

Paul Fenter

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Professional Experience:

- 2007- present: Senior Physicist, Argonne National Laboratory
- 2002-present: Adjunct Professor, Dept. of Earth and Environmental Sciences, Ullinois Chicago
- 2000-present: Group Leader for Interfacial Processes
- 1997-2007: Physicist, Argonne National Laboratory
- 1993-1997: Research Staff, Princeton Materials Institute, Princeton University
- 1990-1993: Post-Doctoral Fellow, Physics Department, Princeton University and Exxon Corporate Research (Annandale, New Jersey)

Education:

- Ph.D. (Physics) University of Pennsylvania, 1990.
- B.S. (Physics) Rensselaer Polytechnic Institute (Magna cum Laude), 1984.

Research Activities:

- **Molecular scale phenomena at solid-liquid interfaces:** in-situ and real time studies of solid-liquid interfaces including interfacial structure (mineral termination, interfacial hydration, natural organic matter coatings), ion adsorption, and dynamical processes (growth, dissolution).
- **Novel X-ray scattering and X-ray standing wave techniques:** Demonstrated the capability of model-independent imaging of elemental distributions at interfaces using resonant anomalous X-ray scattering and X-ray standing waves enable. First demonstration of imaging sub-nm high interfacial topography using X-ray reflection interface microscopy interfacial X-ray microscopy; developed formalism for understanding XRIM contrast mechanism.
- **Phase sensitive X-ray Scattering:** Development of error-correction algorithms for inverting X-ray reflectivity data.

Awards:

- Outstanding Post-Doctoral Fellow, Exxon Corporate Research Laboratory, 1992 .
- Pacesetter Award, Argonne National Laboratory, 2007 .
- Fellow, American Physical Society, 2007.
- Bertram E. Warren Diffraction Physics Award (American Crystallographic Association), 2012

Selected Activities

- Advanced Photon Source Users Organization (APSUO) Steering Committee, elected 1998 - 2001.
- "Synchrotron Environmental Science-II", Argonne National Laboratory, Argonne, IL (May, 6-8, 2002).
- Reviews in Mineralogy and Geochemistry (RiMG) short course, "Synchrotron Applications in Low Temperature Geochemistry and Environmental Science", Monterey CA (December 4-5, 2002).
- Advanced Photon Source Partner Users Executive Committee: 2005-2007.
- U.S. Department of Energy Basic Needs for Geosciences Workshop, February 22-23, 2007.

- Programmatic and Operations Committee-Hires and Promotion (POC-HP) for Physical Sciences and Engineering/Energy Engineering and Systems Analysis (Member 2008-2011, Chair 2011)
- The 11th International Surface X-ray Neutron Scattering Conference (SXNS-11, Conference Co-chair, and Program committee chair, July 2010).
- The 22nd V. M. Goldschmidt Conference, International Committee and Theme Leader, Montreal Canada (June 24-29, 2012).

Professional Societies:

- American Physical Society
- American Chemical Society
- Geochemical Society.

Selected Publications

[Applications of Synchrotron Radiation in Low-Temperature Geochemistry and Environmental Science](#), Edited by P. Fenter, M. Rivers, N. C. Sturchio and S. Sutton (Reviews in Mineralogy and Geochemistry, Vol. 49), Geochemical Society (2002). (247 citations as of May 2009)

P. Fenter, "[X-ray Reflectivity as a Probe of Mineral-Water Interfaces: A User Guide](#)" in [Applications of Synchrotron Radiation in Low-Temperature Geochemistry and Environmental Science](#), Edited by P. Fenter, M. Rivers, N. C. Sturchio and S. Sutton (Reviews in Mineralogy and Geochemistry, Vol. 49), Geochemical Society 149-220 (2002).

P. Fenter and N. C. Sturchio, "[Mineral-Water Interfacial Structures Revealed by Synchrotron X-ray Scattering](#)" *Progress in Surface Science* **77**, 171-258 (2004).

S. S. Lee, P. Fenter, K. L. Nagy, and N. C. Sturchio, "[Monovalent ion adsorption at the muscovite \(001\) - solution interface](#)", *Langmuir*, 28(23) 8637-8650 (2012).

D. J. Wesolowski, J. O. Sofo, A. V. Bandura, Z. Zhang, E. Mamontov, M. Předota, N. Kumar, J. D. Kubicki, P. R. C. Kent, L. Vlcek, M. L. Machesky, P. A. Fenter, P. T. Cummings, L. M. Anovitz, A. Skelton, J. Rosenqvist, "[The Rutile\(110\)-Water Interface: A comment on 'Structure and Dynamics of Liquid Water on Rutile TiO₂\(110\)' by L.-M. Liu, C. Zhang, G. Thornton and A. Michaelides](#)", *Physical Review B*, **85**, 167401 (1-5) (2012).

M. Schmidt, R. E. Wilson, S. S. Lee, L. Soderholm, and P. Fenter, "[Adsorption of Plutonium-Oxide Nanoparticles](#)", *Langmuir*, **28** 2620-2627 (2012).

H. Zhou, P. Ganesh, V. Presser, M. C. F. Wander, P. Fenter, P. R. C. Kent, D. Jiang, A. Chialvo, J. McDonough, K. L. Shuford, Y. Gogotsi, "[Hydrophobic/Hydrophilic Patchwork on Epitaxial Graphene](#)", *Phys. Rev. B.*, **85**, 035406(1-11) (2012).

T. T. Fister, M. Schmidt, P. Fenter, C. S. Johnson, M. D. Slater, M. K. Y. Chan, E. L. Shirley, "[Electronic structure of lithium battery interphase compounds: comparison between inelastic x-ray scattering measurements and theory](#)", *Journal of Chemical Physics*, **135**, 224513 (1-5) (2011).

S. S. Lee, K. L. Nagy, C. Park, P. Fenter, "[Heavy Metal Sorption at the Muscovite \(001\)-Fulvic Acid Interface](#)", *Environmental Science & Technology* **45**(22), 9574-9581 (2011).

P. Fenter, S. S. Lee, Z. Zhang, N. C. Sturchio, "[In-situ Imaging of Orthoclase-Aqueous Solution Interfaces with X-ray Reflection Interface Microscopy](#)", *Journal of Applied Physics*, **110**, 102211(1-9) (2011).

S. S. Lee, P. Fenter, C. Park, N. C. Sturchio, and K. L. Nagy, "[Hydrated Cation Speciation at the Muscovite \(001\)-Water Interface](#)", *Langmuir Letters*, **26**(22) 16647-16651 (2010).

- P. Fenter, S. S. Lee, C. Park, J. G. Catalano, Z. Zhang, N. C. Sturchio, “[Probing Interfacial Reactions with X-ray Reflectivity and X-ray Reflection Interface Microscopy: Influence of NaCl on the Dissolution of Orthoclase at pH 2](#)”, *Geochimica et Cosmochimica Acta*, **74**, 3396-3411 (2010).
- V. Kohli, M. J. Bedzyk, and P. Fenter, “[Direct-Method for Imaging Elemental Distribution Profiles with Long-Period X-ray Standing Waves](#)”, *Physical Review B*, **81**, 054112(1-14) (2010).
- J. G. Catalano, P. Fenter, C. Park, Z. Zhang, K. M. Rosso, “[Structure and oxidation state of hematite surfaces reacted with aqueous Fe\(II\) at acidic and neutral pH](#)”, *Geochimica et Cosmochimica Acta*, **74** 1498-1512 (2010).
- V. Kohli, Z. Zhang, C. Park, P. Fenter, “[Rb⁺ and Sr²⁺ Adsorption at the TiO₂\(110\)-Electrolyte Interface Observed with Resonant Anomalous X-ray Reflectivity](#)”, *Langmuir*, **26**(2) 950-958 (2010).
- P. Fenter, C. Park, V. Kohli, and Z. Zhang, “[Image Contrast in X-ray Reflection Interface Microscopy: Comparison of Data with Model Calculations and Simulations](#)”, *Journal of Synchrotron Radiation*, **15**, 558-571 (2008).
- J. G. Catalano, C. Park, P. Fenter, and Z. Zhang, “[Simultaneous Inner- and Outer-Sphere Arsenate Adsorption on Corundum and Hematite](#)”, *Geochimica et Cosmochimica Acta*, **72**(8) 1986-2004 (2008).
- C. Park and P. A. Fenter, “[Phasing of Resonant Anomalous X-ray Reflectivity Spectra and Direct Fourier Synthesis of Element-Specific Partial Structures at Buried Interfaces](#)”, *Journal of Applied Crystallography*, **40** 290-301 (2007).
- P. Fenter, C. Park, and Z. Zhang, Y. Wang “[Observation of Subnanometre-high Surface Topography with X-ray Reflection Phase-Contrast Microscopy](#)”, *Nature Physics* **2**(10) 700-704 (2006).
- C. Park, P. A. Fenter, K. L. Nagy and N. C. Sturchio, “[Hydration and Distribution of Ions at the Mica-Water Interface](#)”, *Physical Review Letters*, **97**, 016101(1-4) (2006).
- Z. Zhang, P. Fenter, L. Cheng, N. C. Sturchio, M. J. Bedzyk, M. Předota, A. Bandura, J. Kubicki, S. N. Lvov, P. T. Cummings, A. A. Chialvo, M. K. Ridley, P. Bénézeth, L. Anovitz, D. A. Palmer, M. L. Machesky, D. J. Wesolowski, “[Ion Adsorption at the Oxide-Water Interface: Linking Molecular and Macroscopic Properties](#)”, *Langmuir* **20** 4954-4969 (2004).
- Z. Zhang, P. Fenter, L. Cheng, N. C. Sturchio, M. J. Bedzyk, M. L. Machesky, D. J. Wesolowski, “[Model-Independent Imaging of Adsorbed Cations at the Crystal-Water Interface](#)”, *Surface Science Letters*, **554**(2-3) L95-L100 (2004).
- L. Cheng, P. Fenter, N. C. Sturchio and M. J. Bedzyk, “[Fourier Expansion Solution of Atom Distributions in a Crystal by X-ray Standing Waves](#)”, *Physical Review Letters*, **90** 255503(1-4) (2003).
- P. Fenter, C. Park, L. Cheng, Z. Zhang, M. P. S. Krekeler, and N. C. Sturchio “[Orthoclase Dissolution Kinetics Probed by In Situ X-ray Reflectivity: Effects of Temperature, pH and Crystal Orientation](#)”, *Geochimica et Cosmochimica Acta*, **67**(2) 197-211 (2003).
- H. Henry Teng, Paul Fenter, Likwan Cheng, and Neil C. Sturchio, “[Resolving Orthoclase Dissolution Mechanisms with Atomic Force Microscopy and X-ray Reflectivity](#)”, *Geochimica et Cosmochimica Acta* **65**(20), 3459-3474 (2001).
- P. Fenter, P. Geissbühler, E. DiMasi, G. Srager, L. B. Sorensen, N. C. Sturchio, “[Surface Speciation of Calcite Observed In Situ by High Resolution X-ray Reflectivity](#)”, *Geochimica et Cosmochimica Acta* **64**, 1221-1228 (2000).