# Yun Liu

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ResearchID at Web of Science: http://www.researcherid.com/rid/F-6516-2012


## RESEARCH INTERESTS:

- Neutron and X-ray scattering techniques.
- Structure and dynamics of colloidal systems, such as nucleation/clusterization in colloidal and biological molecular assembly systems, ion/counterion association in polyelectrolyte solution, and colloidal interactions.
- Interaction of small molecules on the surface or porous media, such as hydrogen storage, green-house gas capture, molecular recognition based on surface selection, molecular sieving, small molecule dynamics on functionalized surface.
- Water structure and dynamics in nano-porous systems, such as fuel cell membranes.

## EDUCATION:

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| Sep. 1999-<br>Aug. 2005 | Ph. D. of Nuclear Science and Engineering, M.S. in Nuclear Engineering<br>Nuclear Science and Engineering Department, **MIT**, USA<br>Cumulative Graduate GPA: 4.9/5.0 |
| Sep. 1997-<br>Jul. 1999 | Master of Nuclear Technology & Application<br>Engineering Physics Department, **Tsinghua University**, P. R. China |
| Sep. 1993-<br>Jul. 1997 | Bachelor of Engineering Physics<br>Engineering Physics Department, **Tsinghua University**, P. R. China |

## EMPLOYMENT EXPERIENCE:

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| 2011- | **Research Assistant Professor** at Department of Chemical & Biomolecular Engineering, University of Delaware. |
| 2009- | **Staff Scientist** in SANS/USANS team, NIST Center for Neutron Research. |
| 2010-2011 | **Senior Scientist** at Department of Chemical Engineering, University of Delaware. |
| 2009-2010 | **Research Scientist** at Department of Chemical Engineering, University of Delaware. |
| 2005-2008 | **Guest Researcher**, NIST Center for Neutron Research. |
| 2005-2008 | **Research Associate,** Dept. of Materials Science and Engineering, University of Maryland, College Park. |
| 1999-2005 | **Research Assistant**, Nuclear Science and Engineering Department, **MIT** |

## SCHOLARSHIPS AND AWARDS:

NIST chapter of Sigma Xi's 2008 outstanding poster award (2008).

Final list of Clifford G. Shull Fellowship (2007).
Shanghai Laser Award for Research Achievement, Nuclear Science and Engineering Department, MIT (2005).
Presidential Fellowship, MIT (Summer, 2002).
Graduate Fellowship, MIT (Summer, 2001 – Summer, 2002).
Outstanding Performance Graduate Student, Nuclear Science and Engineering Department, MIT (2000).
Title of "Excellent Graduate", Tsinghua University (1997).
**Highest Scholarship Award**, Tsinghua University (1996-1997). This award is regarded as the most honorable university-wide award and is awarded to less than ten out of about ten thousand students each year.
Excellent Student of Beijing's Universities and "Sonny" Scholarship (1995-1996).
"Nanxiang Jiang" Scholarship, Tsinghua University (1994-1995).
First Class Prize of "Excellent Student of Tsinghua University" (1993-1994).

## GRANTS:

- *Investigation of protein cluster formation*; Key co-PI with Norman J. Wagner (PI), Genentech Inc, 2010-present.
- *A Study of Real-Space Neutron Scattering Methods*; LDRD Director's Fund of Oak Ridge National Laboratory; co-PI with J. Lee Robertson (PI); 2009-2010.
- *An Experimental, Theoretical and Molecular Modeling Approach to Characterize the Structure and Dynamics of Charged PAMAM Dendrimers in Solution*; LDRD Director's Fund of Oak Ridge National Laboratory; co-PI with Wei-Ren Chen (PI); 2008-2009.

## SERVICE:

- Member of "Soft Matter" program committee for 7$^{th}$ ACNS (American Conference on Neutron Scattering), Knoxville, Tennessee, 2014.
- Member of the Editorial Board for the journal, "Chemical Engineering & Process Techniques".
- Organizer for "Frontier of selective-structure characterization in complex soft matter materials" at Annual Meeting for American Crystallographic Association (ACA) in 2014 at Albuquerque, New Mexico, USA.
- Organizer and session chair for the symposium of "Charged Colloids with Short-range Attractions" for American Physical Society National March Meeting, 2013 at Baltimore, MD
- Session chair for Complex Fluids and Gels for American Conference on Neutron Scattering, June 24-28, Georgetown University, Washington DC, 2012
- Session chair for Biocolloids V for 86$^{th}$ ACS Colloid & Surface Science Symposium at Johns Hopkins University, June 10-13, 2012
- Organizer for the 8$^{th}$ Middle Atlantic Soft Matter Workshop at National Institute of Standards and Technology, Maryland on December 9, 2011
- Reviewer for the Neutron Scattering Section of CPHS at Tsinghua University, Beijing, China, in June, 2011
- Member of the international advisory committee of Compact Pulsed Hadron Sources (CPHS) at Tsinghua University, China, June, 2009.
- Organizer of a tutorial session of American Conference on Neutron Scattering, Santa Fe, NM, May 11-15, 2008.

- Symposium co-organizer and session chair of the HH Symposium entitled "The Hydrogen Economy" at the Materials Research Society National Meeting in San Francisco, Mar. 24-28, 2008.

## TEACHING EXPERIENCE:

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| Oct. 2010 | Lecture in a course at Chemical Engineering Department, University of Delaware<br>CHEG 867: *Scattering Methods for Characterizing Soft Condensed Matter* |
| May 2010 | Lecture in NCNR/NSF Summer School on the Fundamentals of Neutron Scattering, National Institute of Standards and Technology, Gaithersburg, Maryland |
| May 2008 | Tutorial session lecture for 2008 ACNS, Santa Fe, NM.<br>*Colloidal Interaction in Solution* |
| Spring 2004 | **Teaching Assistant**, Nuclear Science and Engineering Department, MIT, USA<br>*Statistical thermodynamics of complex liquids*. (Course 10.44J, 22.52J, 8.575J) |
| Spring 2003 | **Teaching Assistant,** Nuclear Science and Engineering Department, MIT, USA<br>*Interaction of radiation with matter*. (Course 22.51) |
| Spring 2000 | **Teaching Assistant**, Nuclear Science and Engineering Department, MIT, USA<br>*A hands-on introduction to nuclear magnetic resonance*. (Course 22.920) |

## JOURNAL REVIEWER:

Journal of American Chemical Society, Physical Review Letters, Physical Review B, Physical Review E, Langmuir, Journal of Physical Chemistry, Journal of Physical Chemistry Letters, Chemical Physics Letters, Chemistry of Materials, Journal of Physics Condensed Matter, Journal of Alloys and Compounds, International Journal of Thermophysics, Materials Science and Engineering C, International Journal of Modern Physics B.

## MEMBERSHIP:

Neutron Scattering Society of America, American Physical Society, Material Research Society, American Chemical Society

## UNDERGRADUATE, GRADUATE AND POSTDOC ADVISEES:

Graduate:

- Douglas Godfrin, University of Delaware, (2010-present)
- Jie Chen, Tsinghua University, China (2012-present)
- Nestor E. Valadez Perez, University of Guanajuato, Mexico (2012-present)
- Jung Min Kim, University of Delaware, (2009-2012)

Post-graduate

- Dr. Christopher E. Bertrand, National Institute of Standards and Technology (2013-present)
- Dr. Tianfu Li, Chinese Institute of Atomic Energy, China (2007-2011)
- Dr. Xin Li, Rensselaer Polytechnic Institute, (2008 – 2011)
- Dr. Eric Yearley, University of Delaware, (2010 – 2012)
- Dr. Jiang Du, Institute of Chemistry, Chinese Academy of Science, China (2008-2009)

Undergraduate:

- Katherine E. Borner, Chemistry Department, University of Texas at Dallas, USA (Summer, 2013)
- Michelle Reele, Chemical Engineering Department, SUNY Buffalo, USA (Summer, 2012)

- Navjot Kaur, The City College of New York, NY, USA (Summer, 2010)
- Aaron Aziz, Chemical Engineering Department, University of Maryland, USA (Summer, 2009)

**TECHNICAL SKILLS**:

Expert in neutron scattering, inelastic X-ray scattering instrument, X-ray photon correlation spectroscopy.

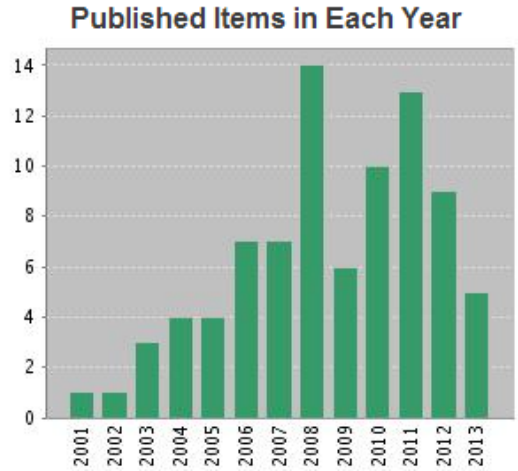
Expert in Nuclear Magnetic Resonance Spectrometers (NMR)

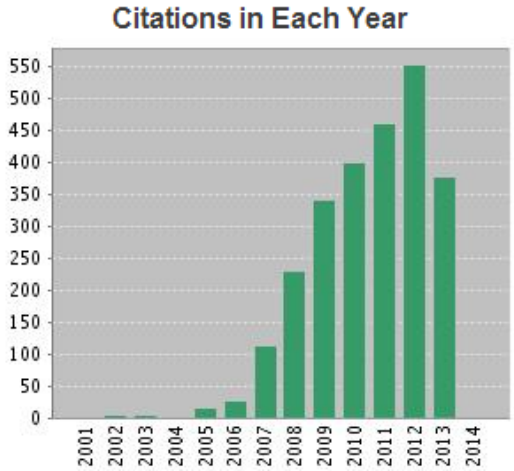
Experienced with wide range of volumetric gas loading and treatment apparatus

Experienced programmer (C, C++, Matlab, Python, Java, FORTRAN, UNIX scripting)

Lab computer administrator for over 20 computers (Linux, Unix, DOS/Windows) from 2001 to 2002. Maintained computer networks, 7 SGI stations controlling NMR machines, two file servers, and two gateways.

**ACADEMIC PUBLICATIONS:**




(Total citations: 2522. Citations in 2012 alone: 551. H-index=25. )
(Data taken from ISI Web of Science as of Nov. 21, 2013)

**Ph.D. Dissertation, MIT**

Studies of Structure and Dynamics of Biological Macro-molecular Assemblies by Low Angle Neutron Diffraction and Inelastic X-ray Scattering, MIT, Defended on August 3, 2005.

**M. S. Thesis, MIT**

Characterizing Porous Media by Diffusive-MASS NMR

**Journal Papers Published and in Press** (*: corresponding author, total 79 peer-reviewed publications. 83 publications if including ACS conference abstracts based on ISI Web of Science.)

1) Néstor E. Valadez-Pérez, **Yun Liu**, Aaron P. R. Eberle, Norman J. Wagner, Ramón Castañeda-Priego, "Towards a general definition of gelation for adhesive hard-sphere dispersions", *Physical Review E*, accepted (2013).

2) **Yun Liu***, "Colloidal systems with both a short-range attraction and a long-range repulsion", *Chemical Engineering & Process Techniques* 1(2), 1010 (2013).

   (An invited perspective article about colloidal systems with competing interactions.)

3) Néstor E. Valadez-Pérez, Ramón Castañeda-Priego, **Yun Liu***, "Percolation in colloidal systems with competing interactions: the role of long-range repulsion", *RSC Advances* 3, 25110-25119 (2013).

4) Paul Douglas Godfrin, Ramón Castañeda-Priego, **Yun Liu**, Norman J. Wagner, "Intermediate range order and structure in colloidal dispersions with competing interactions", *J. Chem. Phys.* 139, 154904 (2013).

5) Eric J. Yearley, Isidro E. Zarraga*, Steven J. Shire, Thomas M. Scherer, Yatin Gokarn, Norman J. Wagner, **Yun Liu***, "Small-Angle Neutron Scattering Characterization of Monoclonal Antibody Conformations and Interactions at High Concentrations", *Biophysical Journal*, 105, 720-731(2013).

6) Ali Qajar, Maryam Peer, Ramakrishnan Rajagopalan, **Yun Liu**, Craig Brown, Henry C. Foley, "Surface compression of light adsorbates inside microporous PFA-derived carbons" *Carbon*, 60, 538-549(2013).

7) Bin Wu, **Yun Liu***, Xin Li, Eugene Mamontov, Alexander I. Kolesnikov, Souleymane O. Diallo, Changwoo Do, Lionel Porcar, Kunlun Hong, Sean C. Smith, Li Liu, Gregory S. Smith, Takeshi Egami, Wei-Ren Chen*, "Charge-Dependent Dynamics of a Polyelectrolyte Dendrimer and Its Correlation with Invasive Water", *J. of the American Chemistry Society* 135(13), 5111-5117 (2013).

8) Baoshan Huang, Yang Zhang, Xiang Shu, **Yun Liu**, Dayakar Penumadu, X. Philip Ye, "Neutron Scattering for Moisture Detection in Foamed Asphalt", *Journal of Materials in Civil Engineering*, 25(7), 932-938 (2013).

9) **Y. Liu***, C. M. Brown, D. A. Neumann, D. B. Geohegan, A. A. Puretzky, C. M. Rouleau, H. Hu, D. Styers-Barnett, P. O. Krasnov, B. I. Yakobson, "Metal-assisted hydrogen storage on Pt-decorated single-walled carbon nanohorns", *Carbon* 50, 4953-4964(2012).

10) C. Y. Shew, C. Do, K. Hong, **Y. Liu**, L. Porcar, G. Smith, W. R. Chen, "Conformational effect on small angle neutron scattering behavior of interacting polyelectrolyte solutions: a perspective of integral equation theory", *J. Chem. Phys.* 137, 024907(2012).

11) B. Wu, W. R. Chen, T. Egami, X. Li, **Y. Liu**, Y. Wang, C. Do, L. Porcar, K. Hong, L. Liu, G. Smith, S. Smith, "Molecular dynamics and neutron scattering study of the dependence of polyeletrolyte dendrimer conformation on counterion behavior", *J. Chem. Phys.* 137, 064902 (2012).

12) B. Wu, B. Kerkeni, T. Egami, C. Do, **Y. Liu**, Y.M. Wang, L. Porcar, K. L. Hong, S. C. Smith, E. L. Liu, G. S. Smith, W. R. Chen, "Structured water in polyelectrolyte dendrimers: Understanding small angle neutron scattering results through atomistic simulation", *J. Chem. Phys.* 136, 144901 (2012).

13) P. Falus, L. Porcar, E. Fratini, W. R. Chen, A. Faraone, K. Hong, P. Baglioni, **Y. Liu***, "Distinguishing the monomer to cluster phase transition in concentrated lysozyme solutions by

studying the temperature dependence of the short-time dynamics", *J. Phys. Condensed Matter* 24, 064114(2012).

14) Xin Li, Bin Wu, **Yun Liu**, Roger Pynn, Chwen-Yang Shew, Gregory S. Smith, Kenneth W. Herwig, J. Lee Robertson, Wei-Ren Chen, Li, Liu, "Contrast variation in spin-echo small angle neutron scattering", *J. Phys.: Condens. Matter* 24, 064115(2012).

15) Kunlun Hong, **Yun Liu**, Lionel Porcar, Dazhi Liu, Carrie Y. Gao, Gregory S. Smith, Kenneth W. Herwig, Sheng Cai, Xin Li, Bin Wu, Wei-Ren Chen, Li Liu , "Structural response of polyelectrolyte dendrimer towards molecular protonation: the inconsistency revealed by SANS and NMR", *J. Phys.: Condens. Matter* 24, 064116 (2012).

16) Bin Wu, Xin Li, Changwoo Do, Tae-Hwan Kim, Chwen-Yang Shew, **Yun Liu**, Jun Yang, Kunlun Hong, Lionel Porcar, Chun-Yu Chen, Emily L. Liu, Gregory S. Smith, Kenneth W. Herwig, Wei-Ren Chen, "Spatial distribution of intra-molecular water and polymeric components in polyelectrolyte dendrimers revaled by small angle scattering investigations", *J. Chem. Phys.* 135, 144903 (2011).

17) Cheng-Si Tsao, **Yun Liu**, Haw-Yeu Chuang, Huan-Hsiung Tseng, Tsan-Yao Chen, Chien-Hung Chen, Ming-Sheng Yu, Qixiu Li, Angela Lueking, Sow-Hsin Chen, "Hydrogen Spillover Effect of Pt-Doped Activated Carbon Studied by Inelastic Neutron Scattering", *J. Phys. Chem. Lett.* 2, 2322 (2011).

(Highlighted by **MIT News**: "Findings could lead to better hydrogen storage" on Sep. 19, 2011. The link: http://web.mit.edu/newsoffice/2011/better-hydrogen-storage-0919.html )

18) W. Chen, T. Xu, F. He, W. Wang, C. Wang, J. Strzalka, **Y. Liu**, J. Wen, D. Miller, J. Chen, K. Hong, L. Yu, S. Darling, "Hierarchical Nanomorphologies Promote Exciton Dissociation in Polymer: Fullerene Bulk Heterojunction Solar Cells", *Nano* 11, 3707-3713 (2011).

(Highlighted by **Argonne National Laboratory of DOE** in an article titled as "rethinking the idealized morphology in high-performance organic photovoltaics" in September, 2011.
The link is http://www.anl.gov/solar/research/photovoltaic/ideal_morphology.html)

19) E. W. Huang, **Y. Liu**, Y. Ren, L. Porcar, J. J. Kai, P. K. Liaw, G. S. Smith, W. R. Chen, "Evolution of microstructure in a nickel-based superalloy as a function of aging time", *Philosophical Magazine Letters* 91(7), 483-490 (2011).

20) A. G. Richter, S. A. Dergunov, B. Ganus, Z. Thomas, S. V. Pingali, V. Urban, **Y. Liu**, L. Porcar, E. Pinkhassik, "Scattering Studies of Hydrophobic Monomers in Liposomal Bilayers: An Expanding Shell Model of Monomer Distribution", *Langmuir* 27, 3792-3797 (2011).

21) V. Peterson, C. M. Brown, **Y. Liu**, K. J. Cameron, "Structural Study of $D_2$ within the Trimodal Pore System of a Metal Organic Framework", *J. Phys. Chem. C* 115, 8851-8857 (2011).

22) A. Chuang, **Y. Liu**, T. J. Udovic, P. K. Liaw, G. P. Yu, J. H. Huang, "Inelastic neutron scattering study of hydrogenated $(Zr_{55}Cu_{30}Ni_5Al_{10})_{99}Y_1$ bulk metallic glass", *Phys. Rev. B.* 83(17), 174206 (2011).

23) F. He, W. Wang, W. Chen, T. Xu, S. B. Darling, J. Strzalka, **Y. Liu**, L. Yu, "Tetrathienoanthracene-based Copolymers for Efficient Solar Cells", *J. of the American Chemical Society* 133, 3284-3287 (2011).

24) J. M. Kim, R. Castaneda-Priego, **Y. Liu**, N. J. Wagner "On the importance of thermodynamic self-consistency for calculating stable clusters in hard-core double Yukawa fluids" *J. Chem. Phys.* 134, 064904 (2011).

25) X. Li, C. Y. Shew, **Y. Liu**, R. Pynn, L. Liu, K. Herwig, G. Smith, L. Robertson, W. R. Chen, "Prospect for characterizing interacting soft colloidal structures using spin-echo small angle neutron scattering", *J. Chem. Phys.* 134, 094504 (2011).

26) **Y. Liu***, L. Porcar, J. Chen, W. R. Chen, P. Falus, A. Faraone, E. Fratini, K. Hong, P. Baglioni, "Lysozyme Protein Solution with an Intermediate Range Order Structure" *J. Phys. Chem. B* 115, 7238-7247(2011).

- An invited article for the special issue, "Clusters in Complex Fluids", in *J. Phys. Chem. B.*
- Selected to Scientific Highlights of Institut Laue-Langevin, France.

27) Y. Yang, C. M. Brown, C. Zhao, A. L. Chaffee, B. Nick, D. Zhao, P. A. Webley, J. Schalch, J. M. Simmons, **Y. Liu**, J. H. Her, C. E. Buckley, D. A. Sheppard, "Micro-Channel Development and Hydrogen Adsorption Properties in Templated Microporous Carbons Containing Platinum Nanoparticles" *Carbon* 49, 1305 (2011).

28) X. Li, M. Zamponi, K. Hong, L. Porcar, C. Y. Shew, T. Jenkins, E. Liu, G. S. Smith, K. W. Herwig, **Y. Liu***, W. R. Chen*, "pH Responsiveness of Polyelectrolyte Dendrimers: A Dynamical Perspective" *Soft Matter* 7, 618(2011).

29) X. Li, K. L. Hong, **Y. Liu**, C. Y. Shew, E. Liu, K. W. Herwig, G. S. Smith, J. P. Zhao, G. Z. Zhang, S. Pispas, W. R. Chen, "Water distributions in polystyrene-block-poly[Styrene-poly(ethylene oxide)] block grafted copolymer system in aqueous solutions revealed by contrast variation small angle neutron scattering study", *J. of Chem. Phys.* 133, 144912 (2010).

30) C. S. Tsao, **Y. Liu**, M. D. 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. of Physical Chemistry Letters* 1, 1569 (2010).

31) X. Li, C. Y. Shew, **Y. Liu**, R. Pynn, E. Liu, K. W. Herwig, G. S. Smith, J. L. Robertson, W. R. Chen, "Theoretical Studies on the Structure of Interacting Colloidal Suspensions by Spin-echo Small Angle Neutron Scattering", *J. Chem. Phys.* 132, 174509 (2010).

32) **Y. Liu**, C. Y. Chen, H. L. Chen, K. L. Hong, C. Y. Shew, X. Li, L. Liu, Y. B. Melnichenko, G. S. Smith, K. W. Herwig, L. Porcar, W. R. Chen, "Electrostatic Swelling and Conformational Variation Observed in High-Generation Polyelectrolyte Dendrimers", *J. of Physical Chemistry Letters* 1, 2020 (2010).

33) S. Xiang, W. Zhou, Z. Zhang, M. A. Green, **Y. Liu***, B. Chen*, "Open Metal Sites within Isostructural Metal-Organic Frameworks for Differential Recongnition of Acetylene and Extraordinarily High Acetylene Storage at Room Temperature" *Angewandte Chemie International Edition* 49, 4615 (2010).

34) **Y. Liu**, L. Porcar, K. Hong, C. Y. Shew, X. Li, E. Liu, P. D. Butler, K. W. Herwig, G. S. Smith, W. R. Chen, "Effect of Counterion Valence on the pH Responsiveness of Polyamidomaine Dendrimer Structure" *J. Chem. Phys*. **132**, 124901 (2010).

35) H. Wu, J. M. Simmons, **Y. Liu**, C. M. Brown, X. S. Wang, S. Ma, V. K. Peterson, P. D. Southon, C. J. Kepert, H. C. Zhou, T. Yildirim, W. Zhou, "Metal-Organic Frameworks with Exceptionally High Methane Uptake: Where and How is Methane Stored?" *Chemistry: A European Journal* 16, 5205(2010).

36) L. Porcar, K. Hong, P. D. Butler, K. W. Herwig, G. S. Smith, **Y. Liu***, W. R. Chen*, "Intramolecular Structural Change of PAMAM Dendrimers in Aqueous Solutions Revealed by Small-Angle Neutron Scattering" *J. Phys. Chem. B* 114, 1751-1756 (2010).

37) L. Porcar, P. Falus, W. R. Chen, A. Faraone, E. Fratini, K. Hong, P. Baglioni, **Y. Liu***, "Formation of the Dynamic Clusters in Concentrated Lysozyme Protein Solutions", *J. of Physical Chemistry Letters* **1**, 126-129 (2010).

Selected to Scientific Highlights of Institut Laue-Langevin, France

38) S. Xiang, W. Zhou, J. M. Gallegos, **Y. Liu***, B. Chen*, "Exceptionally High Acetylene Uptake in a Microporous Metal-Organic Framework with Open Metal Sites", *J. of the American Chemical Society* **131**, 12415-12419 (2009).

(Highlighted by NIST Tech Beat, Aug. 25, 2009. Reported by many websites worldwide.

http://www.nist.gov/public_affairs/techbeat/tb2009_0825.htm#acetylene. "Safer, Denser Acetylene Storage in an Organic Framework")

39) M. Xue, **Y. Liu**, R. M. Schaffino, S. Xiang, X. Zhao, G. S. Zhu, B. Chen, "New Prototype IRMOF $Zn_4O(FMA)_3$ Exhibiting High Gas Storage", *Inorg. Chem.* **48** (11), 4649-4651 (2009).

40) C. I. Contescu, C. M. Brown, **Y. Liu**, V. V. Bhat, N. C. Gallego, "Detection of Hydrogen Spillover in Palladium-modified Activated Carbon Fibers During Hydrogen Adsorption", *J. Phys. Chem. C* **113**, 5886-5890 (2009).

41) C. M. Brown, **Y. Liu**, T. Yildirim, V. K. Peterson, C. J. Kepert, "Hydrogen Adsorption in HKUST-1: a Combined Inelastic Neutron Scattering and First-principle Study", *Nanotechnology*, **20**, 204025, (2009).

42) E. W. Huang, P. K. Liaw, L. Porcar, **Y. Liu**, Y. L. Liu, J. J. Kai, W. R. Chen, "Study Nano-Precipitates Using Small Angle Neutron Scattering", *Applied Physics Letters* **93**, 161904 (2008).

43) T. Li, K. Hong, L. Porcar, R. Verduzco, P. D. Butler, G. S. Smith, **Y. Liu***, W. R. Chen*, "Assessing the Intra-molecular Cavity of a PAMAM Dendrimer in Aqueous Solutions by Small Angle Neutron Scattering", *Macromolecules* **41**(22), 8916-8920 (2008).

44) L. Porcar, **Y. Liu**, R. Verduzco, K. Hong, P. D. Butler, L. J. Magid, W. R. Chen, "Structural Investigation of PAMAM Dendrimers in Aqueous Solutions Using Small-Angle Neutron Scattering: Effect of Generation", *J. of Physical Chemistry B* **112**(47), 14772-14778 (2008).

45) **Y. Liu***, J. Her, A. Dailly, A. J. Ramirez-Cuesta, D. A. Neumann, C. M. Brown*, "Reversible Structure Transition in MIL-53 with Large Temperature Hysteresis", *J. of the American Chemical Society* **130**, 11813-11818 (2008).

46) J. Luo, H. Xu, **Y. Liu**, Y. Zhao, L. L. Daemen, C. M. Brown, T. V. Timofeeva, S. Ma, H. C. Zhou, "Hydrogen Adsorption in a Highly Stable Porous Rare-Earth Metal-Organic Framework: Sorption Properties and Neutron Diffraction Studies", *J. of the American Chemical Society* **130**, 9626 (2008).

47) **Y. Liu**, H. Kabbour, C. M. Brown, D. A. Neumann, C. C. Ahn, "Increasing the Density of Adsorbed Hydrogen with Coordinatively Unsaturated Metal Centers in Metal-organic Frameworks", *Langmuir* **24**, 4772 (2008).

- Highlighted by NIST Tech Beat, Apr. 1, 2008. Reported by numerous websites worldwide. http://www.nist.gov/public_affairs/techbeat/tb2008_0401.htm#hydrogen. "More Solid than Solid: A Potential Hydrogen-Storage Compound".)

- One of five most cited papers published by *Langmuir* in 2008 (citations till July, 2009).
- Selected to NCNR Accomplishments and Opportunities of 2008.

48) 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**"**, submitted to *J. of Physical Chemistry B* **112**, 4309 (2008).

49) V. K. Peterson, **Y. Liu**, C. M. Brown, C. J. Kepert, "Structure Characterization of $D_2$ in $Cu_3$(1,3,5-benzenetricarboxylate)$_2$ Using Neutron Powder Diffraction", *Materials Science Forum* **561-565**, 1601-1604 (2007).

50) W. R. Chen, L. Porcar, **Y. Liu**, P. D. Butler, L. J. Magid, "Study the Counterion Effect on the Structural Properties of Charged G4 PAMAM Dendrimer Aqueous Solutions by Small Angle Neutron Scattering", *Macromolecules* **40**, 5887 (2007).

51) S. H. Chen, M. Broccio, **Y. Liu**, E. Fratini, P. Baglioni, "The 2Y Model and its Applications: the Cases of Charged Proteins and Copolymer Micellar Solutions", *J. of Applied Crystallography* **40**, S321 (2007).

52) **Y. Liu**, C. M. Brown, J. L. Blackburn, D. A. Neumann, T. Gennett, L. Simpson, P. Parilla, A. C. Dillon, M. J. Heben, "Inelastic Neutron Scattering of $H_2$ Adsorbed in Boron Substituted Single Wall Carbon Nanotubes", *J. of Alloys and Compounds* **446-447**, 368 (2007).

53) **Y. Liu**, C. M. Brown, D. A. Neumann, V. K. Peterson, C. Kepert, "Inelastic Neutron Scattering of $H_2$ Adsorbed in HKUST-1", *J. of Alloys and Compounds* **446-447**, 385 (2007).

54) M. Dinca, W. S. Han, **Y. Liu**, A. Dailly, C. M. Brown, D. A. Neumann, J. R. Long, "Observation of $Cu^{II}$-$H_2$ Interactions in a Fully-Desolvated, Sodalite-Type Metal-Organic Framework", *Angewandte Chemie International Edition* **46**, 1419 (2007).

55) M. Dinca, A. Dailly, **Y. Liu**, C. M. Brown, D. A. Neumann, J. R. Long, "Hydrogen Storage in a Microporous Metal-Organic Framework with Exposed $Mn^{2+}$ Coordination Sites", *J. of the American Chemical Society* **128**, 16876 (2006).
- Highlighted by Chemical & Engineering News, Vol. 85, 11 (2007). It has been cited as "**significant milestone** in hydrogen storage".
- Ranked as one of Journal of the American Chemical Society's **Hot Papers**: Nov. 2007, January, March, and May 2008.
- Selected to NCNR Accomplishments and Opportunities of 2006.

56) V. K. Peterson, **Y. Liu**, C. M. Brown, C. J. Kepert, "Neutron Powder Diffraction Study of $D_2$ Sorption in $Cu_3$(1,3,5-benzenetricarboxylate)$_2$", *J. of the American Chemical Society* **128**, 15578 (2006).
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**Conference Proceedings:**

73) L. Porcar, **Y. Liu**, K. Hong, P. D. butler, E. W. Huang, W. R. Chen, "Counterion Association and Structural Conformation Change of Charged PAMAM Dendrimer in Aqueous Solutions Revealed by Small Angle Neutron Scattering" *Macromol. Symp.* 279, 65-71 (2009).

74) C. M. Brown, **Y. Liu**, D. A. Neumann, "Neutron Powder Diffraction of Metal-Organic Frameworks for Hydrogen Storage" *PRAMANA Physics Journal* **71**, 755-760 (2008).

75) C. M. Brown, **Y. Liu**, W. R. Chen, S. P. Tung, and B. J. Hwang, "Dynamics of Water in a Porous Phosphate Glass", *Proceedings for the 8th International Conference on Quasi-Elastic Neutron Scattering 2006*, page 45-50, Published by Materials Research Society, 2007.

76) **Y. Liu,** C. M. Brown, D. A. Neumann, H. Kabbour, C. C. Ahn, "Hydrogen adsorption in MOF-74 studied by inelastic neutron scattering", in Life Cycle Analysis for New Energy Conversion and Storage Systems, edited by V. M. Fthenakis, A. C. Dillon, and N. Savage, *Materials Research Society Symposium Proceeding* **1041E**, 1040-R2_03 (2007)**.** (invited)

77) C. M. Brown, **Y. Liu**, H. Hui, A. A. Puretzky, B. Zhao, C. M. rouleau, D. Styers-Barnett, D. B. Geohegan, "Inelastic Neutron Scattering as a Probe of the States of Hydrogen in Carbon Materials", *2007 Carbon Conference Proceedings*, Seattle (2007).

78) H. Hu, B. Zhao, A. A. Puretzky, C. M. Rouleau, D. Styers-Barnett, D. B. Geohegan, C. M. Brown, **Y. Liu**, W. Zhou, H. Kabbour, D. A. Neumann, C. C. Ahn, "Tailoring of Single Carbon Nanohorns for Hydrogen Storage and Catalyst Supports", *2007 Carbon Conference Proceedings*, Seattle (2007).

79) **Y. Liu,** C. M. Brown, T. B. Baumann, D. A. Neumann, "Applications of Neutron Scattering Techniques to Hydrogen Storage Materials", *Transactions of the American Nuclear Society* **97**, 319 (2007). (invited)

**Other publications:**

80) L. Porcar, **Y. Liu**, W.R. Chen, K. Hong, P. Falus, A. Faraone, E. Fratini, P. Baglioni, "Dynamic clusters in lysozyme solution" Scientific highlights in *Annual Report of ILL*, (2010).

81) C. M. Brown, **Y. Liu**, H. Kabbour, D. A. Neumann, C. C. Ahn, "Denser than solid hydrogen: improving hydrogen storage", Scientific highlights in *Annual Report of NCNR*, (2008).

82) M. Dinca, A. Dailly, **Y. Liu**, C. M. Brown, D. A. Neumann, J. R. Long, "Enhanced hydrogen storage in a microporous metal-organic framework" Scientific highlights in *Annual Report of NCNR*, (2006).

**Invited Talks:** (27 invited talks at national and international meetings and organizations.)

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| Jan. 2014 | Bimolecular Interaction Technologies Center (BITC) Workshop on Concentrated mAb solutions at Amgen Inc., Thousand Oaks, California, USA |
| Aug. 2013 | International Materials Research Congress at Cancun, Mexico<br>Understanding concentrated protein solutions with competing potential features |
| May 2013 | European Spallation Source at Lund, Sweden<br>Adsorption of small molecules in porous materials: from metal-organic frameworks to colloidal particles with open structure |
| May 2013 | *Neutrons and Life Science*, at Lund, Sweden (Co-organized by European Spallation Sources)<br>Neutron Scattering Studies of Concentrated Protein Solutions |
| Oct. 2012 | *QENS & WINS 2012* at Nikko, Japan<br>(10th International Conference on Quasielastic Neutron Scattering & 5th Workshop on Inelastic Neutron Spectrometer from Sep. 30 to Oct. 4, 2012)<br>Probing reversible clusters in concentrated protein solutions |
| Feb. 2012 | Department of Nuclear Science & Engineering, MIT<br>Relation between cluster formation and intermediate-range order in colloidal systems |
| Oct. 2011 | Amgen Inc., Thousand Oaks, California, USA<br>Cluster Formation in Concentrated Lysozyme Protein Solutions |

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| Jun. 2011 | HANARO, Korea Atomic Energy Research Institute, Daejeon, Korea<br>Applications of neutron scattering for soft-condensed matter and hydrogen storage materials |
| Jun. 2011 | Department of Engineering Physics, Tsinghua University, China<br>Neutron Scattering Studies of Soft-condensed Matter Materials at Modern Facilities |
| Mar 2011 | Department of Chemical Engineering, University of Delaware<br>Studying structure and dynamics of concentrated colloidal solutions under equilibrium and non-equilibrium conditions using neutron scattering techniques |
| Nov 2010 | Institut Laue-Langevin, Grenoble, France<br>Intermediate range order structure in lysozyme solutions |
| Nov 2010 | International workshop on dynamic crossover phenomena in water and other glass forming liquids, Fiesole, Florence, Italy<br>Intermediate range order structure in lysozyme solutions |
| Aug 2010 | Colloquium talk at Department of Physics, Temple University<br>Application of Neutron Scattering to Biological and Hydrogen Storage Materials |
| Jun. 2009 | Workshop on Compact Pulsed Hadron Sources (CPHS09), Tsinghua University, Beijing, China<br>Structural characterization of nanoscale materials using small angle neutron scattering |
| Feb. 2009 | Department of Physics, The Chinese University of Hong Kong, Hong Kong, China<br>Hydrogen adsorption properties in metal-organic frameworks |
| Nov. 2008 | The 2nd US-China Workshop on Scientific & Industrial Applications Using Neutron, Muons & Protons, 2008, Dongguan City, Guangdong Province, China<br>Probing Hydrogen in Storage Materials Using Neutron Scattering Techniques |
| Nov. 2008 | Institute of Chemistry, Chinese Academy of Science, China.<br>Applications of Neutron Scattering Techniques for Materials Science Research |
| May 2008 | American Conference on Neutron Scattering, 2008, Santa Fe, NM<br>(For the tutorial session of SANS and Reflectometry for Soft Condensed Matter Research)<br>Colloidal Interactions in Solutions |
| Apr. 2008 | Canadian Neutron Beam Centre, Ontario, Canada<br>Hydrogen Storage in Metal-Organic Frameworks |
| Apr. 2008 | Department of Physics & Astronomy, McMaster University, Canada<br>Improving Hydrogen Storage in Metal-organic Frameworks Using Exposed Metal Sites |
| Feb. 2008 | Department of Materials Science and Engineering, Uni. Of Pennsylvania<br>Improving Hydrogen Storage in Metal-organic Frameworks Using Exposed Metal Sites |
| Dec. 2007 | Materials Science Division, Argonne National Laboratory, Argonne, IL<br>Storing $H_2$ in Nano-porous Materials |
| Nov. 2007 | Material Research Society, 2007 Fall Meeting, Boston, MA<br>Impact of Coordinatively Unsaturated Metal Sites of MOFs on $H_2$ Affinity and Surface Packing Density |
| Nov. 2007 | ANS/ENS International Meeting and Nuclear Technology Expo, Washington D. C.<br>Application of Neutron Scattering Techniques to Hydrogen Storage Materials |
| Feb. 2007 | SNS at Oak Ridge National Laboratory, Oak Ridge, TN<br>Applications of Neutron Scattering to Biological and Hydrogen Storage Materials |
| Nov. 2006 | Department of Nuclear Science and Engineering, MIT, Boston, MA<br>Characterization of Hydrogen Structure and Dynamics by Neutron Scattering |
| Apr. 2005 | Squishy Physics Seminar at Harvard University |

An effective long-range attraction between protein molecules in solutions studied by small angle neutron scattering.

**Contributed Talks:**

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| Mar. 2013 | American Physical Society National March Meeting, 2013 at Baltimore, MD<br>Session J34: Charged Colloids with Short-Range Attractions II<br>Transition from monomeric state to dynamic cluster state in lysozyme protein solutions |
| Oct. 2012 | AICHE 2012 at Pittsburgh, PA<br>Characterization of Monoclonal Antibody Conformations and Self-Associations at High Concentrations Using Neutron Scattering Techniques |
| Jun. 2012 | American Conference on Neutron Scattering<br>Intermediate-Range Order in Charge Colloidal Systems with a Short-range Attraction |
| Feb. 2012 | American Physical Society National Meeting, Boston, MA<br>Intermediate-range order in protein suspensions |
| Jun. 2010 | 84$^{th}$ Colloid and Surface Science Symposium<br>Dynamic Clusters in Lysozyme Protein Solution |
| May 2010 | Spallation Neutron Source, Oak Ridge National Laboratory<br>Dynamic Clusters in Lysozyme Protein Solution |
| Aug. 2009 | 238$^{th}$ ACS National Meeting and Exposition, Washington D. C.<br>Equilibrium protein cluster in solutions: Dynamic or Static? |
| Jun. 2009 | 13$^{th}$ International Conference on Surface and Colloid Science and the 83$^{rd}$ ACS Colloid & Surface Science Symposium, New York, NY<br>Study of the Short-Range Attraction of Globular Proteins in Solution |
| May 2008 | American Conference on Neutron Scattering, 2008, Santa Fe, NM<br>Investigating Dihydrogen Binding to Coordinatively Unsaturated Metal Centers in Metal-organic Frameworks |
| Mar. 2008 | Materials Research Society, 2008 Spring Meeting, San Francisco, CA<br>Reversible Structural Transition of MIL-53 and its Effect on Hydrogen Storage |
| Dec. 2007 | NIST Center for Neutron Research, Gaithersburg, MD<br>Hydrogen Storage in Nano-porous Materials |
| Nov. 2007 | Material Research Society, 2007 Fall Meeting, Boston, MA<br>Improving the Packing Density of Adsorbed Hydrogen and a Novel Configuration of Hydrogen Molecules in MOF-74 |
| Mar. 2007 | 233$^{rd}$ American Chemical Society National Meeting, Chicago, IL<br>SANS Studies of the Molecular Conformation and Structure of Charged G4 PAMAM Dendrimers in Aqueous Solutions |
| Mar. 2007 | American Physical Society March Meeting, Denver, CO<br>Direct $H_2$ binding to Unsaturated Metal Sites in Metal-organic Frameworks |
| Mar. 2007 | American Physical Society March Meeting, Denver, CO<br>SANS Studies of the Molecular Conformation and Structure of Charged G4 PAMAM Dendrimers in Aqueous Solutions |
| Nov. 2006 | Material Research Society, 2006 Fall Meeting, Boston, MA<br>Direct Observation of Hydrogen Binding to Unsaturated Metal Sites in Metal-organic Frameworks |
| Apr. 2006 | Material Research Society, 2006 Spring Meeting, San Francisco, CA<br>Quantum Dynamics of $H_2$ in MOF5 Studied by Inelastic Neutron Scattering |
| Oct. 2005 | Symposium on Bio-Materials and Neutron, AVS meeting, Boston, MA |

Effective Protein-Protein Interaction and Clustering Phenomenon in Solution Studied by SANS.