

# YANG ZHANG

111A Talbot Laboratory, MC-234  
104 South Wright Street  
Urbana, IL 61801

<http://zhang.npre.illinois.edu> • [zhyang@illinois.edu](mailto:zhyang@illinois.edu) • 518.2888.518

## APPOINTMENTS

2012 – *present* **Assistant Professor**, Department of Nuclear, Plasma, and Radiological Engineering, Department of Materials Science and Engineering, Program of Computational Science and Engineering, Center for Biophysics and Quantitative Biology, University of Illinois at Urbana-Champaign (UIUC)

**Core Faculty Member and Group Leader**, Computational Molecular Science Group, Beckman Institute for Advanced Science and Technology

2010 – 2012 **Clifford G. Shull Fellow**, Neutron Sciences Directorate, Oak Ridge National Laboratory (ORNL)

## EDUCATION

**Ph.D.** Nuclear Science and Engineering, **Massachusetts Institute of Technology** (MIT), 2010  
Thesis: “*Neutron Scattering Investigations on the Unusual Phase Behavior of Water*”

**B.S.** Electrical Science and Technology, **University of Science and Technology of China** (USTC), 2004

## RESEARCH INTERESTS

My research focuses on the study of **extreme/non-equilibrium properties of matter** using synergistically integrated *theory-driven atomistic simulations* and *neutron and X-ray experiments*, which can be roughly divided into two areas:

- **Extreme/non-equilibrium properties of liquids** (water, metallic/molecular/ionic liquids, colloids, granular materials)
- **Glassy, jammed, and kinetically trapped soft matter** (heterogeneity, hierarchy, metastability, self-organization, functionality, programmability, controllability)

The goal is to understand **long timescale phenomena and rare events** in matter and engineer them into transformative applications.

## PUBLICATIONS

**More than 30 publications (citations > 1100, h-index = 17)** in book sections and high-impact journals such as *Phys. Rev. Lett.*, *J. Am. Chem. Soc.*, *Angew. Chem.*, *P. Natl. Acad. Sci. USA*, and *Nat. Commun.* A full list of publications is appended.

## AWARDS & HONORS

2017.04 **Landis Young Member Engineering Achievement Award**, American Nuclear Society, “*in recognition of his contributions to nuclear and advanced experimental techniques to understand the complex makeup, nature and performance of materials in the far-from-equilibrium state*”

2015.05 **Doctoral New Investigator Award**, American Chemical Society Petroleum Research Fund

2013.05 Collins Fellow, College of Engineering Academy for Excellence in Engineering Education, UIUC

2013 – 2015 List of Teachers Ranked as Excellent (Fall 2013, Fall 2014, Spring 2015, Spring 2017)

2010.09 **Clifford G. Shull Fellowship**, ORNL

2010.03 Student Research Showcase, Nuclear Science and Engineering Research Expo, MIT

2009.10 Best Poster Award, the 15th User’s Meeting of National Synchrotron Radiation Research Center, Taiwan, “*Water in the Confined Space: Study of Density Anomalies of Supercooled Water*”

- 2008.05 **Manson Benedict Award**, “in recognition of the outstanding excellence of your academic and research performance” and “for excellence in neutron scattering research, particularly the study of critical behavior of supercooled water”, MIT
- 2008.05 **Neutron Scattering Society of America Prize** “for cyber development of enhancing the North American neutron community”
- 2004.07 Distinguished Graduate of Anhui Province, Distinguished Graduate of USTC
- 2003.05 Elected representative of USTC for the Associations of East Asian Research Universities
- 2000.11 Best Paper Award on Modern Chinese Society Research
- 1999 – 2003 Recipient of five scholarships, including **Guo Moruo Scholarship** (2003), **Samsung Scholarship** (2003), Outstanding Student Scholarship (2001), **Lenovo Scholarship** (2000), Outstanding Freshman Scholarship (1999)
- 2002 – 2004 Recipient of nine prizes in international contests in *Mathematical Modeling*, including Interdisciplinary Contest in Modeling (ICM 2003, 2004), Mathematical Contest in Modeling (MCM 2002), INRIA and LIAMA Contests in Scientific Computing Software Scilab (2003)

### EDITORSHIPS

- Associate Editor, *Science and Technology of Advanced Materials*, 2016 – present
- Associate Editor, *Frontiers in Materials*, Glass Science section, owned by Springer Nature, 2015 – present
- Associate Editor, *Frontiers in Physics*, and *Frontiers in Chemistry*, Physical Chemistry and Chemical Physics section, owned by Springer Nature, 2015 – present
- Guest Editor, *MRS Advances*, Theory, Characterization, and Modeling section, Fall 2015

### INVITED TALKS

**More than 40 invited talks** at national and international conferences, meetings, workshops, and departmental seminars at peer universities.

1. Beckman Institute Director’s Seminar, UIUC, “*Hiking on the Energy Landscape – All-Atom Computational Understanding of the Universality of Long Timescale Phenomena and Rare Events in Non-Equilibrium Matter: Metal, Water, and Protein*”, 2017.11
2. The 8th International Discussion Meeting on Relaxations in Complex Systems (8IDMRCS), Wilsa, Poland, “*Ioffe-Regel Localization of Acoustic Excitations in Liquids*”, 2017.07
3. Theoretical and Computational Biophysics Seminar, Beckman Institute, UIUC, “*All-atom Simulations of the Hierarchical Dynamics of Proteins on the Timescale of Seconds and the Experimental Verifications*”, 2017.04
4. Department of Materials Science and Engineering Colloquium, University of Florida, “*Hiking on the Energy Landscape and Counting – Experimental Quantification of the Energy Landscape of Non-Equilibrium Matter: Metals, Water, and Proteins*”, 2017.04
5. TMS Annual Meeting, San Diego, CA, “*Quasi-Elastic Neutron Scattering and Machine Learning Studies of the Arrhenius Crossover Phenomenon and Its Correlation with the Kinetic Fragility in Glass-Forming Metallic Liquids*”, 2017.02
6. WPI-AIMR Workshop on Structure and Dynamics of Glasses, Tohoku University, Japan, “*Ioffe-Regel localization of the longitudinal acoustic excitations and the Arrhenius crossover regime in metallic liquids*”, 2017.02
7. Department of Chemistry, Physical Chemistry Seminar, UIUC, “*Hiking on the Energy Landscape and Counting – Experimental Quantification of the Energy Landscape of Non-Equilibrium Matter: Metals, Water, and Proteins*”, 2016.11
8. Department of Materials Science and Engineering Colloquium, University of California Berkeley, “*Hiking on the Energy Landscape and Counting – Experimental Quantification of the Energy Landscape of Non-Equilibrium Matter: Metals, Water, and Proteins*”, 2016.10
9. Neutron Electrostatic Levitator (NESL) User Workshop, ORNL, “*Correlation between Fragility and Arrhenius Crossover Phenomenon in Metallic, Molecular, and Network Liquids*”, 2016.08
10. American Conference on Neutron Scattering, Long Beach, CA, “*Energy Landscape Statistics and Coarsening in Liquids and Soft Matter – A Relaxation-Excitation Mode Analysis (REMA)*”, 2016.07

11. The 11th International Conference on Bulk Metallic Glasses (BMG XI), Washington University in St. Louis, *"Quasi-Elastic Neutron Scattering and Machine Learning Studies of the Arrhenius Crossover Phenomenon and Its Correlation with the Kinetic Fragility in Glass-Forming Metallic Liquids"*, 2016.06
12. Institute of Physics, Chinese Academy of Sciences, Beijing, China, *"Quasi-Elastic Neutron Scattering and Machine Learning Studies of the Arrhenius Crossover Phenomenon and Its Correlation with the Kinetic Fragility in Glass-Forming Metallic Liquids"*, 2016.05
13. 40 Years of Neutron Scattering Symposium, NIST, *"Density Fluctuations in Liquids – from rubidium to water, and to complex metallic liquids"*, 2016.02
14. Gordon Research Conference, Neutron Scattering: Effect of Disorder and Disordered Materials, Hong Kong, *"Energy Landscape Statistics and Coarsening in Liquids and Glasses"*, 2015.06
15. NIST Center for Neutron Research Summer School on Fundamentals of Neutron Scattering, NIST, *"Quasi-Elastic Neutron Scattering Analysis of the Relaxation Modes in Liquids and Soft Materials"*, 2015.06
16. National Synchrotron Light Source II (NSLS-II) and Center for Functional Nanomaterials (CFN) Joint Users' Meeting, BNL, *"Energy Landscape Statistics and Coarsening in Liquids – A Relaxation Mode Analysis"*, 2015.05
17. Future and Current Use of Neutron Spin-Echo Spectroscopy in Condensed Matter Research Workshop, ORNL, *"Atomic-scale dynamics of a model glass-forming metallic liquid: on set of activated dynamics and dynamical clustering"*, 2015.05
18. US Army Construction Engineering Research Laboratory (CERL), Champaign, IL, *"Liquids and Glassy Materials"*, 2015.03
19. DOE Workshop on Fundamental Challenges in Our Understanding of the Physics and Chemistry of Water, Houston, TX, *"Coupled Coherent and Incoherent Inelastic Neutron Spectra of Heavy Water"*, 2015.01
20. The Center for High Resolution Neutron Scattering (CHRNS) NSF Review, NIST, *"Emergent Ordering in Multiphase Ionic Materials"*, 2015.01
21. DOE Grand Challenges in Soft Matter Workshop, University of California Santa Barbara, *"Liquids, Supercooled Liquids, and Glasses – Challenges in Understanding Slow Dynamics"*, 2014.05
22. Department of Physics, Condensed Matter Seminar, UIUC, *"Glassy Soft Matter – from Supercooled Water to Protein Preservation"*, 2014.02
23. Berkeley Mini Stat Mech Meeting breakout session, University of California Berkeley, *"Odd–Even Glass Transition Temperatures in Network-Forming Ionic Glass Homologue"*, 2014.01
24. International collaborative online course "Neutrons in Soft Matter Science: Complex Materials on Mesoscopic Scales" invited lecturer, Joint Institute for Neutron Sciences, *"Liquids, Supercooled Liquids, and Glasses"*, 2013.11
25. Department of Materials Science and Engineering, Soft Materials Seminar, UIUC, *"Glassy Soft Matter – from Supercooled Water to Protein Preservation"*, 2013.09
26. School of High Resolution Neutron Scattering to Measure Slow Dynamics, ORNL, *"Reverse Engineering the Slow Dynamics of Supercooled Liquids by Scattering"*, 2013.03
27. Petersen Asphalt Research Conference, Laramie, WY, *"Neutron Scattering for Moisture Detection in Foamed Warm Mix Asphalt"*, 2012.07
28. Department of Food Science and Engineering, University of Tennessee Knoxville, *"Bio-preservation"*, 2012.02
29. Department of Nuclear, Plasma and Radiological Engineering, UIUC, *"A Drop of the Hard Stuff – from Supercooled Water to Complex Materials"*, 2012.02
30. Berkeley Mini Stat Mech Meeting breakout session, University of California Berkeley, *"Observation of Two Dynamical Onset Temperatures of Interfacial and Bulk-akin Water in Metal Organic Framework"*, 2012.01
31. Departments of Physics and Materials Research Laboratory, University of California Santa Barbara, *"A Tale of Two Waters"*, 2012.01
32. Department of Materials Science and Engineering, University of Tennessee Knoxville, *"Phase Transitions and Critical Phenomena – A Curious Case of Water"*, 2011.10
33. Neutron Sciences Seminar, ORNL, *"An Apparent Tricritical Like Behavior of Confined Water"*, 2011.10
34. Center for Molecular Biophysics, ORNL, *"Critical Behavior of Water and Its Impact on the Structure and Dynamics of Biomaterials"*, 2011.09
35. Young Faculty and Research Scientist Seminar, Department of Nuclear Science and Engineering, MIT, *"A Drop of the Hard Stuff – from Supercooled Water to Metallic Glass"*, 2011.03
36. NIST Center for Neutron Research, NIST, *"Unraveling Water's Secrets"*, 2011.02

37. Department of Materials Science and Engineering, University of Tennessee Knoxville, “*A Tale of Two Waters*”, 2010.03
38. Clifford G. Shull lecture, ORNL, “*A Tale of Two Waters*”, 2010.03
39. Department of Civil Engineering, MIT, “New Insights into the Slow Dynamics of Supercooled Water in Aged Cement Paste”, 2008.11

### CONFERENCE ORGANIZATIONS

- Lead organizer, 2018 APS March Meeting Focused Session “Physics of Liquids”, co-organizers: T. Egami, 2018.03
- Co-organizer, ORNL Joint Nanoscience and Neutron Scattering User meeting, 2017.07
- Lead organizer, 2017 APS March Meeting Focused Session “Physics of Liquids”, co-organizers: H. E. Stanley, C. A. Angell, 2017.03
- Co-organizer, ORNL Center for Nanophase Materials Sciences (CNMS) User Meeting, 2016.08
- Member, Advisory Committee, the 11th International Conference on Bulk Metallic Glasses (BMG XI), St. Louis, MO, 2016.06
- Lead organizer, 2015 MRS Fall Meeting Symposium “Liquids and Glassy Soft Materials – Theoretical and Neutron Scattering Studies”, co-organizers: T. Egami, E. L. Liu, H. E. Stanley, 2015.11
- Co-organizer, “Workshop on Topics in Soft Condensed Matter”, MIT, 2015.11
- Co-organizer, ORNL Neutron Sciences User Meeting, 2015.10

### OTHER SYNERGISTIC ACTIVITIES

- Member, Users Organization Steering Committee, Advanced Photon Source (APS) at ANL, 2017 – 2020
- Member, Program Advisory Committee, Beckman Institute for Advanced Science and Technology, 2017 – 2010
- Secretary, Users Executive Committee, Center for Nanophase Materials Sciences (CNMS) at ORNL, 2015.12 – 2017.12
- Member, Proposal Review Committee, Center for Nanophase Materials Sciences (CNMS) at ORNL, 2016 – present
- Member, Proposal Review Panel, Center for Functional Nanomaterials (CFN) at BNL, 2015 – 2017
- Member, Science Review Committee, Neutron Sciences Directorate at ORNL, 2014 – 2017
- Invited participant, Neutron Spin Echo for Slow Dynamics Investigations Workshop, 2016.11
- Member, Executive Committee, Spallation Neutron Source and High-Flux Isotope Reactor User Group (SHUG) at ORNL, 2013.07 – 2015.12
- Invited participant, Spallation Neutron Source Second Target Station Workshop, ORNL, 2015.10
- Invited participant, Neutron Measurements for Materials Design and Characterization Workshop organized by NIST, Potomac, MD, 2014.08
- Invited participant, DOE Grand Challenges in Soft Matter Workshop, UCSB, 2014.05
- Invited participant, Future Science Impact Meeting, ORNL, 2013.10
- Member, Science Highlights Editorial Committee, Neutron Sciences, ORNL, 2012.01 – 2012.09

### REVIEW ACTIVITIES

- Reviewer for neutron and X-ray beam time allocations at SNS/HFIR, NCNR, and SSRL
- Reviewer for National Science Foundation, ACS Petroleum Research Fund, Austrian Science Fund, Chilean National Science and Technology Commission, DOE Office of Science Graduate Student Research (SCGSR) Program
- Reviewer for Tenure and Promotion at Tsinghua University
- Reviewer for *Nature*, *P Natl Acad Sci USA*, *Phys Rev Lett/B/E*, *Nat Commun*, *J Chem Phys*, *Soft Matter*, *Phys Chem Chem Phys*, *J Phys-Condens Mat*, *J Phys Chem Lett/B/C*, *ACS Macro Lett*, *Biophys J*, *J of Mater Chem B*, *Nano Lett*, *Nanoscale*, *Langmuir*, *Chem Phys Lett*, *Chem Phys*, *RSC Adv*, *Sci Rep*, *Ann Phys*, *Intermetallics*, etc.

### PROFESSIONAL SOCIETY MEMBERSHIPS

American Physical Society, Materials Research Society, Minerals Metals and Materials Society, American Nuclear Society, American Association for the Advancement of Science, Neutron Scattering Society of America, Society for Science at User Research Facilities

## TEACHING

The classical and quantum theories of the interaction of radiation (heavy and light charged particles, electromagnetic waves, photons, and neutrons) with matter are core components of nuclear and materials science and engineering. At UIUC, I teach a sequence of four courses at different progressive levels on this subject:

- Part 1. (Undergraduate, Required) *NPPE-446 Radiation Interaction with Matter I*, covers classical mechanics, classical electrodynamics, and quantum mechanics.
- Part 2. (Undergraduate, Required) *NPPE-447 Radiation Interaction with Matter II*, covers nuclear physics including nuclear properties, nuclear force and structure, radioactive decay, interactions of radiation with matter, and nuclear reactions.
- Part 3. (Graduate, Required) *NPPE-521 Interaction of Radiation with Matter*, covers quantitative treatments of single interaction event in atomic and nuclear physics.
- Part 4. (Graduate, Elective) *NPPE-529/CSE-529 Interaction of Radiation with Matter II: Multiple Events and Computational Methods*, covers thermodynamics, kinetic theory, equilibrium and non-equilibrium statistical mechanics, phase transitions and critical phenomena, liquid theory, and atomistic simulations.

The sequence, in the aggregate, aims to provide the students with solid training concerning essential physical principles, mathematical competence, and computational skills.

## STUDENTS' AWARDS & HONORS

- 2017.04 Zhikun Cai, Beckman fellowship
- 2017.04 Nathan Walter, Roy A. Axford fellowship
- 2015.08 Abhishek Jaiswal, CSE fellowship
- 2015.05 Abhishek Jaiswal, Block Grant fellowship
- 2014.04 Pawel Piotrowicz, NPPE Outstanding Undergraduate Research Award
- 2014.02 Nathan Walter, Computational Physics Student Summer Workshop fellowship at LANL
- 2014.01 Nathan Walter, NRC fellowship
- 2013.08 Ke Yang, Best Group Presentation Award at ANL/ORNL NX Summer School
- 2013.06 Abhishek Jaiswal, Best Group Presentation Award at NCNR Summer School

## PUBLICATIONS

- [1] T. P. Money Penny II, N. P. Walter, Z. Cai, Y.-R. Miao, D. L. Gray, J. J. Hinman, S. Lee, **Y. Zhang\***, J. S. Moore, "Impact of shape persistence on the porosity of molecular cages", *J. Am. Chem. Soc.* 139(8), 3259 (2017)
- [2] A. Jaiswal, T. Egami, K. F. Kelton, K. S. Schweizer, **Y. Zhang\***, "Correlation between fragility and the Arrhenius crossover phenomenon in metallic, molecular, and network liquids", *Phys. Rev. Lett.* 117, 205701 (2016)
- [3] K. Yang, Z. Cai, A. Jaiswal, M. Tyagi, J. S. Moore, **Y. Zhang\***, "Dynamic odd-even effect in liquid n-alkanes near melting points", *Angew. Chem. Int. Ed.* 128, 14296 (2016)
  - "***The science behind faster gasoline***" from Rob Dimeo, Director of NIST Center for Neutron Research
  - "***New discovery may lead to the development of super premium gasoline***", [\*\*\*UIUC College of Engineering news\*\*\*](#), [\*\*\*Beckman Institute news\*\*\*](#), etc.
  - "***Discovery of a dynamic odd-even effect in liquid n-alkanes near melting points***", *2017 Accomplishments and Opportunities, NIST Center for Neutron Research (2017)*
  - "***New discovery may lead to the development of super premium gasoline***", *Science Daily, Science Newsline, scienceblog, phys.org, phys.org Last Week Top Stories, AAAS EurekAlert, chemeuropa, Principia Scientific, Chem Info, Science Mic, Parallel State, etc.*
  - "***Discovery on Liquid Alkanes can Benefit Petroleum Industry***", [\*\*\*AZO Materials\*\*\*](#)

- **“Revolutionary Novel Discovery may Result in Development of Super-Premium Gasoline”, [Engineers Garage](#)**
  - **“Discovery could lead to crude oil and gasoline being transported across country 30 times faster”, [Innovation Toronto](#)**
  - **“Transporting Petroleum Could Now Be Done 30 Times Faster Than Usual”, [Gineers Now](#)**
- [4] K. Yang, Z. Cai, M. Tyagi, M. Feyngenson, J. C. Neuefeind, J. S. Moore, **Y. Zhang\***, “Odd-even structural sensitivity on dynamics in network-forming ionic liquids”, *Chem. Mater.* 28(9), 3227 (2016)
- [5] A. Jaiswal, S. O’Keefe, R. Mills, A. Podlesynak, G. Ehlers, W. Dmowski, K. Lokshin, T. Egami, **Y. Zhang\***, “Onset of cooperative dynamics in an equilibrium glass-forming metallic liquid”, *J. Phys. Chem. B* 120(6), 1142 (2016)
- [6] A. Jaiswal, **Y. Zhang\***, “Robustness of dynamical cluster analysis in a glass-forming metallic liquid using an unsupervised machine learning algorithm”, *MRS Adv.* 1(26), 1929 (2016)
- [7] K.-H. Liu, **Y. Zhang**, U.-S. Jeng, C.-Y. Mou, “Density of hydrophobically confined deeply-cooled water investigated by small angle X-ray scattering”, *J. Chem. Phys.* 143, 094704 (2015)
- [8] A. Jaiswal, A. Podlesynak, G. Ehlers, R. Mills, S. O’Keefe, J. Stevick, J. Kempton, G. Jelbert, W. Dmowski, K. Lokshin, T. Egami, **Y. Zhang\***, “Coincidence of collective relaxation anomaly and specific heat peak in a bulk metallic glass-forming liquid”, *Phys. Rev. B* 92, 024202 (2015)
- [9] A. Jaiswal, T. Egami, **Y. Zhang\***, “Atomic-scale dynamics of a model glass-forming metallic liquid: dynamical crossover, dynamical decoupling, and dynamical clustering”, *Phys. Rev. B* 91, 134204 (2015)
- **Featured on the front page of *Phys. Rev. B* web site**
- [10] L. J. Santodonato, **Y. Zhang\***, M. Feyngenson, C. M. Parish, M. C. Gao, M. K. Miller, R. J. K. Weber, J. C. Neuefeind, Z. Tang, P. K. Liaw, “Deviation from high-entropy configurations in the atomic distributions of a multi-principal-element alloy”, *Nat. Commun.* 6, 5964 (2015)
- **“Mixing Up a Batch of Stronger Metals”, [ORNL NScD homepage story](#), *ORNL Neutron Times***
  - **“Mixing Up a Batch of Stronger Metals”, [UIUC NPRE news](#)**
  - **“Mixing Up a Batch of Stronger Metals”, [Phys.org](#), *DOE Office of Science Headlines*, *eScienceNews*, *Science Comments*, *physnews*, *UTK MSE Newsletter*, etc.**
  - **“High-Entropy Alloys Could Lead to a Wide Range of Complex Materials”, [APS homepage Science and Research Highlights](#)**
- [11] K. Yang, M. Tyagi, J. S. Moore, **Y. Zhang\***, “Odd-even glass transition temperatures in network-forming ionic glass homologue”, *J. Am. Chem. Soc.* 136(4), 1268 (2014)
- **“Dynamic Origin of the Anomalous Odd-even Glass Transition Temperature in an Ionic Glass”, *2014 Accomplishments and Opportunities, NIST Center for Neutron Research (2014)***
  - **“New atomic properties found in ionic glass”, [UIUC College of Engineering news](#), *UIUC NPRE news*, *Beckman Institute news***
- [12] B. Huang, **Y. Zhang**, X. Shu, Y. Liu, P. X. Ye, “Neutron scattering for moisture detection in foamed asphalt”, *J. Mater. Civil Eng.* 25(7), 932 (2013)
- [13] K.-H. Liu, **Y. Zhang**, J.-J. Lee, C.-C. Chen, Y.-Q. Yeh, S.-H. Chen, C.-Y. Mou, “Density and anomalous thermal expansion of deeply-cooled water confined in mesoporous silica investigated by synchrotron X-ray diffraction”, *J. Chem. Phys.* 139, 064502 (2013)
- [14] C. E. Bertrand, **Y. Zhang**, S.-H. Chen, “Deeply-cooled water under strong confinement: neutron scattering investigations and the liquid-liquid critical point hypothesis”, *Phys. Chem. Chem. Phys.* 15(3), 721 (2013)
- ***Phys. Chem. Chem. Phys. invited Perspective article.***
- [15] **Y. Zhang**, M. Tyagi, E. Mamontov, S.-H. Chen, “Quasi-elastic neutron scattering studies of the slow dynamics of supercooled and glassy aspirin”, *J. Phys.-Condens. Mat.* 24(6), 064112 (2012)
- **“Dynamics of Water and Glass-Forming Liquids’ highlights *ORNL neutron science*”, [ORNL Neutron Sciences Research Highlights](#).**

- [16] S.-H. Chen, **Y. Zhang**, “Dynamic crossover phenomenon in confined water and its relation to the liquid-liquid critical point: experiments and MD simulations”, *Proceedings of the International School of Physics “Enrico Fermi”: Complex Materials in Physics and Biology* 176, 129 (2012)
- [17] X. Li, C.-Y. Shew, L. He, F. Meilleur, D. A. A. Myles, E. Liu, **Y. Zhang**, G. S. Smith, K. W. Herwig, R. Pynn, W.-R. Chen, “Scattering functions of platoonic solids”, *J. Appl. Crystallogr.* 44, 545 (2011)
- “*Scattering functions of platoonic solids*”, *IUCr Newsletter* 19(2), (2011)
- [18] **Y. Zhang**, A. Faraone, W. A. Kamitakahara, K.-H. Liu, C.-Y. Mou, J. B. Leao, S. Chang, S.-H. Chen, “Density measurement of confined water with neutron scattering”, *P. Natl. Acad. Sci. USA* 108(47), 1193 (2011)
- [19] **Y. Zhang**, A. Faraone, W. A. Kamitakahara, K.-H. Liu, C.-Y. Mou, J. B. Leao, S. Chang, S.-H. Chen, “Density hysteresis of heavy water confined in a nanoporous silica matrix”, *P. Natl. Acad. Sci. USA* 108(30), 12206 (2011)
- “*Unraveling water’s secrets*”, [\*MIT homepage today’s spot\*](#), Aug. 1, 2011
  - *Book Cover*, “*Scattering Methods in Complex Fluids*”, by Sow-Hsin Chen and Piero Tartaglia, Cambridge University Press (2015)
  - “*Density Hysteresis in Nanoconfined Water*”, 2011 Accomplishments and Opportunities, NIST Center for Neutron Research (2011)
  - “*Shedding light on water’s mysterious behavior*”, DOE Office of Science headlines
  - *Cover of the DOE Neutron Scattering Principal Investigators’ Meeting Report* (2012)
  - “*Revealing water’s secrets*”, [\*MIT news\*](#), [\*MIT NSE news\*](#), [\*Phys.org\*](#), [\*ORNL in the news\*](#), etc.
  - “*MIT research supports controversial theory about water*”, [\*Newsroom America\*](#)
  - “*MIT Scientists Tackle Water Controversy*”, [\*Crazy Engineers\*](#)
  - “*Explaining some of water’s mysteries*”, [\*Softpedia\*](#)
  - “*The Secrets of Water*”, [\*Hydrophilia\*](#)
  - “*Water’s secrets revealed*”, [\*R&D Magazine\*](#)
  - “*More light on anomalous behavior of water*”, *Chemical Industry Digest*
- [20] C.-S. Tsao, M. Li, **Y. Zhang**, J. B. Leao, Wei-Shan Chiang, Tsui-Yun Chung, Yi-Ren Tzeng, Ming-Sheng Yu, S.-H. Chen, “Probing the room temperature spatial distribution of hydrogen in nanoporous carbon by use of small-angle neutron scattering”, *J. Phys. Chem. C* 114, 19895 (2010)
- [21] C.-S. Tsao, Y. Liu, M. Li, **Y. Zhang**, J. B. Leao, H.-W. Chang, M.-S. Yu, S.-H. Chen, “Neutron scattering methodology for absolute measurement of room-temperature hydrogen storage capacity and evidence for spillover effect in a Pt-doped activated carbon”, *J. Phys. Chem. Lett.* 1, 1569 (2010)
- *MRS ACNS 2010 highlight*
- [22] S.-H. Chen, M. Lagi, X. Chu, **Y. Zhang**, C. Kim, A. Faraone, E. Fratini, P. Baglioni, “Dynamics of a globular protein and its hydration water studied by neutron scattering and MD simulations”, *J. Spectrosc.* 24, 1 (2010)
- *Journal of Spectroscopy cover story*
- [23] S.-H. Chen, **Y. Zhang**, M. Lagi, X. Chu, L. Liu, A. Faraone, E. Fratini, P. Baglioni, “The dynamic response function  $\chi_T(Q,t)$  of confined supercooled water and its relation to the dynamic crossover phenomenon”, *Z. Phys. Chem.* 224, 109 (2010)
- [24] S.-H. Chen, **Y. Zhang**, M. Lagi, S.-H. Chong, P. Baglioni, F. Mallamace, “Evidence of dynamic crossover phenomena in water and other glass-forming liquids: experiments, MD simulations and theory”, *J. Phys.-Condens. Mat.* 21, 504102 (2009)
- *Institute of Physics (IOP) Select*
- [25] **Y. Zhang**, M. Lagi, E. Fratini, P. Baglioni, E. Mamontov, S.-H. Chen, “Dynamic susceptibility of supercooled water and its relation to the dynamic crossover phenomenon”, *Phys. Rev. E* 79, 040201 (2009)
- “*Twenty Most Important Publications*” from Neutron Science Directorate, ORNL, 2009-2012
  - *Virtual Journal of Biological Physics Research*, Vol. 17, Issue 8 (2009)

- [26] A. Faraone, **Y. Zhang**, K.-H. Liu, C.-Y. Mou, S.-H. Chen, “Single particle dynamics of water confined in a hydrophobically modified MCM-41-S nanoporous matrix”, *J. Chem. Phys.* 130, 134512 (2009)
- **“Water dynamics in hydrophobic confinement”, *Highlighted on 2009 Accomplishments and Opportunities, NIST Center for Neutron Research (2009)***
  - ***Virtual Journal of Biological Physics Research, Vol. 17, Issue 8 (2009)***
- [27] **Y. Zhang**, M. Lagi, D. Liu, F. Mallamace, E. Fratini, P. Baglioni, E. Mamontov, M. Hagen, S.-H. Chen, “Observation of high-temperature dynamic crossover in protein hydration water and its relation to reversible denaturation of lysozyme”, *J. Chem. Phys.* 130, 13501 (2009)
- ***Virtual Journal of Biological Physics Research, Vol 17, Issue 8 (2009)***
- [28] **Y. Zhang**, K.-H. Liu, M. Lagi, D. Liu, K. C. Littrell, C.-Y. Mou, S.-H. Chen, “Absence of the density minimum of supercooled water in hydrophobic confinement”, *J. Phys. Chem. B* 113, 5007 (2009)
- [29] **Y. Zhang**, M. Lagi, F. Ridi, E. Fratini, P. Baglioni, E. Mamontov, S.-H. Chen, “Observation of dynamic crossover and dynamic heterogeneity in hydration water confined in aged cement paste”, *J. Phys.-Condens. Mat.* 20, 502101 (2008)
- ***Institute of Physics (IOP) Select***
  - ***IOP journals 10% articles, accessed over 250 times in the first month of publication***
  - ***IOP journals 3% articles, accessed over 500 times in the first year of publication***
- [30] D. Liu, X. Chu, M. Lagi, **Y. Zhang**, E. Fratini, P. Baglioni, A. Alatas, A. Said, E. Alp, S.-H. Chen, “Studies of phononlike low-energy excitations of protein molecules by inelastic X-ray scattering”, *Phys. Rev. Lett.* 101, 135501 (2008)
- ***APS homepage Science and Research Highlights***
  - **“A Quantum of Vibration in an Unexpected Place”, [APS Science and Research](#)**
  - **“The atomic dance of proteins”, *APS Science 2008, 68-69 (2008)***
  - ***Virtual Journal of Nanoscale Science and Technology, Vol. 18, Issue 14 (2008)***
  - ***Virtual Journal of Biological Physics Research, Vol. 16, Issue 7 (2008)***
- [31] D. Liu, **Y. Zhang**, Y. Liu, J. Wu, C.-C. Chen, C.-Y. Mou, S.-H. Chen, “Density measurement of 1-D confined water by small angle neutron scattering method: pore size and hydration level dependences”, *J. Phys. Chem. B* 112, 4309 (2008)
- [32] D. Liu, **Y. Zhang**, C.-C. Chen, C.-Y. Mou, P. H. Poole, S.-H. Chen, “Observation of the density minimum in deeply supercooled confined water”, *P. Natl. Acad. Sci. USA* 104(23), 9570 (2007)
- **“A density minimum in supercooled water”, [PNAS cover story](#), *P. Natl. Acad. Sci. USA* 104(23), 9547 (2007)**
  - **“Supercooled liquid: Water ways”, [Nature Nanotechnology](#), June 8, 2007**
  - **“Thermodynamics: Highs and lows in the density of water”, [Nature Nanotechnology](#) 2, 396 (2007)**
  - **“Supercool, and Strange”, [Science News cover story](#)**
  - **“The density minimum in deeply supercooled confined water”, *2007 Accomplishments and Opportunities, NIST Center for Neutron Research, 8-9 (2007)***
  - ***Cover of the DOE Neutron Scattering Principal Investigators’ Meeting Report (2010)***
  - **“Densities of Confined Supercooled Water”, *ORNL Annual Report (2010)***
  - ***Highlights on [ScienceWatch.com](#), [Journalreview.org](#), [X-Ray Group Virtual Journal Club](#), etc.***
  - ***Virtual Journal of Biological Physics Research, Vol. 14, Issue 1 (2007)***
- [33] S.-H. Chen, L. Liu, X. Chu, **Y. Zhang**, E. Fratini, P. Baglioni, A. Faraone, E. Mamontov, “Experimental evidence of fragile-to-strong dynamic crossover in DNA hydration water”, *J. Chem. Phys.* 125, 171103 (2006)
- **“A mechanism for the onset of bioactivity in biomolecules”, *2006 Accomplishments and Opportunities, NIST Center for Neutron Research, 32-33 (2006)***
  - ***Virtual Journal of Biological Physics Research, November 15, 2006***
- [34] G. Li, P. Zhang, N. Chen, D. He, Y. Zhou, **Y. Zhang**, “Fundamental and harmonic induction fields in PPM undulator”, *High Power Laser and Particle Beams* 1, 105 (2004)



- [35] A. Jaiswal, **Y. Zhang\***, “Coherent quasi-elastic neutron scattering studies of the collective diffusion of glass-forming metallic liquids”, *Transactions of the American Nuclear Society* 110, 942 (2014)
- [36] S.-H. Chen, Z. Wang, A. I. Kolesnikov, **Y. Zhang**, K.-H. Liu, “Search for the first-order liquid-to-liquid phase transition in low-temperature confined water by neutron scattering”, *AIP Conference Proceedings: Slow Dynamics in Complex Systems* 1518, 77, Eds: M. Tokuyama and I. Oppenheim (2013)
- [37] S.-H. Chen, X. Chu, M. Lagi, C. Kim, **Y. Zhang**, A. Faraone, J. B. Leao, E. Fratini, P. Baglioni, F. Mallamace, “Dynamical coupling between a globular protein and its hydration water studied by neutron scattering and MD simulation”, *World Premier International - Advanced Institute for Materials Research (WPI-AIMR) Proceedings* (2009)
- [38] S.-H. Chen, F. Mallamace, L. Liu, D. Liu, X. Chu, **Y. Zhang**, C. Kim, A. Faraone, C.-Y. Mou, E. Fratini, P. Baglioni, A. I. Kolesnikov, V. Garcia-Sakai, “Dynamic crossover phenomenon in confined supercooled water and its relation to the existence of a liquid-liquid critical point in water”, *AIP Conference Proceedings: Complex Systems* 982, 39-52, Eds: M. Tokuyama, I. Oppenheim, H. Nishiyama (2008)