

ROBERT P WINARSKI

Physicist

X-ray Microscopy Group

Center for Nanoscale Materials
Nanoscience and Technology Division
Building 440, Room A138
Phone: 630-252-9921
E-mail: winarski@anl.gov

Argonne National Laboratory
9700 S Cass Ave., Argonne, IL 60439



Education

Ph.D. Physics, Tulane University
M. S. Physics, Tulane University
B. S. Physics, University of Notre Dame

Awards and honors

R&D 100 Award for the Hard X-ray Nanoprobe (2009)
ANL inventor award for D. Shu, J. Maser, B. Lai, S. Vogt, M. Holt, C. Preissner, R. P. Winarski, and G. B. Stephenson, Optomechanical Structure for a Multifunctional Hard X-ray Nanoprobe Instrument

Research interests

X-ray related research in the areas of materials science and X-ray instrumentation development. Development of X-ray instrumentation for in-situ and in-operando analysis. Imaging of magnetic materials.

Professional Experience

- Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2009-present*
Physicist
- Developed the nanotomography program at the Hard X-ray Nanoprobe Beamline.
 - Nanoprobe Beamline Systems Manager.
 - Developing a research program to image magnetic domains in three dimensions.
- Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2010-2012*
Beamline Director
- Beamline Director for the Hard X-ray Nanoprobe Beamline.
 - Responsible for successfully managing the operation and user science program at the beamline.
- Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2003-2008*
Assistant Physicist
- Co-principal investigator for the Center for Nanoscale Materials X-ray Nanoprobe project (\$13 million).
 - Responsible for the construction of the Nanoprobe Beamline (R&D100 award 2009), including design, procurement and installation of unique major pieces of beamline equipment.
 - Major responsibility for design, specification and procurement of almost two-thirds of the \$12 million dollar budget.
 - Completion of the beamline on time and on schedule.

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- Conceived of and implemented innovative synchrotron radiation experiments and techniques specifically related to the nanoprobe.
- Scientific interest in full-field x-ray imaging, nanotomography, and nanomagnetism.

Argonne National Laboratory - Experimental Facilities Division (XFD)
Postdoctoral Fellow

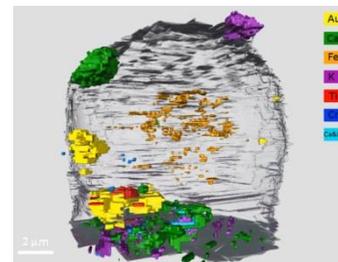
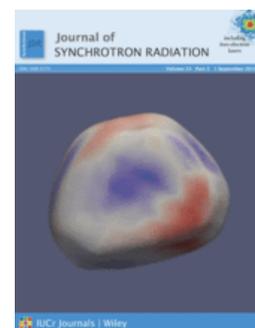
2000-2003

- Independent research at and construction and operation of beamline 4ID-C, the Advanced Photon Source's high-resolution intermediate energy polarization dependent spectroscopy facility.
- Developed unique experimental capabilities for this circular polarizing undulator beamline, including a spectrometer for measuring soft x-ray emission magnetic circular dichroism.

Selected Publications

Journal articles from the last ten years:

1. Qinang Hu, Mohammed Aboustait, Taehwan Kim, M. Tyler Ley, Jeffrey W. Bullard, George Scherer, Jay C. Hanan, Volker Rose, Robert Winarski, Jeffrey Gelb, Direct measurements of 3d structure, chemistry and mass density during the induction period of C3s hydration, *Cement and Concrete Research* (89) 14-26 (2016).
2. Qinang Hu, Mohammed Aboustait, Taehwan Kim, M. Tyler Ley, Jay C. Hanan, Jeffrey Bullard, Robert Winarski, Volker Rose, Direct three-dimensional observation of the microstructure and chemistry of C3S hydration, *Cement and Concrete Research* (88) 157-169 (2016).
3. Shuck, C. E., Frazee, M., Gillman, A., Beason, M. T., Gunduz, I. E., Matous, K., Winarski, R. & Mukasyan, A. S., *X-ray nanotomography and focused-ion-beam sectioning for quantitative three-dimensional analysis of nanocomposites*, *J. Synchrotron Rad.* (23) 990-996 (2016).
4. Jonathan Logan, Ross Harder, Luxi Li, Daniel Haskel, Pice Chen, Robert Winarski, Peter Fuesz, Deborah Schlagel, David Vine, Christa Benson and Ian McNulty, *Hard x-ray polarizer to enable simultaneous three-dimensional nanoscale imaging of magnetic structure and lattice strain*, *J. Synchrotron Rad.* (23) 1056-1069 (2016).
5. Z.W. Hu and R.P. Winarski, In situ 3-D mapping of pore structures and hollow grains of interplanetary dust particles with phase contrast x-ray nanotomography, *Meteoritics & Planetary Science* (51) 1632-1642. (2016).
6. Qinang Hu, Mohammed Aboustait, M Tyler Ley, Jay C Hanan, Volker Rose, Robert Winarski, *Combined three-dimensional structure and chemistry imaging with nanoscale resolution*. *Acta Materialia* (77) 173-182 (2014).
7. Masoud Allahkarami, Sudheer Bandla, Robert P. Winarski, and Jay C. Hanan, *X-ray nanotomography of a nanofiber: Quantitative measurement of diameter fluctuations*, *Applied Surface Science* (297) 9-15 (2014).
8. Kangkang Wang, Daniel Rosenmann, Martin Holt, Robert Winarski, Saw-Wai Hla et al., *An easy-to-implement filter for separating photo-excited signals from topography in scanning tunneling microscopy*, *Review of Scientific Instruments* (84) 063704 (2013).
9. Martin Holt, Ross Harder, Robert Winarski, Volker Rose, *Nanoscale Hard X-Ray Microscopy Methods for Materials Studies*, *Annual Review of Materials Research* 43(1) 183-211 (2013).



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10. Sudheer Bandla, Robert P. Winarski, and Jay C. Hanan, *Nanotomography of Polymer Nanocomposite Nanofibers*, Imaging Methods for Novel Materials and Challenging Applications, Volume 3, edited by Helena Jin, Cesar Sciammarella, Cosme Furlong, Sanichiro Yoshida (Springer), New York, 193-198, (2013).
11. Sejung R. Chae, Juhyuk Moon, Seyoon Yoon, Sungchul Bae, Pierre Levitz, Robert Winarski, and Paulo J. M. Monteiro, *Advanced Nanoscale Characterization of Cement Based Materials Using X-Ray Synchrotron Radiation: A Review*, International Journal of Concrete Structures and Materials 7(2) 95–110, (2013).
12. J. L. Provis, A. Hajimohammadi, C. E. White, S. A. Bernal, R. J. Myers, R. P. Winarski, V. Rose, T. E. Proffen, A. Llobet, and J. S. J. van Deventer, *Nanostructural Characterization of Geopolymers by Advanced Beamline Techniques*, Cement and Concrete Composites (36) 56-64, (2013).
13. R. P. Winarski, M. V. Holt, V. Rose, P. Fuesz, D. Carbaugh, C. Benson, D. Shu, D. Kline, G. B. Stephenson, I. McNulty and J. Maser, *A Hard X-ray Nanoprobe Beamline for Nanoscale Microscopy*, Journal of Synchrotron Radiation (19) 1056-1060, (2012).
14. V. Rose, T.Y. Chien, J. Hiller, D. Rosenmann, and R.P. Winarski, *X-ray nanotomography of SiO₂-coated Pt₉₀Ir₁₀ tips with sub-micron conducting apex*, Applied Physics Letters 99, 173102 (2011);.
15. John L. Provis, Volker Rose, Robert P. Winarski, and Jannie S.J. van Deventer, *Hard X-ray nanotomography of amorphous aluminosilicate cements*, Scripta Materialia (65) 316–319 (2011).
16. H. C. Kang, H. Yan, R. P. Winarski, M. V. Holt, J. Maser, C. Liu, R. Conley, S. Vogt, A. T. Macrander, and G. B. Stephenson, *Focusing of hard x-rays to 16 nanometers with a multilayer Laue lens*, Applied Physics Letters 92, 221114 (2008).
17. H. C. Kang, H. Yan, R. P. Winarski, M. V. Holt, J. Maser, C. Liu, R. Conley, S. Vogt, A. T. Macrander, and G. B. Stephenson, *Focusing of hard x-rays to 16 nanometers with a multilayer Laue lens*, Virtual Journal of Nanoscale Science & Technology 17 (25) (2008).
18. D. Shu, J. Maser, M. Holt, R. P. Winarski, C. Preissner, B. Lai, S. Vogt, G.B. Stephenson, *A Robot-Based Detector Manipulator System for a Hard X-ray Nanoprobe Instrument*, Nuclear Instruments & Methods in Physics Research Section A 582 159-161 (2007).



Proceedings from the last ten years:

1. B. Ma, R.P. Winarski, J. Wen, D.J. Miller, C.U. Segre, U. Balachandran, D.R. Forrest, Investigation of Carbon Nanostructure in Copper Covetics by X-ray Nanotomography, Proceedings of the 2nd International Conference on Tomography of Materials and Structures (ICTMS 2015), 77-81 (2015).
2. T. Ley, Q. Hu, T. Kim, M. Moradian, J. Hanan, V. Rose, R. Winarski, J. Gelb, Combining nano X-ray Tomography and X-ray Fluorescence for In Situ Observations and 3D Chemical Segmentation, Proceedings of the 2nd International Conference on Tomography of Materials and Structures (ICTMS 2015), 260-264 (2015).
3. Qinang Hu, Tyler Ley, Mohammed Aboustait, Robert Winarski, Volker Rose, Direct three dimensional observations of the microstructure and chemistry of the hydration of C3S, 6th Advances in Cement-Based Materials, Kansas State University, July 20-22, 2015.
4. Hu, Z. W.; Winarski, R., Making Hidden Pristine Submicron Carbonaceous Hollow Grains Stand Out In Situ in Interplanetary Dust, 78th Annual Meeting of the Meteoritical Society, LPI Contribution No. 1856, 5267.

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5. Qiang Hu, Mohammad Aboustait, M. Tyler Ley, Jay Hanan, Jeff Davis, Robert Winarski, and Volker Rose, 3D Chemical Segmentation of Complex Particles by Combining X-ray Tomography and Chemical Mapping with Laboratory and Synchrotron Techniques, 1st International Conference on the Tomography of Materials and Structures, 1-5 July 2013, Ghent, Belgium. V. Cnudde and D. Bernard, eds., Univ. Ghent, 259-263 (2013).
6. M.T. Ley, Q. Hu, M. Aboustait, J. Hanan, J. Davis, R. Winarski, and V. Rose, Multi Scale Characterization of the Chemical Phases within Fly Ash with Synchrotron and Laboratory Techniques, 14th Annual Euroseminar on Microscopy Applied to Building Materials, Helsingor, Denmark, June 10-14, 2013.
7. Hu, Z. W.; Winarski, R., Going About Submicron Components of Comet Wild 2 and Asteroid Regolith with a Nondestructive 3D Nano-Imaging Approach, Meteoritics and Planetary Science Supplement, id.5349,76th Annual Meeting of the Meteoritical Society, held July 29-August 7, 2013.
8. R. P. Winarski, M. V. Holt, V. Rose, F. DeCarlo, J. M. Maser, Nanotomography at the Argonne Hard X-Ray Nanoprobe Beamline, Powder Diffraction, vol. 24 (2), 166 (2009).
9. D. Shu, J. Maser, M. Holt, R. P. Winarski, C. Preissner, B. Lai, S. Vogt, G.B. Stephenson, Design of a Precision Specimen Exchange Robot-Arm System for a Hard X-ray Nanoprobe Instrument, Proceedings of the American Society for Precision Engineering 22nd Annual Meeting, The American Society for Precision Engineering, 40 295 - 298 (2008).
10. D. Shu, J. Maser, M. Holt, R. P. Winarski, C. Preissner, A. Smolyanitskiy, B. Lai, S. Vogt, and G. B. Stephenson, Optomechanical Design of a Hard X-ray Nanoprobe Instrument with Nanometer-Scale Active Vibration Control, Ninth International Conference on Synchrotron Radiation Instrumentation, AIP 879, 1321-1324 (2007).

Patents:

D. Shu, J. Maser, B. Lai, S. Vogt, M. Holt, C. Preissner, R. P. Winarski, and G. B. Stephenson, *Optomechanical Structure for a Multifunctional Hard X-ray Nanoprobe Instrument*, Patent Number 7331714, February 2008.

