

Jay S. Shore

Education

B. S., Science Education, Oregon State University, Corvallis OR, 1986

Ph.D., Physical Chemistry, University of Illinois at Urbana-Champaign, Urbana IL, 1992

Professional Experience

1999 - present South Dakota State University, Associate Professor
1995 - 1999 South Dakota State University, Assistant Professor
1992 - 1995 University of California, Berkeley, Post-Doctoral Research Associate
1989 - 1992 University of Illinois at Urbana-Champaign, Research Associate
1987 - 1989 University of Illinois at Urbana-Champaign, Teaching Assistant

Teaching Activities

Undergraduate Courses: General Chemistry(I and II), Quantitative Analysis, Physical Chemistry

Graduate Courses: Chemical Literature, Nuclear Magnetic Resonance Spectroscopy, Density Matrix Calculations, Advanced Physical Chemistry, Advanced NMR Techniques

Professional Affiliations

American Chemical Society

Publications

S. Prasad, P. Zhao, J. Huang, J. J. Fitzgerald, and J. S. Shore. "Niobium-93 MQMAS NMR Spectroscopic Study of Alkali and Lead Niobates." *Solid State Nuclear Magnetic Resonance* **19**, 45-62 (2001).

J. J. Fitzgerald, S. Prasad, J. Huang, and J. S. Shore. "Solid State ^{93}Nb NMR and ^{93}Nb Nutation Studies of Polycrystalline $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ and $(1-x)\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3/x\text{PbTiO}_3$ Solid-Solution Relaxor Ferroelectrics." *J. Am. Chem. Soc.* **122**, 2556-2566 (2000).

D. J. Sullivan, J. S. Shore, and J. A. Rice. " ^{113}Cd Double-Resonance NMR as a Probe of Clay Mineral Cation Exchange Sites." *American Mineralogist* **85**, 1022-1029 (2000).

P. Zhao, S. Prasad, J. Huang, J. J. Fitzgerald, and J. S. Shore. "Lead-207 NMR Spectroscopic Study of Lead-Based Electronic Materials and Related Lead Oxides." *J. Phys. Chem. B* **103**, 10617-10626 (1999).

S. Prasad, P. Zhao, J. Huang, J. J. Fitzgerald, and J. S. Shore. "Pure-Phase Two-Dimensional Niobium-93 Nutation Spectroscopic Study of Lead Metaniobate and the Piezoelectric Lead Magnesium Niobate." *Solid State Nucl. Magn. Reson.* **14**, 231-235 (1999).

Publications (cont.)

J. J. Fitzgerald, J. Huang, and J. S. Shore. "Solid-State ^{93}Nb MAS NMR Studies of Single Crystal $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3$ (PMN) and $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ (PZN) and Related Lead Titanate Solid-Solution Relaxor Ferroelectrics." *Ferroelectrics* **233**, 187-210 (1999).

D. J. Sullivan, J. S. Shore, and J. A. Rice. "Assessment of Cation Binding to Clay Minerals Using Solid-State NMR." *Clays and Clay Minerals* **46**, 349-354 (1998).

J. S. Shore, S. DePaul, M. Ernst, and B. L. Phillips. "Double-Resonance and Two-Dimensional Silicon-29 NMR Spectroscopy of Minerals." J. J. Fitzgerald ed. *Solid-State Nuclear Magnetic Resonance of Inorganic Materials*. ACS Symposium Series, vol. 717, 305-325. ACS Books (1998).

L. M. Bull, A. K. Cheetham, T. Anupold, A. Reinhold, A. Samoson, J. Sauer, B. Bussemer, Y. Lee, S. Gann, J. Shore, A. Pines, and R. Dupree. "A High-Resolution ^{17}O NMR Study of Siliceous Zeolite Faujasite." *J. Am. Chem. Soc.* **120**, 3510-3511 (1998).

S. DePaul, M. Ernst, J. S. Shore, J. Stebbins and A. Pines. "Cross Polarization From Quadrupolar Nuclei to Silicon Using Low Radio-Frequency Amplitudes During Magic-Angle Spinning." *J. Phys. Chem.* **101**, 3240-3249 (1997).

J. S. Shore, S. H. Wang, R. E. Taylor, A. T. Bell, and A. Pines. "Determination of Quadrupolar and Chemical Shielding Tensor Elements Using Solid State Two-Dimensional NMR Spectroscopy." *J. Chem. Phys.* **105**, 9412-9420 (1996).

J. Kritzenberger, H. C. Gaede, J. Shore, A. Pines and A. Bell. "Xenon-129 NMR Study of TiO_2 (Anatase)-Supported V_2O_5 Catalysts." *J. Phys. Chem.* **98**, 10173-10179 (1994).

M. Janicke, B. F. Chmelka, R. G. Larsen, J. Shore, K. Schmidt-Rohr, L. Emsley, H. Long, and A. Pines. "Two-Dimensional Xenon-129 Exchange NMR Measurements of Xenon Dynamics in Na-A Zeolite." J. Weitkamp, H. G. Karge, H. Pfeifer, and W. Hoelderich eds. *Zeolites and Related Microporous Materials: State of the Art 1994*. Studies in Surface Science and Catalysis, vol. 84. Elsevier Science B. V. (1994).

R. G. Larsen, J. Shore, K. Schmidt-Rohr, L. Emsley, H. Long, and A. Pines. "NMR Study of Xenon Dynamics and Energetics in Na-A Zeolite." *Chem. Phys. Lett.* **214**, 220-226 (1993).

H. W. Long, H. C. Gaede, J. Shore, L. Reven, C. R. Bowers, J. Kritzenberger, T. Pietraß, and A. Pines. "High Field Cross Polarization NMR from Laser Polarized Xenon to a Polymer Surface." *J. Am. Chem. Soc.* **115**, 8491-8492 (1993).

J. Shore, S. Yang, J. Haase, D. Schwartz, and E. Oldfield. "Barium Nuclear Magnetic Resonance Spectroscopic Study of $\text{YBa}_2\text{Cu}_3\text{O}_7$." *Phys. Rev. B.* **46**, 595-598 (1992).

S. Yang, J. Shore and E. Oldfield. "Oxygen-17 Nuclear Magnetic Resonance Spectroscopic Study of the Lanthanide Oxides." *J. Magn. Reson.* **99**, 408-412 (1992).

Publications (cont.)

L. Reven, J. Shore, S. Yang, T. Duncan, D. Schwartz, J. Chung, and E. Oldfield. "Oxygen-17 NMR Spin-Lattice Relaxation and Knight Shift Behavior in Bismuthate, Plumbate, and Cuprate Superconductors." *Phys. Rev. B.* **43**, 10466-10471 (1991).

S. Ganapathy, J. Shore and E. Oldfield. "Variable-Angle Sample-Spinning Nuclear Magnetic Resonance Spectroscopic Studies of Non-Integral Spin Quadrupolar Nuclei in Solids: Analysis of Spinning-Sidebands for the Case $\eta=0$." *Chem. Phys. Lett.* **169**, 301-306 (1990).

E. Oldfield, C. Coretsopoulos, S. Yang, L. Reven, H. C. Lee, J. Shore, O. H. Han, E. Ramli, and D. Hinks. "An Oxygen-17 Nuclear Magnetic Resonance Spectroscopic Study of High- T_c Superconductors." *Phys. Rev. B.* **40** 6832-6849 (1989).

Grant Activity

J. A. Rice and J. S. Shore, "Acquisition of a NMR Console for a Multi-User Solid-State NMR Facility" submitted to NSF June 2010, \$186,700 requested (not funded).

J. A. Rice, F. Halaweish, M. Miller, D. Raynie, J. S. Shore, and R. Utecht, "Graduate Assistantships in Chemistry" submitted to U. S. Department of Education GAANN program Dec. 2009, \$525,060 requested over 3 years (funded 08/10 to 08/13).

J. S. Shore, "The Development, Implementation, Evaluation, and Dissemination of High Quality Visualizations for Chemistry Education" submitted to NSF May 2009, \$196,477 requested over 3 years (not funded).

J. A. Rice, G. Chilom, and J. S. Shore, "Effect of soil organic matter self-assembly on carbon sequestration" submitted to the USDA, May 2009, \$349,934.00 requested over 3 years (funded 09/01/2009 - 08/31/2012).

"The Development of Visualizations to Promote Conceptual, Student-Based and Inquiry-Driven Learning of Chemistry". Submitted to the National Science Foundation's CCLI program (not funded).

"The Development of Visualizations to Promote Conceptual, Student-Based, and Inquiry-Driven Learning of Chemistry". Submitted to the Dreyfus Foundation (not funded).

"The Implementation and Use of Molecular Dynamics Calculations for the Study of Solids of Technological Importance." Submitted to the Research Corporation (not funded).

"The Development and Use of Molecular Dynamics Calculations for the Study of Solids of Technological Importance". Submitted to the Governor's 2010 Individual Research Seed Grant Program (not funded).

Grant Activity (cont.)

J. S. Shore. "The Development and Use of Molecular Dynamics Calculations for the Study of Solids of Technological Importance", submitted March 28, 2005 to the state of South Dakota's Governors 2010 Individual Research Seed Grant. 25% academic release time and one month of summer support was requested (not funded).

M. Miller, D. P. Cartrette, and J. S. Shore. "Enhancing the Evaluation Feedback System to Improve conceptual Understanding in Chemistry", submitted December 2004 to NSF Curriculum, Laboratory and Instructional Division, the Adaptation and Implementation program. \$189,495 requested over 2 years (not funded).

M. Miller and J. S. Shore. "Enhancing the Evaluation Feedback System in Large-Lecture Classes to Improve Conceptual Understanding in Chemistry", submitted December of 2003 to NSF Curriculum, Laboratory and Instructional Division, the Adaptation and Implementation program. \$194,944 requested over 2 years (not funded).

A. Sykes, J. S. Shore, M. S. McDowell. "MRI/RUI South Dakota Infrastructure Improvement: Acquisition of an Area-Detector X-ray Diffractometer", submitted January of 2003 to NSF, Division of Chemistry, Major Research Instrumentation Program. \$285,000 requested (not funded).

J. A. Rice and J. S. Shore. "Chemistry of the Clay-Organic Matter Interface", submitted December 2001 to the NSF-Chemistry Projects Program. \$2,508,095 requested over 5 years (not funded).

J. S. Shore. "NMR Investigation of Mixed-Metal Oxide Perovskite Ferroelectric and Related Materials", submitted September 2000 to the DePSCoR program. \$274,040 over three years (not funded).

J. S. Shore and W. P. Jensen. "U.S. - Korea - Australia Cooperative Science: Solid State NMR, X-ray and Neutron Diffraction Study of Inorganic Nitrates" submitted August of 2000 to the International Division at the National Science Foundation. \$45,318 over 2 years (funded).

J. S. Shore. "Two-Dimensional, Multiple-Quantum NMR Studies of Transition Aluminas." Supported by the Alcoa Foundation. \$10,000 for 1 year (funded).

J. S. Shore. "Structural Investigation of Layered Aluminum Silicate", submitted on July 1996 to the EPSCOR program at the National Science Foundation. \$149,150 over 3 years requested (not funded).

J. A. Rice and J. S. Shore. "Solid-State NMR Investigation of Cation Binding on Organic and Inorganic Colloids", submitted to the Environmental Geochemistry and Biogeochemistry Division of the National Science Foundation. \$364,930 over 3 years requested (not funded).

Grant Activity (cont.)

J. J. Fitzgerald, J. Shore, L. Brown. "Relationship Between Synthesis and Processing of Lead Magnesium Niobate - Based Ceramics and Their Structure and Electrical Properties", submitted on September 27, 1995 to The Materials Division - Electronic & Optical Ceramics Program of the Office of Naval Research through the University Research Initiative Support Program. \$1,680,770 over 5 years requested (funded).

J. A. Rice and J. S. Shore. "Solid-State NMR Investigation of Cation Binding Sites", submitted March 1996 to the United States Environmental Protection Agency's Office of Exploratory Research. \$349,795 over 3 years requested (not funded).

J. S. Shore. "Nuclear Magnetic Resonance Spectroscopy of Quadrupolar Nuclei" submitted to the SDSU Research Support Fund (not funded).

Invited Talks

Midwest Regional Meeting of the American Chemical Society. Oct. 25, 2012. J. S. Shore. "Solid-state ^{93}Nb NMR spectroscopy of ferroelectric and related materials." (talk)

Computational Science and Statistic Ph. D. Program Seminar Series, Brookings, SD, Oct. 5, 2006. "Opportunities for Computational Techniques in Chemistry"

Local American Chemical Society Meeting, Sioux Falls, SD, Sept. 16, 2006. "Visualizing Chemistry. Is a Picture Worth A Thousand Words?"

University of Science and Technology of China, Hefei, China. Chemistry Department Seminar. June 5, 2002. "Solid-State ^{207}Pb NMR Spectroscopic Study of Lead Oxide Compounds."

Yunnan Normal University, Kunming, China. Chemistry Department Seminar. May 23, 2002. "Solid-State ^{207}Pb NMR Spectroscopic Study of Lead Oxide compounds."

National University of Singapore, Singapore. Chemistry Department Seminar. August 10, 2001. "Solid-State ^{207}Pb NMR Spectroscopic Study of Lead Oxide compounds."

New Mexico Regional Nuclear Magnetic Resonance (NMR²) Conference. April 29, 2000. "One- and Two-Dimensional Solid-State ^{93}Nb NMR Spectroscopy."

University of Iowa, Iowa City Iowa. Physical Chemistry Seminar. November 14, 1996. "New Dimensions in NMR."

American Chemical Society, 212th National Meeting, Orlando Florida, August 25-29, 1996. "Double Resonance and Silicon-29 Two-Dimensional NMR of Minerals."

University of South Dakota. Vermilion South Dakota, Chemistry Department Seminar. October 2, 1995. "New Dimensions in NMR."

Invited Talks (cont.)

University of Minnesota, Minneapolis Minnesota, Analytical Chemistry Seminar. September 22, 1995. "Multi-Dimensional NMR Techniques involving Quadrupolar Nuclei."

37th Rocky Mountain Conference on Analytical Chemistry. July 24 - 27, 1995. "Multi-Dimensional NMR Techniques Involving Quadrupolar Nuclei."

Presentations

Biennial Conference on Chemical Education. August 3-7, 2014. J. S. Shore. "Using high-quality calculations to help students visualize chemical principles." (talk).

Biennial Conference on Chemical Education. August 3-7, 2014. J. S. Shore. "A software package to create and evaluate assessment instruments for general chemistry." (talk).

247th National American Chemical Society Meeting. Dallas Texas. March 16-20, 2014. G. Chilom, J. S. Shore, M. M. Khalaf, and J. A. Rice. "Formation of humic-lipid composites in natural organic matter." (poster)

Midwest Regional Meeting of the American Chemical Society. October 26, 2012. J. S. Shore. "An integrated system for the creation and evaluation of assessment instruments and for the tracking of student content knowledge in large lecture general chemistry courses." (talk)

Midwest Regional Meeting of the American Chemical Society. October 26, 2012. J. S. Shore. "Visualizing chemical principles using high-quality calculations." (talk)

Midwest Regional Meeting of the American Chemical Society. October 24, 2002. S. Cady and J. S. Shore. "Variable-Temperature ²⁰⁷Pb NMR Spectroscopy of Inorganic Solids." (poster)

On-line CONFCEM conference organized by the ACS Division of Chemical Education's Committee on Computers in Chemical Education. Mar. 25 - April 29, 2002. A. L. Stallman, T. Hindbjorgen, T. J. Offerdahl, W. P. Jensen, and J. S. Shore. "The Study of Motion of Polyatomic Ions in Ionic Solids." (virtual poster)

36th Midwest Regional Meeting of the American Chemical Society. October 10-13, 2001. J. S. Shore. "Two-Dimensional Nutation NMR Spectroscopy of Quadrupolar Nuclei." (talk)

36th Midwest Regional Meeting of the American Chemical Society. October 10-13, 2001. T. J. Offerdahl and J. S. Shore. "MQMAS, CP-MQMAS and MQMAS-HETCOR Measurements on Aluminum Containing Materials." (talk)

Presentations (cont.)

36th Midwest Regional Meeting of the American Chemical Society. October 10-13, 2001. J. Qi, D. Matthees, and J. S. Shore. "Studies of Metal Alkoxides Using Size Exclusion Chromatography." (talk)

36th Midwest Regional Meeting of the American Chemical Society. October 10-13, 2001. A. L. Stallman, T. J. Offerdahl, W. P. Jensen, and J. S. Shore. "Crystal Packing Effects and Motion of Polyatomic Ions in Ionic Lead Materials." (poster)

218th National American Chemical Society Meeting. New Orleans, Louisiana. August 22-26, 1999. S. Prasad and J. S. Shore. "¹H-²⁹Si Heteronuclear Correlation Spectroscopy of Zeolites." (talk)

41st Rocky Mountain Conference on Analytical Chemistry. August 1-5, 1999. J. S. Shore, S. Prasad, P. Zhao, J. Huang, and J. J. Fitzgerald. "One- and Two-Dimensional Solid State ⁹³Nb NMR Spectroscopy of Inorganic Niobates." (talk)

41st Rocky Mountain Conference on Analytical Chemistry. August 1-5, 1999. J. Huang, S. Prasad, J. S. Shore, J. J. Fitzgerald, H. Lock, and G. E. Maciel. "Solid-State ²⁵Mg and ⁹³Nb NMR Studies of the Formation of Lead Magnesium Niobate Pb(Mg_{1/3}Nb_{2/3})O₃." (poster)

ONR Acoustic Transduction Materials and Devices Workshop, Pennsylvania State University, April 13 - 15, 1999. J. S. Shore, J. J. Fitzgerald, S. Prasad, P. Zhao, and J. Huang. "Two-Dimensional Niobium-93 MQMAS and Nutation Spectroscopic Study of PMN, PMN/PT and Related Materials." (poster)

ONR Acoustic Transduction Materials and Devices Workshop, Pennsylvania State University, April 13 - 15, 1999. L. F. Brown, J. Huang, J. J. Fitzgerald, J. S. Shore, B. J. Schuldt, and N. R. Burghardt. "Electrical Properties and Chemical Characterization of PMN and 0.90PMN-0.1PT Materials." (poster)

ONR Acoustic Transduction Materials and Devices Workshop, Pennsylvania State University, April 13 - 15, 1999. J. J. Fitzgerald, J. S. Shore, P. Zhao, J. Huang, S. Prasad, and L. F. Brown. "Solid-State ²⁵Mg and ⁹³Nb NMR Studies of the Short-Range B-Site Chemical Environments and Ordering in PMN and Related Ferroelectrics." (talk)

40th Rocky Mountain Conference on Analytical Chemistry. July 27-30, 1998. P. Zhao, S. Prasad, J. Huang, J. J. Fitzgerald, and J. S. Shore. "One- and Two- Dimensional Solid-State Niobium-93 NMR Spectroscopy." (Poster)

1998 ONR Transducer Materials and Transducers Workshop, Pennsylvania State University, May 12 - 14, 1998. J. S. Shore, J. J. Fitzgerald, S. Prasad, P. Zhao, and J. Huang. "Niobium-93 and Lead-207 NMR Study of Piezoelectric and Related Materials." (poster)

Presentations (cont.)

39th Rocky Mountain Conference on Analytical Chemistry. August 3-7, 1997. P. Zhao, S. Prasad, M. Benjamin, J. Huang, J. J. Fitzgerald, and J. S. Shore. "Lead-207 NMR Spectroscopic Study of Piezoelectric Lead Magnesium Niobate and Related Materials." (Poster)

39th Rocky Mountain Conference on Analytical Chemistry. August 3-7, 1997. S. Prasad, P. Zhao, J. Huang, J. J. Fitzgerald, and J. S. Shore. "Niobium-93 Nutation Spectroscopic Study of Piezoelectric Lead Magnesium Niobate and Related Materials." (Poster)

1997 ONR Transducer Materials and Transducers Workshop, Pennsylvania State University, April 29 - May 1, 1997. J. J. Fitzgerald, J. Shore, P. Zhao, J. Huang, S. Prasad, M. Benjamim, T. Offendahl, and L. Brown. "Synthesis, Characterization and Electrical Properties of Lead Magnesium Niobate-Related Materials." (talk)

1997 ONR Transducer Materials and Transducers Workshop, Pennsylvania State University, April 29 - May 1, 1997. L. Brown, J. J. Fitzgerald, J. Shore, M. L. Klinkenborg, and A. S. M. G. Mostafa. "Investigation of the Dielectric and Piezoelectric Properties of PMN and PMN-PT." (poster)

American Chemical Society, 31st Regional Meeting, Sioux Falls, South Dakota. November 6-8, 1996. D. J. Sullivan, J. S. Shore, and J. A. Rice. "Multiple-Resonance Solid State NMR Investigation of Cation Exchange Sites in Clay Minerals." (talk)

American Chemical Society, 31st Regional Meeting, Sioux Falls, South Dakota. November 6-8, 1996. J. S. Shore, "Double Resonance and Multi-Dimensional NMR of Solids." (talk)

American Chemical Society, 31st Regional Meeting, Sioux Falls, South Dakota. November 6-8, 1996. B. J. Vollmer and J. S. Shore, "Simulations of Multi-Dimensional Solid State NMR Spectra Using a Macintosh." (poster)

American Chemical Society, 212th National Meeting, Orlando Florida, August 25-29, 1996. D. J. Sullivan, J. S. Shore, and J. A. Rice. "Multiple-Resonance Solid State NMR Investigation of Cation Exchange Sites in Clay Minerals." (poster)

38th Rocky Mountain Conference on Analytical Chemistry. July 21-26, 1996
S. M. DePaul, M. Ernst, L. M. Bull, S. Wang, J. Shore, J. F. Stebbins, and A. Pines.
"Cross Polarization from Quadrupolar Nuclei Under MAS." (Poster).

37th Rocky Mountain Conference on Analytical Chemistry. July 24 - 27, 1995
R. Dupree, J. S. Shore, Y. K. Lee, L. M. Bull, S. L. Gann, A. K. Cheetham, and A. Pines.
"¹⁷O NMR Studies of Zeolites" (Poster).