep-2012.Jun **B.E. Metallic Material Engineering**, *Hunan University of Technology*, Zhuzhou, Hunan, China
Advisor (senior year): Prof. Shuzhu Zhou

Professional Experiences

2019.Mar-present **Instrument Scientist**, *Oak Ridge National Laboratory*, Oak Ridge, TN, USA
Work within the Materials Engineering Group to develop advanced neutron imaging techniques and conduct research at both HFIR and SNS.

- Point-of-contact of Imaging/MARS beamline (CG-1D) at HFIR.
- Help industrial/academic Users in designing/optimizing experiments, on-site experimentation, data analysis, and writing manuscripts.
- Collaborate with researchers in developing/implementing advanced neutron imaging techniques, such as high-resolution imaging, phase grating interferometry (nGI), polarized imaging, Bragg-edge imaging, and resonance imaging.
- Science lead in designing the relocated cold neutron imaging instrument (NB-4) after HFIR Beryllium Reflector Replacement and Cold Guide Hall Extension.

2017.Apr-2019.Feb **Postdoctoral Research Associate**, *Oak Ridge National Laboratory*, Oak Ridge, TN, USA
Mentored by instrument scientists, software scientists, and radiochemists, I am greatly involved in the development of energy-dependent neutron imaging capability at SNAP beamline. This enables Spallation Neutron Source (SNS) to become the fourth facility that is capable of performing resonance imaging in the world.

- To fill the gap in resonance imaging data reduction/analysis, I developed two open-source Python libraries, *ImagingReso* and *ResoFit*.
- For the first time, demonstrated the resonance imaging capability at SNS. The result shows that resonance radiography could spatially resolve elements/isotopes within a foil stack containing Ag, Au, Co, Cd, Hf, Ta, and W foils.
- For the first time, acquired and reconstructed the neutron resonance tomography at SNS. The spatial distributions of uranium and gadolinium within bulk tristructural-isotropic (TRISO) fuel kernels were successfully mapped. This demonstrates that the capability in mapping high-Z elements/isotopes in bulk material, specifically for advanced nuclear fuels.
- Applied Bragg-edge imaging to investigate the phase transitions within bulk TRISO fuel kernels before and after conversion process. Diffraction measurements are scheduled at VULCAN to validate the findings.
- I also built and maintained a user accessible website (`https://isc.sns.gov/apps/venus`). It allows the simulation of the expected resonance spectra for neutron resonance imaging.

2013.Jan-2017.Mar **Graduate Research Assistant**, *The University of Utah*, Salt Lake City, UT, USA
Learned and applied neutron imaging/diffraction to investigate Li-ion batteries.

- Fabricated and tested Si nano-powder composite electrodes which could maintain high capacity (~1400 mAh/g) after 25 cycles.
- Wrote successful beamtime proposals to measure at both ORNL and LANL under DOE User Program,
- For the first time, successfully extracted Li diffusion coefficients from *ex-situ* neutron tomography data along with kinetic modeling.
- For the first time, spatially resolved the inhomogeneous Li transport responses within coin cell electrodes under different charge/discharge rates using neutron tomography. The result has been published at *Journal of Power Sources* (impact factor: 7.467 as of 2020).
- Designed and fabricated low cost *in-situ* electrochemical cells for diffraction measurement at NPDF, LANL.

Selected Publications

ORCID: 0000-0002-0083-1408

2023 Z. Gao, **Y. Zhang**, S. Qian, W. Yang, Z. Wu, K. Gluesenkamp, K. Nawaz, A. Gehl. "Nondestructive neutron imaging diagnosis of acidic gas reduction catalyst after 400-Hour operation in natural gas furnace," ***Chemical Engineering Journal***, 454, 140099. DOI: 10.1016/j.cej.2022.140099.

2022 S. Huang, C. Shen, K. An, **Y. Zhang**, I. Spinelli, M. Brennan, D. Yu. "Residual stress and microstructure in IN718-René41 graded superalloy fabricated by laser blown directed energy deposition," ***Frontiers in Metals and Alloys***, 1. DOI: 10.3389/ftmal.2022.1070562.

2022 G. Jang, **Y. Zhang**, J. Keum, Y. Bootwala, M. Hatzell, D. Jassby, C. Tsouris. "Neutron tomography of porous aluminum electrodes used in electrocoagulation of groundwater," ***Frontiers in Chemical Engineering***, 1. DOI: 10.3389/fceng.2022.1046627.

2022 D. Gupta, **Y. Zhang**, Z. Nie, J. Wang, G. Koenig. "Chemical redox of lithium-ion solid electroactive material in a packed bed flow reactor," ***Chemical Engineering Science***, 1. DOI: 10.1016/j.ces.2022.117443.

2021 Y. Yuan, **Y. Zhang**, H. Bilheux, S. Salmon. "Biocatalytic yarn for peroxide decomposition with controlled liquid transport," ***Advanced Materials Interfaces***, 8(7), 2002104. DOI: 10.1002/admi.202002104.

2021 F. Ossler, C. Finney, J. Warren, J. Bilheux, **Y. Zhang**, R. Mills, L. Santodonato, H. Bilheux. "Dynamics of hydrogen loss and structural changes in pyrolyzing biomass utilizing neutron imaging," ***Carbon***, 176, 511-529. DOI: 10.1016/j.carbon.2020.11.060.

2021 S. Venkatakrishnan, **Y. Zhang**, L. Dessieux, C. Hoffmann, P. Bingham, H. Bilheux. "Improved acquisition and reconstruction for wavelength-resolved neutron tomography," ***Journal of Imaging***, 1. DOI: 10.3390/jimaging7010010.

2020 D. Pajerowski, R. Ng, P. Nathan, **Y. Zhang**, M. Stone, A. dos Santos, J. Bunn, V. Fanelli. "3D scanning and 3D printing AlSi10Mg single crystal mounts for neutron scattering," ***Review of Scientific Instruments***, 91(5), 053902.

2019 **Y. Zhang**, J. Bilheux, H. Bilheux and J. Lin. "An interactive web-based tool to guide the preparation of neutron imaging experiments at oak ridge national laboratory," ***Journal of Physics Communications***, 3(10) (2019) 103003.

2019 J. Bilheux, H. Bilheux, J. Lin, I. Lumsden and **Y. Zhang**. "Neutron imaging analysis using jupyter Python notebook," ***Journal of Physics Communications***, 3(8) (2019) 083001.

2019 R. Dadisman, J. Shen, H. Feng, L. Crow, C. Jiang, T. Wang, **Y. Zhang**, H. Bilheux, S. R. Parnell, R. Pynn and F. Li. "Design and characterization of zero magnetic field chambers for high efficiency neutron polarization transport," ***Nuclear Instruments and Methods in Physics Research Section A***, 940 (2019) 174-180.

2018 **Y. Zhang**, K. Myhre, H. Bilheux, A. Tremsin, J. Johnson, J. Bilheux, A. Miskowiec, R. Hunt, L. Santodonato and J. Molaison, "Neutron resonance radiography and application to nuclear fuel materials," ***Transactions of the American Nuclear Society***, 2018.

2018 K. Myhre, **Y. Zhang**, H. Bilheux, J. Johnson, J. Bilheux, A. Miskowiec and R. Hunt, "Nondestructive tomographic mapping of uranium and gadolinium using energy-resolved neutron imaging," ***Transactions of the American Nuclear Society***, 2018.

2018 **Y. Zhang**, K.S.R. Chandran and H. Bilheux. "Imaging of the Li spatial distribution within V_2O_5 cathode in a coin cell by neutron computed tomography," ***Journal of Power Sources***, 376 (2018) 125-130.

2017 **Y. Zhang** and J. Bilheux. "ImagingReso: A tool for neutron resonance imaging," ***The Journal of Open Source Software***, 2 (2017) 407.

2017 **Y. Zhang**, K.S.R. Chandran, M. Jagannathan, H. Bilheux and J. Bilheux, "The nature of electrochemical delithiation of Li-Mg alloy electrodes: Neutron computed tomography and analytical modeling of Li diffusion and delithiation phenomenon," ***Journal of the Electrochemical Society***, 164 (2017) A28-A38.

2016 **Y. Zhang**, "Study of Li-Mg alloy and Si powder anodes for Li-ion batteries: Experiments, neutron imaging and modeling," ***The University of Utah***, (2016).

Presentations

Oral Presentations

2023 "Material characterization by neutron imaging and neutron grating interferometry," ***TMS 2023 Annual Meeting and Exhibition***, March 2023, accepted.

2022 "Recent advances at the cold neutron imaging instrument at HFIR," ***American Conference of Neutron Scattering (ACNS22)***, June 2022.

2022 **(Invited)** "Neutron Imaging Capabilities at Oak Ridge National Laboratory," ***Wuhan University Graduate Seminar***, June 2022.

2022 "Neutron imaging capabilities and recent development at High Flux Isotope Reactor," ***TMS 2022 Annual Meeting and Exhibition***, March 2022.

2021 **(Invited)** "Neutron Imaging Capabilities at ORNL," ***Innovation Driven Research/Education Ecosystem for Advanced Manufacturing For the Defense (IDREAM4D)***, December 2021.

2021 **(Invited)** "Prospects and challenges of neutron imaging techniques," ***TMS 2021 Annual Meeting and Exhibition***, March 2021.

2020 "Current and Future Neutron Imaging Capabilities at ORNL," ***National School on Neutron and X-Ray Scattering***, June 2020.

2019 **(Invited)** "Prospects and challenges of neutron imaging techniques," ***American Geophysical Union SCIWS14 Workshop***, December 2019.

2019 "Advanced Characterization of Nuclear Materials Using Neutron Imaging," ***MRS Fall Meeting***, December 2019.

2019 "Neutron Imaging at the High Flux Isotope Reactor and Spallation Neutron Source," ***International Collaboration on Advanced Neutron Sources XXIII***, October 2019.

2019 "Recent Developments and Future Opportunities in Neutron Imaging Data Analysis at HFIR," ***Imaging Software Workshop***, October 2019.

2019 "Python Libraries for Resonance Imaging," ***10th Workshop on NEUtron WAVElength Dependent Imaging***, May 2019.

2018 "Neutron Resonance Radiography and Application to Nuclear Fuel Materials," ***American Nuclear Society Winter Meeting***, November 2018.

2018 "Energy Selective Neutron Imaging Using Epithermal Neutron Imaging at Spallation Neutrons Source," ***ORPA Research Symposium***, August 2018.

2018 "Three-Dimensional Mapping of Gadolinium and Uranium in TRISO Nuclear Fuel Kernels Using Epithermal Neutron Imaging," ***American Conference on Neutron Scattering***, June 2018.

2016 "Investigation of Li Spatial Distribution inside Bulk Li-Mg Alloy Electrode after Delithiation Using Neutron Imaging," ***Materials Science and Technology***, October 2016

Poster Presentations

2019 "The neutron imaging facility at the HFIR, ORNL," ***2019 Neutron Scattering User Meeting***, June 2019.

2019 "The neutron imaging facility at the HFIR, ORNL," ***Frontiers of Structural Materials Research Workshop***, August 2019.

2018 "Neutron Tomographic Imaging of Li Spatial Distribution in Vanadium Oxide Cathode of a Coin Cell and in Delithiated Li-Mg Alloy Electrode," ***American Conference on Neutron Scattering***, June 2018.

2018 "Neutron Tomographic Imaging of Li Spatial Distribution in a Small Volume Vanadium Oxide Cathode in a Coin Cell," ***MRS Spring Meeting***, April 2018.

2017 "Neutron Resonance Imaging of Uranium in Advanced Nuclear Fuel," ***9th Workshop on NEUtron WAVElength Dependent Imaging***, June 2017.

Honors and Awards

2023 **Team Science Award**, Buildings and Transportation Science Division, ORNL

2022 **Team Science Award**, Buildings and Transportation Science Division, ORNL

2022 **Session Chair**, American Conference of Neutron Scattering (ACNS22)
2021 **Supplemental Performance Award**, Neutron Sciences Directorate, ORNL
2021 **Certificate of Completion**, Neutron Instrument Building School, ORNL
2015 **Selected Participant**, 11th LANSCE Neutron School, Los Alamos National Laboratory.
2012 **Merit Student**, College of Metallurgical Engineering, Hunan University of Technology.

Mentorship

Interns

- Naznin Afrin, M.S. student (The University of Texas Rio Grande Valley, Summer 2022)
- Esmeralda González, B.S. student (The University of Texas Rio Grande Valley, Summer 2023)

Service

2016-present Reviewer, *Journal of the Electrochemical Society*
2018-present Reviewer, *Scientific Reports*
2021-present Reviewer, *Nuclear Instruments and Methods*
2021-present Committee member, Advanced Characterization, Testing, and Simulation Committee, *The Minerals, Metals and Materials Society*

Professional Associations

2020-present The Minerals, Metals and Materials Society
2018-present Materials Research Society
2018-2020 American Nuclear Society

Awarded Project

2023-2025
Title: **GOALI: Nanofluidic Physics of CO2 Utilization and Storage in Shale and Tight Oil Reservoirs**
Funder: NSF
PI: Xiaolong Yin
Awarded: $555,274
My Role: Collaborator (unfunded)

2020-2023
Title: **Intelligent Acquisition and Reconstruction for Hyperspectral Tomography Systems**
Funder: DOE BES
PI: Hassina Bilheux
Awarded: $3,660,000
My Role: Collaborator