

# SHUO QIAN

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## EDUCATION

- **Rice University** Houston, TX U.S.A.  
*Ph.D. in Physics* 2009
- **University of Science and Technology of China** Hefei, Anhui, China  
*B.S. in Applied Physics* 2004

## POSITIONS

- **2012 - Present:** *The Bio-SANS Instrument Scientist*, Center for Structural Molecular Biology, Biology and Soft Matter Division, Oak Ridge National Laboratory
- **2009 - 2011 :** *Postdoctoral Research Fellow*, Chemical Sciences Division and Neutron Scattering Sciences Division, Oak Ridge National Laboratory

## HONORS and AWARDS

2017 ORNL Significant Event Award (In-vivo Biomembrane Research Project)  
2016 ORNL Significant Event Award (Bio-SANS Wide-Angle Detector Upgrade Project)  
2014 ORNL Performance Award  
2009 Biophysical Society Student Travel Awards  
2008 Rice University Graduate Student Travel Award  
2007 Rice University Graduate Student Travel Award  
2004 Rice University Fellowship  
2003 Outstanding Student Scholarship of USTC  
2001 Outstanding Student Leader of USTC  
1999 Outstanding Freshman Scholarship of USTC

## EXPERIENCE

- **Oak Ridge National Laboratory** Oak Ridge, TN  
*Neutron Sciences Directorate* 2009-present
  - Exploiting neutron for energy, environment and biology; developing instrumentation for neutron scattering;
  - Studying structure and interaction of macromolecules such as protein, biomembrane;
  - Techniques: Small-angle X-ray/neutron scattering/diffraction, Oriented Circular Dichroism, Computer Simulation and Modeling;
  - Grant: ORNL LDRD (FY2015-2017) PI for the development of Small-Wide Angle Neutron Scattering (SWANS) instrument concept
  - Grant: ORNL LDRD (FY2012-2015) PI for the development of Grazing Incidence Small Angle Neutron Scattering (GISANS) on Bio-SANS
  - Grant: ORNL LDRD (FY2012-2014) Co-PI for the development of nondestructive evaluation of hydrided Zr cladding by in-situ neutron scattering and tomography
- **Laboratory of Membrane Biophysics, Rice University** Houston, TX U.S.A.  
*Advisor: Huey W. Huang* 2004 - 2009
  - Studied the structure and mechanism of pore-forming peptides in lipid membrane; membrane fusion kinetics and structures;

- Studied transport property of solid state materials under extreme conditions;

## PROFESSIONAL SERVICE

- Book editor: “Biological Small Angle Scattering: Techniques, Strategies and Tips”, B Chaudhuri, IG Muoz, S Qian, VS Urban (Spring 2017)
- Proposal Peer Review: NIST Center for Neutron Research
- Journal Peer Review: *Biophysical Journal*, *PLOS ONE*, *Scientific Reports*, *BBA - Biomembranes*
- Mentor for intern undergraduate students (Oak Ridge Institute for Science and Education): Thomas Bowling (GaTech 2013), Holly Ray (Univ. of Tennessee 2013), Jordan Favret (Louisiana State Univ. 2014), Evan Glass (University of Florida 2015, 2016)
- Session co-chair, Annual Meeting of Biophysical Society, Long Beach, CA 2008
- National School on Neutron and X-ray Scattering, ORNL, Oak Ridge, TN 2010, 2011, 2012, 2013, 2014
- Graduate Course on Neutron Scattering Applications in Structural Biology, ORNL, Oak Ridge, TN 2010 and 2011
- Organizing session chair: “Membrane Protein Scattering”, American Crystallographic Association annual meeting, Honolulu, HI 2013
- Session Chair, American Conference on Neutron Scattering (ACNS), Knoxville, TN 2014
- Chair for Small Angle Scattering Special Interest Group (2015), American Crystallographic Association
- Organizing session chair: “SAS with Membranes and Membrane Proteins”, American Crystallographic Association annual meeting, Philadelphia, PA 2015
- Organizing session chair: “Hybrid Method Approaches for Structural Biology”, American Crystallographic Association annual meeting, Denver, CO 2016
- Workshop Co-organizer: “Small Angle Neutron Scattering Workshop”, 5th International Symposium on Diffraction Structural Biology, Knoxville, TN 2016

## MEMBERSHIPS

Biophysical Society  
American Crystallographic Association  
American Physical Society  
Neutron Scattering Society of America (NSSA)

## PUBLICATIONS

- Kang T., **Qian S.**, Smith G.S., Do C., Heller W.T., “Small-angle neutron scattering study of a dense microemulsion system formed with an ionic liquid”, *Soft Matter*, 13, 39, 7154-7160 (2017)
- Liu J., Olds D., Peng R., Yu L., Foo G.S., **Qian S.**, Keum J.K., Guiton B.S., Wu Z., Page K., “Quantitative analysis of the morphology of 101 and 001 faceted anatase TiO<sub>2</sub> nanocrystals and its implication on photocatalytic activity” *Chemistry of Materials*, 29(13), 5591-5604 (2017)
- Nickels J.D., Chatterjee S., Stanley C.B., **Qian S.**, Cheng X., Myles D.A., Standaert R.F., Elkins J.G., Katsaras J., “The In Vivo Structure of Biological Membranes and Evidence for Lipid Domains”, *PLoS Biology*, 15(5), e2002214 (2017).

- Rai D.K., **Qian S.**, “Interaction of the Antimicrobial Peptide Aurein 1.2 and Charged Lipid Bilayer”, *Scientific Reports*, 7, 3719 (2017).
- Rai D.K., **Qian S.**, Heller W.T., “The Interaction of Melittin with Dimyristoyl Phosphatidylcholine-Dimyristoyl Phosphatidylserine Lipid Bilayer Membranes”, *Biochimica et Biophysica Acta-Biomembranes*, 1858, 11, 2788-2794 (2016).
- Rai D.K., Sharma V.K., Anunciado D., O'Neill H.M., Mamontov E., Urban V.S., Heller W.T., **Qian S.**, “Neutron Scattering Studies of the Interplay of Amyloid  $\beta$  Peptide(1 - 40) and An Anionic Lipid 1,2-dimyristoyl-sn-glycero-3-phosphoglycerol”, *Scientific Reports*, 6, 30983 (2016).
- Sharma V.K., Mamontov E., Tyagi M., **Qian S.**, Rai D.K., Urban V.S., “Dynamical and Phase Behavior of a Phospholipid Membrane Altered by an Antimicrobial Peptide at Low Concentration”, *Journal of Physical Chemistry Letters*, 7, 2394-2401 (2016)
- **Qian S.**, Pingali S.V., Weiss K., Urban V.S., O'Neill H.M., Langan P., “Neutron Scattering for Biological Research: Progress at the Bio-SANS Beam Line”, *Tech Connect World 2016*
- Plaza N.Z., Pingali S.V., **Qian S.**, Heller W.T., Jakes J.E., “Informing the improvement of forest products durability using small angle neutron scattering”, *Cellulose*, 23, 3, 1593-1607 (2016)
- Anunciado D., Rai D., **Qian S.**, Urban V., O'Neill H., “Small-angle neutron scattering reveals the assembly of alpha-synuclein in lipid membranes”, *Biochimica et Biophysica Acta* (2015) 1854, 12, 18811889
- **Qian S.**, “Probing Peptide-Membrane Interaction by Neutron Scattering”, *Proceedings of the 24th American Peptide Symposium*, (2015) dx.doi.org/10.17952/24APS.2015.225.
- **Qian S.**, Heller W. T., “Melittin-induced cholesterol reorganization in lipid bilayer membranes”, *Biochimica et Biophysica Acta - Biomembranes*, 1848 (2015) 2253-2260.
- Y. Yan, **S. Qian**, K. Littrell, C.M. Parish, L.K. Plummer, “Fast, quantitative, and nondestructive evaluation of hydrided LWR fuel cladding by small angle incoherent neutron scattering of hydrogen”, *Journal of Nuclear Materials*, 460 (2015) 114-121
- L. He, C. Do, **S. Qian**, G. D. Wignall, W. T. Heller, K. C. Littrell, G. S. Smith, “Corrections for the geometric distortion of the tube detectors on SANS instruments at ORNL”, *Nucl. Inst. Meth. in Phys. Res. A* (2015) 775, pp 63-70
- **S. Qian**, D. K. Rai, W. T. Heller, “Alamethicin Disrupts the Cholesterol Distribution in Dimyristoyl Phosphatidylcholine-Cholesterol Lipid Bilayers”, *J. Phy. Chem. B* (2014) 118 (38), pp 1120011208
- Heller, W. T., Urban, V. S., Lynn, G. W., Myles, D. A., Pingali, S. V., **Qian, S.**, Littrell, K. C., Melnichenko, Y. B., Wignall, G. D., Buchanan, M. V., Selby, D. L. and Butler, P. D., “The Bio-SANS Small-Angle Neutron Scattering Instrument at the High Flux Isotope Reactor at Oak Ridge National Laboratory”, *J. Appl. Crystallogr.* (2014) 47 (4)
- A. Sverzhinsky, **S. Qian**, L. Yang, M. Allaire, I. Moraes, D. Ma, J. W. Chung, M. Zoonens, J.-L. Popot, J. W. Coulton, “Amphipol-trapped ExbBExbD Membrane Protein Complex from Escherichia coli: a Structural and Biochemical Case Study”, *J. Membrane Biol.* (2014) 247
- R. Le, B. Harris, I. J. Iwuchukwua, B. Bruceb, X. Cheng, **S. Qian**, W. Heller, H. M. O'Neill, P Frymier, “Analysis of the Solution Structure of Thermosynechococcus elongatus Photosystem I in n-dodecyl-beta-D-maltoside Using Small-Angle Neutron Scattering and Molecular Dynamics Simulation”, *Archives of Biochemistry and Biophysics* (2014) Volume 550-551, 50-57
- F. Giusti, J. Rieger, L. J. Catoire, **S. Qian**, A. N. Calabrese, T. G. Watkinson, M. Casiraghi, S. E. Radford, A. E. Ashcroft, J.-L. Popot “Synthesis, Characterization and Applications of a Perdeuterated Amphipol”, *J. Membrane Biol.* (2014) 247 (4)
- Y. Yan, **S. Qian**, K. Littrell, C. M. Parish, G. L. Bell and L. K. Plummer, “Nondestructive Evaluation on Hydrided LWR Fuel Cladding by Small Angle Incoherent Neutron Scattering of Hydrogen”, *MRS Proceedings* (2014) Volume 1653

- **S. Qian**, R. Dean , V. Urban, B. Chaudhuri “Internal organization of the mycobacterial partition assembly: does the DNA wrap a protein core?”, *PLOS ONE* (2012) 7(12): e52690
- **S. Qian**, H.W. Huang, “A Novel Phase of Compressed Bilayers That Models the Pre-Stalk Transition State of Membrane Fusion”, *Biophys. J.* (2012) 102, 48-55
- **S. Qian**, W. T. Heller, “Peptide-Induced Asymmetric Distribution of Charged Lipids in a Vesicle Bilayer Revealed by Small-Angle Neutron Scattering”, *J. Phy. Chem. B* (2011) 115, 9831-9837
- C. Lee, Y. Sun, **S. Qian**, H.W. Huang, “Transmembrane Pores Formed by Human Antimicrobial Peptide LL-37”, *Biophys. J.* (2011) 100, 1688-1696
- **S. Qian**, W. Wang, L. Yang, H.W. Huang, “Structure of transmembrane pore induced by Bax derived peptide: Evidence for lipidic pores”, *Proc. Nat. Acad. Sci. U.S.A* (2008) 105, 17379-17383
- **S. Qian**, W. Wang, L. Yang, H.W. Huang, “Structure of the Alamethicin Pore Reconstructed by X-Ray Diffraction Analysis”, *Biophys. J.* (2008) 94, 3512-3522
- K.Q. Ruan, Y. Yu, S.L. Huang, H.L. Li, **S. Qian**, L.Z. Cao, “Physical properties in layered transition-metal oxide crystals and anisotropic transport measurement” *Proceedings of the Twentieth International Cryogenic Engineering Conference, ICEC 20* (2005) 545-548
- Y. Yu, K. Q. Ruan, S. L. Huang, **S. Qian**, Y. Chai, H. Yang, L. Z. Cao, “Transport Property Of  $Nd_{2-x}Sr_xNiO_4$  Poly Crystals”, *Chinese Journal of Low Temperature Physics* (2004) 24, 204
- H. L. Li, K. Q. Ruan, Q. Wang, Y. Chen, **S. Qian**, Y. Yu, S. L. Huang, Z. Zheng, C. Y. Wang, L. Z. Cao, “Out-of-plane Transport in  $Bi_{2-x}Pb_xSr_2Co_2O_y$  Single Crystals”, *Physica Status Solidi (B)* (2003) 240, 596

## INVITED TALKS

- “Application of SANS for Biomolecules Complex”, ORNL SANS and Neutron Spin Echo Workshop, Oak Ridge, TN 2014
- “Bio-SANS, A Neutron Toolbox for Biomacromolecules Study”, American Crystallographic Association annual meeting, Albuquerque, NM 2014
- “Recent Developments at the Bio-SANS”, ORNL Neutron and Nano User meeting, Oak Ridge, TN 2013
- “Bio-SANS Effort on Membrane Protein Scattering”, American Crystallographic Association annual meeting, Honolulu, HI 2013
- “SANS Studies of Membrane-Active Peptides with Membrane, and Beyond”, Biology and Soft Matter Division Seminar, ORNL, Oak Ridge, TN 2013
- “Large Scale Structures in Biology”, Integrative Graduate Education and Research Traineeship (IGERT) Courses, Oak Ridge, TN 2013
- “Neutrons in Biology”, Oak Ridge Institute for Continued Learning, Oak Ridge, TN October 2012
- “Introduction to SAS Analysis”, Workshop for Analyzing SANS Data, ORNL, Oak Ridge, TN 2011

## SELECTED CONTRIBUTED PRESENTATIONS

- “Neutron Scattering for Membrane Protein”, Gordon Research Conference on Membrane Protein Folding, Stonehill College, Easton, MA 2017
- **Oral Presentation** “Interplay of Amyloid  $\beta$  Peptide(1-40) and An Anionic Lipid Dimyristoyl-glycero-phosphoglycerol.”, American Crystallographic Association annual meeting, Denver, CO 2016

- **Oral Presentation** “Water Distribution in Membrane Fusion Intermediates Revealed by Neutron Membrane Diffraction”, American Crystallographic Association annual meeting, Philadelphia, PA 2015
- **Oral Presentation** “Redistribution of Cholesterol by Membrane Active Peptides Alamethicin and Melittin”, American Physical Society March Meeting, San Antonio, TX 2015
- “Application of Small Angle Neutron Scattering on the Structure and Function of Biological Complex” (poster), Molecular Biophysics Symposium at Virginia Tech, Blacksburg, VT 2014
- “Probing the induced folding of Alpha-synuclein in lipid membranes by small angle neutron scattering” (co-author, poster), Annual Meeting of Biophysical Society, San Francisco, CA 2014
- “Nondestructive Evaluation of Hydrided LWR Fuel Cladding by Small Angle Neutron Incoherent Scattering of Hydrogen” (co-author, talk), Material Research Society Fall meeting, Boston, MA 2013
- “Small Angle Neutron Scattering Study of Moisture-Induced Structural Changes in *Pinus Taeda*” (co-author, talk), Material Research Society Fall meeting, Boston, MA 2013
- “Recent Development from the Center for Structural Molecular Biology at Oak Ridge National Laboratory”, Atlanta Region Biophysics Symposium (Emory University), Atlanta, GA 2013
- “Recent Science and Technical Development from the Center for Structural Molecular Biology at Oak Ridge National Laboratory”, Bluegrass Molecular Biophysics Symposium (University of Kentucky), Lexington, KY 2013
- “Small-Angle Neutron Scattering for Membrane Protein”, Frontiers in Structural Biology of Membrane Proteins Symposium (University of Alabama at Birmingham), Birmingham, AL 2013
- “Redistribution of Cholesterol in Model Lipid Membranes in Response to the Membrane-Active Peptide Alamethicin” (co-author), American Physical Society March Meeting, Baltimore, MD 2013
- “Low Noise, High Throughput Small-Angle Neutron Scattering of Protein in Solution”, presenting author) Annual Meeting of Biophysical Society, Philadelphia, PA 2013
- **Symposium Talk** “Biomolecule Studies By Small Angle Neutron Scattering”, Symposium on Biomolecular Structure, Dynamics and Function, St. Jude Children’s Research Hospital, Memphis, TN April 2012
- “Peptide-induced Asymmetric Distribution of Charged Lipids in a Vesicle Bilayer Revealed by Small-Angle Neutron Scattering”, co-author) American Physical Society March Meeting, Boston, MA 2012
- “A Tale of Two Dimers: GFP Proteins Under Macromolecular Crowding Studied by Small Angle Neutron Scattering”, (presenting author) Annual Meeting of Biophysical Society, San Diego, CA 2012
- **Seminar Talk** “Small-angle Neutron Scattering Study of Lipid Bilayer and Protein”, Brookhaven National Laboratory, Upton, NY 2011
- “Biophysical analysis of conformational changes in Adeno-Associated Viruses under endosomal pH conditions”, (co-author) Annual Meeting of the American Crystallographic Association, New Orleans, LA 2011
- “Recent Bio-Science from the Center for Structural Molecular Biology at Oak Ridge”, (co-author) Annual Meeting of the American Crystallographic Association, New Orleans, LA 2011
- “SANS Investigation of the Response of DMPC-DMPG Lipid Bilayers to Membrane-active peptide”, (presenting author) Annual Meeting of Biophysical Society, Baltimore, MD 2011
- “The Center for Structural Molecular Biology at Oak Ridge National Laboratory”, (co-author) American Conference on Neutron Scattering, Ottawa, ON 2010
- **Platform Talk:** “Point Contact between Membranes Precursory to Fusion”, (presenting author) Annual Meeting of Biophysical Society, San Francisco, CA 2010
- “Evidence for Lipidic Pores”, (presenting author) Annual Meeting of Biophysical Society, Boston, MA 2009
- **Platform Talk:** “Electron Density Image of Alamethicin Pore: Constructed by X-Ray Anomalous Diffraction”, (presenting author) Annual Meeting of Biophysical Society, Long Beach, CA 2008

- “Discovery of a New Tetragonal Phase of Phospholipids Between the Lamellar Phase and the Rhombohedral (Stalk) Phase”, (presenting author) Annual Meeting of Biophysical Society, Baltimore, MD 2007
- “Fusogenic Lipid Compositions: The Relation between PEG-mediated Fusion and the Lamellar-Rhombohedral Phase Transition of Lipids”, Annual Meeting of Biophysical Society Meeting, (presenting author) Salt Lake City, 2006