Biographical Sketch

Professor Tao Xu
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Xu Group Page and Google Scholar Site

Professional Preparation

Bachelor degree in Fine Chemistry and minor in Public Relation and Administrative Management, East China University of Science and Technology (ECUST), Shanghai	1991-1995
Research Assistant, Institute of Fine Chemicals, ECUST, Shanghai, China,	1995-1998
Ph.D. Department of Chemistry, The University of Alabama, Tuscaloosa, AL, USA	1999-2003
Post-doc, Department of Chemistry, Texas A&M University, USA	2003-2004
Post-doc, Materials Science Division, Argonne National Laboratory, USA	2004-2006

Appointments

August 2017-Present: Professor, Department of Chemistry & Biochemistry, Northern Illinois University, DeKalb, Illinois, USA

August 2012-2017: Associate Professor, Department of Chemistry & Biochemistry, Northern Illinois University, DeKalb, Illinois, USA

August 2006-August 2012: Assistant Professor, Department of Chemistry & Biochemistry, Northern Illinois University, DeKalb, Illinois, USA

Research Synopsis

The Xu Group conducts fundamental studies on the quantum-level interactions of electrons and photons within precisely engineered materials. Our mission is to master the control of energy and information at their most fundamental scales, bridging the gap between quantum mechanics and transformative technology through two progressive pillars:

- Investigating Fundamental Quantum Dynamics: We investigate how light and matter interact at the interfaces of functional materials to uncover the governing principles of energy and spin. By gaining these fundamental insights, we not only enhance the efficiency and durability of solar energy conversion but also translate these discoveries into spin-based coherent structures for the next generation of quantum information science.
- Engineering Quantum-Informed Architectures: Building upon these fundamental principles, we transition from observation to construction. By employing the quantum-informed design of atomic-scale architectures, we bridge the gap between quantum mechanics and tangible applications in electrocatalysis, photocatalysis, photovoltaics, batteries, and advanced sensors.

Awards and Honors

1. R&D 100 Award for "Ultrafast and ultrasensitive hydrogen sensors based on self-assembly monolayer promoted 2-dimensional palladium nanoclusters", October, **2006**
2. R&D Magazine Micro/Nano 25 Award, **2006**
3. NIU Outstanding Mentor Award, **2010**
4. National Science Foundation CAREER Award, **2012**
5. Honored International Chair Professorship, Taipei University of Technology **2015**

6. Northern Illinois University Excellence in Innovation Award recipient, **2016**
7. Best Presentation Award in Energy and Fuel Session, 252nd American Chemical Society National Meeting in Philadelphia, PA August **2016**
8. NIU Presidential Research Professorship, July, **2019,** Elevated to Distinguished Professor **2023**.
9. R&D 100 Award for "Versatile Method for Preparing Highly Effective Electro-catalyst for CO2 to Chemical Conversion", Sept, **2020**
10. Highlighted as Researchers to Know 2020 by Illinois Science and Technology Coalition, **2020.**
11. National Science Foundation Special Creativity Award, **2022**
12. Highlighted as Innovator to Know 2023 by Illinois Innovation Network, **2023.**
13. NIU Distinguished Graduate Faculty Award, **2023**.
14. NIU Board of Trustee Professorship **2024**

Memberships

Member of American Chemical Society, Member of Materials Research Society

PhD graduates under my advisory and post-graduate career paths

- Chi-kai Lin, Ph.D. (2007–2011), Post-doc at Argonne National Laboratory, he is now a Advanced Material Scientist at Apple Inc. (A Fortune #1 company)
- Zhenzhen Yang, Ph.D. (2007–2011), Post-doc at Argonne National Laboratory, now an Assistant Chemist at Chemical Sciences and Engineering, Argonne National Laboratory.
- Xiaoqiao Zeng, Ph.D. (2008–2012, co-advised by Zhili Xiao), Post-doc at Argonne National Laboratory, then a term Chemist at Chemical Science and Engineering Division of Argonne National Laboratory.
- Lauren Grabstanowicz, Ph.D. (2010–2014), Research Scientist and now a project manager at Alcoa Inc. (A Fortune 125 company).
- Heather Barkholtz, Ph.D. (2012–2016), Post-doc at Sandia National Laboratory, worked as a Chemical Test Section Chief at the Wisconsin Department of Transportation, and now an assistant professor at University of Wisconsin Madison with a joint appointment between the Wisconsin State Laboratory of Hygiene and the UW's School of Pharmacy.
- Qinglong Jiang, Ph.D. (2012–2015), Post-doc at National Magnetic Field Laboratory and Florida State University, now an Assistant Professor at Department of Chemistry and Physics, University of Arkansas at Pine Bluff.
- Jue Gong, Ph.D. (2014-2018), post-doc at Brown University, now an Associate Professor at University of Electronic Technology, China.
- Dominic Rebolla, Ph.D (2014-2019), current under physical recovery
- Dean Walters, Ph.D in 2019, now a senior Engineer at Argonne National Laboratory
- Haiping Xu, Ph.D. (2015-2020), now a postdoc at Argonne National Laboratory in Apple Project.
- Crystal Ferels, Ph.D. (2016-2020, co-advised with Chong Zheng), now a postdoc at Argonne National Laboratory.

- Erik Sarnello, Ph.D. (2017-2021, co-advised with Tao Li), now a postdoc at Argonne National Laboratory.
- Xun Li, Ph.D. (2018-2022), now a Research Scientist at Applied Materials Inc, (A Fortune 156 company), Santa Clara, California.
- Jianxin Wang, Ph.D. (2019-2024), now a post-doc at University of Chicago and Argonne National Laboratory.

Publications on Peer-Reviewed Journals (H-index=48, i10 index=92, total citation>10,000)
Xu Google Scholar Site

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108. Faghani, M.; Janusz, I.; Mueller, R.; Xiao, X.; Xu, T.; Tatara, R. A.; Vaez, M. "Manufacturing-Ready Hemp-Fiber Reinforced Composites: Extrusion Compounding, Pelletization, and Injection-Molding Outcomes". ***Journal of Polymer Engineering,*** **2026**, Accepted.

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106. Zhu, Q.; Xu, J.; Liu, C.; Jiang, W.; Yang, J.; Yang, Z.; Chen, X.; Son, S.-B.; Koirala, K. P.; Wang, C.; Wostoupal, O.; Liu, Q.; Xu, T.; Zhang, Z. Weakly Solvating Electrolyte to Enable Lithium- and Manganese-Rich Cathode-Based Li-Ion Batteries, ***ACS Energy Lett***. **2025**, *10*, 5022–5031.

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15. Patel, U.; Xiao, Z. L.; Hua, J.; Xu, T.; Rosenmann, D.; Novosad, V.; Pearson, J.; Welp, U.; Kwok, W. K.; Crabtree, G. W. Origin of the matching effect in a superconducting film with a hole array. ***Physics Review B*****, 2007**, *76*, 020508.

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6. Metzger, R. M.; Konovalov, V.; Sun, M.; Xu, T.; Zangari, G.; Xu, B.; Benakli M.; Doyle, W. D. Magnetic Nanowires in Hexagonally Ordered Pores of Alumina. ***IEEE Transactions on Magnetism*, 2000**, *36(Part I)*, 30–35.

5. Xu, T.; Metzger, R. M. Light-Induced Enhancement of Rectification by Monolayer of Hexadecylquinolinium Tricyanoquinodimethanide between Al Electrodes. ***Mater. Res. Soc. Symp. Proc.*, 2000**, *620*, JJ10.8.

4. J. Su, Xu, T.; Chen K.; Tian, H. Excited State Properties of bis-1,8-Naphthalimides. ***Dyes and Pigments*, 2000**, *44*, 87–92.

3. Tian, H.; Xu, T.; Zhao, Y.; Chen, K. Two-Path Photo-Induced Electron Transfer in Naphthalimide-Based Model Compound. ***Journal of Chemical Society, Perkin Transaction 2*, 1999**, 545–549.

2. Xu, T.; Su, J.; Chen K.; Tian, H. Synthesis of bis- and tris- 1,8-naphthalimides bridged by N-N bond. ***Heterocyclic Communications*, 1999**, *5*, 31–36.

1. Su, J.; Xu, T.; Chen, K.; Tian, H. Electroluminescence properties of twisted dyad 1,8-naphthalic anhydride derivatives. ***Synthetic Metals*, 1997**, *91*, 249–251.

Book Chapters

3. Jue Gong and Tao Xu: Chapter 4. Perovskite Materials in Biomedical Applications, https://www.springer.com/gp/book/9789811512667#aboutBook
In the book of Revolution of Perovskite Synthesis, Properties and Applications Editors: Arul, Narayanasamy Sabari, Nithya, V.D. (Eds.)
https://www.springer.com/gp/book/9789811512667#aboutBook

2. Guilian Zhu, Tao Xu, Fuqiang Huang, "The Black and White Issue of Nanotitania" Chapter 5, page 77-117, Feb. 2017, in the book of "Black TiO_2 Nanomaterials for Energy Applications" Edited by: Xiaobo Chen (University of Missouri-Kansas City, USA), Yi Cui (Stanford), World Scientific Publishing Co Pte Ltd, ISBN: 978-1-78634-165-5.

1. Tao Xu, "Nanoarchitectured Electrodes for Enhanced Electron Transport in Dye-Sensitized Solar Cells", Chapter 7, page 271-298, "Energy Efficiency and Renewable Energy through Nanotechnology", Ed. Z. Ling, Springer. ISBN: 978-0-85729-637-5.

Invited Colloquium Talks, Conference Oral Presentations and workshop presentation

68. "Light-induced exciton-4f spin interaction in hybrid perovskite semiconductors", Contributed talk by SESSION: Light-Matter Interactions in Molecular Systems and Emerging Semiconductors, 2025 ACS National Meeting in San Diego, CA, March 25, 2025.

67. “Electrocatalytic upgrading of CO2 to multicarbon chemicals on oxygenated metal catalysts”, **Invited** talk by SESSION: CO2 Utilization & Upgrading for Net Zero Emission, 2025 ACS National Meeting in San Diego, CA, March 23, 2025.

66 “Electrochemical CO2 Conversion to Value-added Products: Unlock The Reaction Mechanism Towards Multicarbon Products”, **Invited Keynote** talk by 9th International Conference on Catalysis and Chemical Engineering in San Francisco, CA, Feb. 24, 2025.

65. “Fueling the Future: pursuing fundamental understanding of perovskite solar cells and electrochemical CO2 conversion”, **Invited** colloquium talk at Department of Chemistry, The University of Alabama, Tuscaloosa, Alabama, USA, Feb. 18, **2025**.

64. “Light-Induced Kondo-Like Spin-Spin Interaction in 4f Doped Hybrid Perovskites Semiconductors”, Contributed talk in Session: QT01.09 Chiral Light-Matter Interactions II, Materials Research Society Meeting Fall 2024 at Boston, MA, December 4th, **2024**.

63. “Photo-Induced Exciton-Localized Spin Interaction in Hybrid Perovskites”, **Invited** Talk by Chicago Quantum Exchange, Chicago, Illinois, November 7th, **2024**.

62. “Catalyzed porous electrodes for CO2 conversion to multicarbon organics at high single product selectivity and low over-potential”, SYMPOSIUM: EN05: Electrodes for Chemical and Energy Conversion Technologies, Materials Research Society Meeting Fall 2024 at Boston, MA, December 5th, **2024**.

61. “Photo-Induced Exciton-Localized Spin Interaction in Hybrid Perovskites”, **Invited** talk at Telluride Science and Innovation Workshop on “Electronic and Structural Dynamics in Hybrid Perovskites: Theory Meets Experiment”, in Telluride, Colorado, Oct. 2, **2024.**

60. “Tackling the stability, scalability and toxicity of perovskite solar cells”, **Invited** Oral presentation at Division of Energy and Fuels, American Chemical Society National Meeting Fall 2024, Denver, Colorado, USA on August 19, **2024**.

59. “Electrocatalytic carbon dioxide conversion to value-added multicarbon organics at high single product faradaic efficiency and low over-potentials”, **Invited** Oral presentation at Division of Energy and Fuels, American Chemical Society National Meeting Fall 2024, Denver, Colorado, USA on August 19, **2024**.

58. “Electrocatalytic Conversion of Carbon Dioxide to Value-added Multi-carbon Organics” **Invited** virtual presentation at National Energy Technology Laboratory, Pittsburgh, PA, April 4, **2024**.

57. “Photo-Induced Spin-Spin Coupling in Doped Organic-Inorganic Hybrid Perovskites”, Oral presentation at Division of Physical Chemistry, American Chemical Society National Meeting Spring 2024, New Orleans, Louisiana, USA on March 20, **2024**.

56. “Photocatalysis in consideration of dopants, defects, morphology, internal electric field and beyond”, **Invited** Oral presentation at Division of Physical Chemistry, American Chemical Society National Meeting Spring 2024, New Orleans, Louisiana, USA on March 20, **2024**.

55. “Critical gateway technologies for perovskite solar cells”, **Invited** oral presentation at Division of Energy and Fuels, American Chemical Society National Meeting Spring 2024, New Orleans, Louisiana, USA on March 20, **2024**.

55. “Electrocatalytic Carbon Dioxide Conversion to Value-Added Multicarbon Organics at High Single Product Faradaic Efficiency And Low Over-Potential”, **Invited** oral presentation at 8th International Conference on Catalysis and Chemical Engineering, SESSION-1, Boston, MA February 27, **2024**.

54. “R&D on Gateway Technologies for Perovskite Solar Cells” Presented at Materials Research Society Fall **2023** National Meeting at Boston, MA, November 27, **2023**.

53. “Low Melting point alloys for perovskite solar cells”, invited virtual talk by Indium Inc., Presented by Tao Xu on August 17, **2023**, permitted by NIU and NDA signed between NIU and Indium Inc.

52. “Perovskite solar cells panels for small mobile vehicles”, invited virtual talk by National Cycle Inc, Presented by Tao Xu on Aug. 1, **2023**, permitted by NIU and NDA signed between NIU and National Cycle Inc.

51. “Scalable Integration of CO2 Capture and Electrocatalytic Conversion to Organic Liquids” U.S. Department of Energy, Advanced Manufacturing and Materials Technology Office (AMMTO) & Industrial Efficiency & Decarbonization Office (IEDO) Joint Peer Review workshop May 16th-18th, **2023**, Washington, D.C.

50. “Photo-Induced Spin-Spin Coupling in Doped Organic-Inorganic Hybrid Perovskites”, oral presentation at Division of Electronics, Optics and Photonics, Materials Research Society National Meeting Spring 2023, San Francisco, CA, USA on April 13, **2023**.

49. “In Situ X-Ray Absorption Study of Electrocatalytic Carbon Dioxide Conversion to Multicarbon Organic Liquids at High Single-Product Faradaic Efficiency and Low Over-Potentials”, oral presentation at Division of Characterization, Materials Research Society National Meeting Spring 2023, San Francisco, CA, USA on April 12, **2023**.

48. “Light-controlled spin coupling in doped hybrid perovskites”, oral presentation at Division of Energy and Fuels, American Chemical Society National Meeting Spring 2023, Indianapolis, Indiana, USA on March 28, **2023**.

47. “Lead sequestration for perovskite solar cells”, oral presentation at Division of Environmental Chemistry, American Chemical Society National Meeting Spring 2023, Indianapolis, Indiana, USA on March 28, **2023**.

46. “Electrocatalytic carbon dioxide conversion to multicarbon organic liquids at high single product Faradaic efficiency and low overpotentials”, oral presentation at Division of Catalysis Science and Technology, American Chemical Society National Meeting Spring 2023, Indianapolis, Indiana, USA, on March 27, **2023**.

45. “Cold thoughts on perovskite fever”, **Invited** colloquium talk at Kent State University, Kent, Ohio, USA, Feb. 22, **2023**.

44. Virtual talk invited by Panasonic, America, “Dry air-stable and dendrite-free metal lithium anode for lithium battery” Oct. 2, **2022**.

43. Virtual talk invited by Panasonic, Japan, “Technology for tackling stability and toxicity in emerging perovskite solar cells” Jan. 7, **2022**.

42. Department of Energy, Advanced Manufacturing Office Electrochemistry in Manufacturing - Virtual Workshop Series
    June 15, 2021- Electrochemistry overview and DOE’s interests, Active Participant
    June 17, 2021 - Manufacturing applications for electrochemistry, Active Participant
    Presented “Electrochemical conversion of CO2 to value-added organic liquids”
    June 22, 2021- R&D Needs for EChem deployment Active Participant
    June 29, 2021- Electrochemistry innovation ecosystem and cross-cutting enablers, Active Participant

41. Virtual talk invited by Corning Glass, Corning Innovation Center “Sequestration coating technology and critical glass technology for perovskite solar cells” July 25, **2021** 9:30am - 10:30am (Eastern Time)

40. “Dopants, Isotope, Pressure and Lead Sequestration for Hybrid Perovskite Materials”, Control ID: 3453932, Symposium: F.EL08: Frontiers of Halide Perovskites—Linking Fundamental Properties to Devices, recorded oral presentation (**Invited**) at Materials Research Society Fall National Meeting, virtual due to COVID19 pandemic, Nov.27-Dec.4, **2020**.

39. “Electronegativity-Guided Atomic Doping for Air-Stable and Dentrite-Free Li Metal Anode”, Control ID: 3481932, Symposium: F.EN03: Overcoming the Challenges with Metal Anodes for High-Energy Batteries, recorded oral presentation (**Invited**) at Materials Research Society Fall National Meeting, virtual due to COVID19 pandemic, Nov.27-Dec.4, **2020**.

38. “Electrochemical conversion of CO2 to fuels catalyzed by top-down synthesized supported metals”, Division of Energy and Fuels, **Invited** oral presentation at American Chemical Society National Meeting, Fall 2020, Virtually, USA on August, **2020**.

37. “Tackling the challenges in hybrid perovskite solar cells”, Division of Energy and Fuels, oral presentation at American Chemical Society National Meeting, Fall 2020, Virtually, USA on August, **2020**.

36. “Cold thoughts on perovskite fever”, **Invited** talk (converted to online due to COVID19) for Illinois Solar Decathlon at the University of Illinois at Urbana-Champaign, Illinois, USA, April. 23, **2020**.

35. “Cold thoughts on perovskite fever”, **Invited** Webinar talk for Illinois Sustainable Technology Center (ISTC), a part of the Prairie Research Institute at the University of Illinois at Urbana-Champaign, Illinois, USA, Nov. 4, **2019**. The webinar is available at https://www.istc.illinois.edu/events/sustainability_seminars.

34. “Photocatalytic water disinfection by rationally doped titania nanostructures and electrocatalytic synthesis of value-added fuels from CO2 (final paper number: ENFL 557)”, Division of Energy and Fuels, SESSION: Sustainable Energy & Water via Innovative Electrocatalytic, Photocatalytic & Hybrid Catalytic Systems, **Invited** oral presentation at American Chemical Society National Meeting, Fall 2019 in San Diego, CA, USA on August 28, **2019**.

33. “Ion-free and organic-free synthesis of supported metal electrocatalysts”, Division of Energy and Fuels, **Invited** oral presentation at American Chemical Society National Meeting, Orlando, Florida, USA on April 01, **2019**.

32. “Effects of dopants and pressure on the stablity and optoelectroincs of hybrid perovskite materials”, Division of Energy and Fuels, Oral presentation at American Chemical Society National Meeting, Orlando, Florida, USA on April 01, **2019**.

31. “Cold thoughts on perovskite fever”, **Invited** colloquium talk at Department of Chemistry, Middle Tennessee State University, Murfreesboro, TN, USA, Feb. 21, **2019**.

30. “Cold thoughts on perovskite fever”, **Invited** colloquium talk at Department of Physics and Astronomy, Valparaiso University, Valparaiso, Indiana, IN, USA, Sept. 21, **2018**.

29. “Synchrotron X-ray study of metal nanoparticles synthesized via metal-in-Li solutions”, **Invited** Oral Presentation at American Chemical Society National Meeting, New Orleans, LA, USA on March 22, **2018**.

28. “Cold Thoughts on Perovskite Fever” **Invited** colloquium talk at Department of Chemistry, University of South Dakoda, Vermillion, SD, USA, Oct. 30, **2017**.

27. “Cold Thoughts on Perovskite Fever”, **Contributed** Oral Presentation on 44th IEEE Photovoltaic Specialist Conference, Washington D.C. USA on June 28, **2017**.

26. “Cold Thoughts on Perovskite Fever” **Invited** colloquium talk at Department of Chemistry, University of South Dakoda, Vermillion, SD, USA, Oct. 30, **2017**.

25. “Cold Thoughts on Perovskite Fever”, Oral Presentation on 44th IEEE Photovoltaic Specialist Conference, Washington D.C. USA on June 28, **2017**.

24. "Exploring new opportunities in organic-inorganic hybrid perovskites", **Invited** Oral Presentation at American Chemical Society National Meeting, San Francisco, CA, USA on April 04, **2017**.

23. "Exotic syntheses of supported metal nanoparticles via metal-in-Li solutions", **Invited** Oral Presentation at American Chemical Society National Meeting, San Francisco, CA, USA on April 02, **2017**.

22**.** "Cold Thoughts on Perovskites Fever", Tao Xu, **Invited** colloquium talk at The University of South Florida, Tampa, FL, USA on Nov. 3, **2016**.

21. "Cold Thoughts on Perovskites Fever", Tao Xu, **Invited** Oral Presentation at American Chemical Society National Meeting, Philadelphia, PA, USA on August 21, **2016**. Awarded as the "Best Presentation" of Energy and Fuel Session.

20. "Tackling the Grand Challenges Facing Perovskites Solar Cells", Tao Xu, **Invited** Oral Presentation at American Chemical Society National Meeting, San Diego, CA, USA on March 14, **2016**.

19. "Tackling the Grand Challenges Facing Perovskites Solar Cells", Tao Xu, Oral presentation, Materials Research Society National Meeting, Boston, MA, USA on Nov. 30, **2015**.

18. "Perovskite solar cells---the renaissance of a known dye sensitizer for next generation photovoltaics" Tao Xu, **Invited** colloquium talk by Taipei University of Technology, Taipei, ROC, May 22nd, **2015**.

17. "Perovskite Solar Cells---The Renaissance of A Known Dye Sensitizer for Next Generation Photovoltaics", **Invited** Keynote Talk, Second International Conference on Sustainable Urbanization, Hong Kong, on January 9, **2015**.

16. "3D nanoarchitectured TCO for drift-transport in liquid electrolyte-based dye-sensitized solar cells", **Invited** oral presentation on American Chemical Society National Meeting in Dallas, TX, USA on March 18, **2014**.

15. "Direct Doping of Pd Nanocatalysts in Complex Metals for Enhanced Hydriding Kinetics", **Invited** oral presentation on American Chemical Society National Meeting in Indianapolis, IN, USA on Sept.9th **2013**.

14 "Three-Dimensional Nanoarchitectured Transparent Conducting Oxides for Photovoltaics", **Invited** oral colloquium presentation at The Xinjiang Technical Institute of Physics & Chemistry, Chinese Academy of Science, July 1-2, **2013**

13. "Surfactant-free Synthesis of monometallic and Multimetallic Precious Metal Nanoparticles", **Invited** colloquium talk by the Shanghai Institute of Ceramics, Chinese Academy of Science, June 18-19, **2013**.

12. "Advancing Beyond Current Generation of Photovoltaics and Electrochromics for Building Energy Efficiency", **Invited** colloquium talk by The Hong Kong Polytech University, Hong Kong, June 15, **2013**.

11. "Synthesis of Bimetallic Nanoalloys Directly from The Corresponding Bulk Alloys: An Organic-Free Process", **Invited** seminar talk by Argonne National Laboratory, Catalysis Club, Argonne, IL, USA, June, 11, **2013.**

10. "Synergistic Enhancement of Charge transport and Light Harvesting in Nanoarchitectured Photoelectrochemical Systems", **Invited** colloquium talk by State Key Lab for Crystal Materials, Shangdong University, China, Oct. **2011**.

9. Xu, T.* Gao, S.; "Rational Designs on TiO_2-based Nanocomposites for Solar Photocatalytic Purification" Oral presentation on Materials Research Society National Meeting, San Francisco, CA, April 27, **2011**.

8. "Strategic Photoelectrochemical Nanoarchitectures for Dye-Sensitized Solar Cells and Photocatalytic Oxidation", **Invited** colloquium presentation by Chinese Academy of Science, Institute of Chemistry, Beijing, China, May, 28, **2010**.

7. "Novel Device Fabrication and Synthesis of Nanostructured Precious Metals for Hydrogen Detection, Storage and Fuel Cell Applications", **Invited** colloquium talk by National Renewable Energy Laboratory, Golden, CO, USA April 9, **2010**.

6. "Comprehensive Interface Advancements for High-Efficient Dye-Sensitized Solar Cells", **Invited** colloquium talk by Department of Materials Science and Engineering, University of Utah, Salt Lake City, UT, USA, April 7, **2010.**

5. "New Nanoscale Interfaces for Hydrogen Detection and Dye-Sensitized Solar Cells", **Invited** colloquium talk by Department of Chemistry, Southern Illinois University, Carbondale IL, USA, April 2, **2010.**

4. "New Nanoscale Interfaces for Hydrogen Detection and Dye-Sensitized Solar Cells", **Invited** colloquium talk by Department of Chemistry, University of Illinois at Chicago, IL, USA, March 4, **2010.**

3. "Rapid Hydrogen Detection by Nanoscale Palladium and Quantitative Measurement of Hydrogen Uptake Using A Quartz Crystal Microbalance", **Invited** colloquium talk by School of Materials Engineering, Purdue University, West Lafayette, IN, USA, March 21, **2008**.

2. "Fast Hydrogen Sensors Based on Nanoscale Palladium", **Invited** oral presentation on Fifteenth Annual International Conference on Composites and Nano Engineering, Session 16a, Hainan Island, China, July 15-21, **2007**.

1. "Hydrogen Sensor and Storage Materials", Invited oral presentation on American Chemical Society Regional Meeting at Rockford College, Rockford, IL, March 19, **2007**.

Invited Poster Presentations

4. "Light-induced Kondo-like exciton-spin coupling in neodymium(II) doped hybrid perovskite", Center for Nanoscale Materials User Meeting, Argonne National Laboratory, May 6-8, **2024**, Lemont, Illinois, USA.

3. "Scalable Integration of CO_2 Capture and Electrocatalytic Conversion to Organic Liquids" on U.S. Department of Energy, Energy Efficiency and Renewable Energy (EERE), Advanced Manufacturing and Materials Technology Office (AMMTO) & Industrial Efficiency and Decarbonization Office (IEDO) joint peer review workshop, Washington, D.C. May 16th-18th, **2023**.

2."Nanoarchitectured Photoelectrodes for Enhanced Charge Transport in Dye-Sensitized Solar Cells" The 4th International Conference on The Industrialization of Dye-Sensitized Solar Cells, Colorado Spring, CO, USA, Nov.1-4, **2010**

1. "Strategic Photoelectrodes for Enhanced Electron Transport in Photovoltaic Devices", National Science Foundation, MERSEC Center Workshop on Electronic Transport in Nanoengineered Materials, University of Chicago, Sept. 16-18, **2010**

Representative Synergistic Activities and Community Outreach:

33. Elected to serve on the User Executive Committee at Argonne National Lab's Advanced Photon Source (APS).

32. Vice President of Northern Illinois University Chapter of the National Academy of Inventors. 2025-Present

31. One of the three organizers for Session of CO2 Conversion & Utilization-II: Electrochemical CO2 Conversion to Fuels and Valuable Chemicals, Division of Energy and Fuel, Spring 2025 American Chemical Society, San Diego, California, March, **2025**.

30. Presider at ACS Spring 2025 CATL and ENGL divisions, San Diego, California, March, 2**025**

29. Northern Illinois University Huskie Trek Talk "From Waste to Worth", May, 3, **2024**.

28. Attending the U.S. Department of Energy Review on Center for Nanoscale Materials (CNM) Argonne National Laboratory as CNM User Executive Committee member on May 10, 2024.

27. One of the three organizers for Session of Photocatalysis and Photoelectrocatalysis, Division of Energy and Fuel, Spring 2024 American Chemical Society, New Orleans, Louisiana March 17-21, **2024**.

28. Elected to serve on the User Executive Committee at Argonne's Center for Nanoscale Materials (CNM).

26. Presider for Spring 2023 ACS Symposium "Emerging Materials for Solar Energy Conversion and Utilization", Division of Energy and Fuels, American Chemical Society National Meeting Spring 2023, Indianapolis, Indiana, USA on March 28, 2023.

25. "Fueling the Future with Renewable Energy" presented at Board of Northern Illinois University Research Foundation, on Dec. 13, 2021.

24. Representing NIU faculty to present high-impact research work titled "Fueling the Future with Renewable Energy" (starting from 38':38''), presented at Board Of Trustee Meeting, Northern Illinois University, on Nov. 18, 2021.

23. "Fueling the Future with Renewable Energy" presented at Northern Illinois University STEM Café on May 12, 2021. This is an outreach effort for NIU.

22. Work together with Dr. Anna Quider, Assistant Vice President for Federal Relations of NIU, and Dara Little Assistant Vice President for Sponsored Programs Administration to brainstorm and compile a response to the Request for Information (RFI DE-FOA-0002540) on Inclusive Innovation and Entrepreneurship in Climate Technology from the U.S. Department of Energy.

21. Initialize and organize departmental response to University's emerging research initiative https://www.niu.edu/divresearch/emerging-research-initiatives/index.shtml. As the elected Director of the proposed ERI center, originally named as Sustainable Energy and Environmental Development (SEED) Initiative, now changed to Northern initiative for Clean Energy Research (NICER), Xu wrote the proposal and organize the founding members (Xu, Wheeler, Cheng, Nesterov, Li, now including Brown from Physics and Vahabzadeh from Engineering) meetings, prepared and defensed the interview by university administration on . Our proposal has been selected in the final run. The proposed initiative include faculty members from Chemistry, Physics and Engineering.

20. University service: Requested by Luke M. Sebby, Director of Innovation Partnerships and Technology Transfer, Division of Research and Innovation Partnerships, Xu represent NIU to attend the Air Force Warfighting Integration Capability Energy Challenge Definition Workshop, Dates: Tue, Aug 18, 2020 – Thu, Aug 20, 2020, location virtual, 4 hours/day, total 12 hours.

19. Representing Northern Illinois University on **Congressional** Energy and Environment Innovation Showcase on 12/9, Washington D.C. USA, Dec. 9-10, **2019**.

18. As a selected research-active faculty representative of NIU to attend the forum with Congressman Adam Kinzinger (member of Committee on Energy and Commerce) during his visit to NIU on 7/31/2018. My students and I exemplified the importance of federal investment in world-class scientific facilities such as Argonne's Advanced Photon Source, its impact to our students research and employment evidenced by the world-class scientific accomplishment achieved by our students. As quoted by news media, we "made it clear during this visit that national labs remain important to local and federal education and research." July 31, **2018**.

17. Editorial board members for Energies since **2018-2021**.

16. Session Chair of "Physical properties and characterization of perovskite PV" at 2016 IEEE 43rd Photovoltaic Specialists Conference (PVSC), Portland, OR, USA, June 5-10, **2016**.

15. Coached (Jan-May, 2016) the Illinois Science Olympiad Team for Meadow Glen Elementary School (A National Blue Ribbon School awarded by the U.S. Department of Education), and

the team won 4 First Place Awards among all 10 competition programs participated in by the elementary schools in the Chicago suburban area. May, 7, **2016**.

14. Recruitment colloquium "The Black and White Issue in Titanium Oxide", Department of Natural and Health Sciences, University of St. Francis, Concordia University-Chicago, and Associated Colleges of the Chicago Area (ACCA) Seminar Series, March 25th, **2014**.

13. Guest Editor for International Journal of Photoenergy in **2013-2014**.

12. Recruitment colloquium "3-D Transparent Conducting Oxides (TCO) Nanoarchitectures for Photovoltaic Solar Cells ", Department of Chemistry, University of Wisconsin La Crosse, La Crosse, WI, April 26th, **2013**.

11. NIU STEM Outreach and Energy and Environment Workshop(Sponsored by Xu's NSF Career Project) presented "Making Stuff Smaller," an exploration into the world of nanotechnology and materials science, in Sycamore, IL, October 23, **2012**.

10. Recruitment colloquium "Synergistic Enhancement of Charge transport and Light Harvesting in Nanoarchitectured Photoelectrochemical Solar Cells", Department of Chemistry, Eastern Illinois University, Charleston, IL, March. 28th, **2012**.

9. Recruitment colloquium "Advancing beyond Current Configuration of Dye-Sensitized Solar Cells", Department of Chemistry, University of Illinois at Springfield, IL, Sept. 29th, **2010.**

8. Recruitment colloquium "New Nanoscale Interfaces for Hydrogen Detection and Dye-Sensitized Solar Cells", Department of Chemistry and Environmental Sciences, Southern Illinois University at Edwardsville, IL, Dec. 9th, **2009.**

7. Physical Chemistry Session Chair for The 20TH Argonne Annual Undergraduate Symposium, Argonne National Laboratory, Argonne IL, Nov. 13, **2009**.

6. NIU Chemistry Open House Demonstration to Local High School Students and Teachers, Dekalb, IL, November 11, **2008**.

5. Materials Science Session Chair for The 19TH Argonne Annual Undergraduate Symposium, Argonne National Laboratory, Argonne IL, Nov. 7, **2008**.

4. "Self-Assembled Monolayers for Stiction Reduction in Micromachines" Tao Xu, Micro Assembly Systems Training Workshop, DeKalb, IL, December 10, **2007**,).

3. "Introduction to Nanoscale Materials" Tao Xu, Project Lead The Way, Meeting with High School Teachers in Chicago Suburban, DeKalb, IL, Nov. 9, **2007**.

2. Session Chair for Fifteenth Annual International Conference on Composites/Nano Engineering (ICCE), Hainan Island, China July 19, **2007**.

1. Community outreach: participated the production of educational video for introducing hydrogen economy and hydrogen sensors to Chicago area high schools through Argonne Division of Education Program, Argonne National Laboratory, Feb-April **2006**.

Professional Service:

1. Frequent reviewers for journals from American Chemical Society, Nature Publishing Group, Science, Wiley, Royal Society of Chemistry, Elsevier etc.
2. Frequent reviewers for proposals from the U.S. National Science foundation, Department of Energy, Department of Defense, American Chemical Society Petroleum Research Fund.