

XIAOLIANG WEI, PHD

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EDUCATION

- **Doctor of Philosophy** in Chemistry, 2009
Brown University, USA
Dissertation: Robust, physisorbed self-assembled monolayers on graphite and their applications in nanoscience. *Advisor:* Matthew B. Zimmt.
- **Bachelor of Science** in Materials Science & Engineering, 2003
University of Science and Technology of China (USTC), China

PROFESSIONAL APPOINTMENTS

2018.01-	Assistant Professor, Indiana University-Purdue University Indianapolis (IUPUI)
2014.12-2017.12	Institutional PI in Joint Center for Energy Storage Research (JCESR)
2017.01-2017.12	Scientist III, Pacific Northwest National Laboratory (PNNL), USA
2013.08-2016.12	Scientist II, Pacific Northwest National Laboratory (PNNL), USA
2011.04-2013.07	Post Doctorate Research Associate, PNNL, USA
2010.02-2011.03	Research Associate, Case Western Reserve University, USA

HONORS

2017	“Pathway to Excellence” Patent Awards (two), PNNL
2016	LDRD Award, PNNL
2016	Ronald L. Brodzinski Early Career Exceptional Achievement Award
2015	Exceptional Contribution Award, PNNL
2012	Of-The-Year (OTY) Award, PNNL
2008	Dissertation Fellowship, Brown University
2003	Outstanding Graduating Student of Anhui Province, China

RESEARCH INTERESTS

My research interests are in next-generation energy technologies on both fundamental understanding and technology development to address challenges in sustainability. The major focuses are on electrochemical energy storage and conversion for both stationary and transportation applications. These studies will be very interdisciplinary combining materials science, structural engineering, chemistry, system engineering, and computer modeling. Specific areas include:

- Electro-active organic materials
- Interfacial phenomena
- Redox flow batteries
- Battery recycling
- Nanostructured materials
- Structure-property relationships
- Multivalent batteries
- Scanning probe microscopy

PROFESSIONAL SERVICES

- Symposium lead organizer for 2018 and 2020 MRS Spring Meetings
- Invited Guest Editor for a Methods Collection Special Issue of “Current Research Methods in Flow-Based Electrochemical Systems” in Journal of Visualized Experiments (JoVE), 2020

- Invited Guest Editor for a Special Issue of “Advanced Redox Flow Batteries for Sustainable Energy Storage Applications” in *Frontiers in Chemistry*, 2019
- Invited Guest Editor for Special Issue of “redox flow batteries” in *Energies*, 2016
- Editorial Board Members for *Scientific Reports*, *Advanced Sustainable Systems*, and *PLOS One*
- Invited proposal reviewer for US National Science Foundation (NSF) panelist, DOE’s Office of Electricity, Office of Energy Efficiency and Renewable Energy (EERE), Office of Science, and Advanced Research Projects Agency-Energy (ARPA-E).
- Session Chairs for ECS Meetings (2015) and MRS Meetings (2016, 2018, 2019, 2020)
- Active journal reviewer for *Nature Energy*, *Joule*, *Matter*, *Advanced Materials*, *Advanced Energy Materials*, *Chemical Science*, *ACS Energy Letters*, *Angewandte Chemie International Edition*, *Nano Energy*, *Journal of Materials Chemistry A*, *ChemSusChem*, *Journal of Power Sources*, *Journal of Membrane Science*, *Applied Energy*, etc.

TEACHING EXPERIENCES

- Indiana University-Purdue University Indianapolis (IUPUI), 2018 – present
Renewable Energy Systems and Design (EEN34500)
Fundamentals of Energy Materials (EEN22001)
- Pacific Northwest National Laboratory, 2014 – 2017
Mentor of 4 postdocs
- Brown University, 2003 – 2008
Teaching Assistant and Lab Instructor.

PUBLICATIONS

(Google Scholar Citation: 4056, H-Index: 30; * indicates me as corresponding author)

1. J. Huang, Z. Yang, V. Murugesan, E. Walter, A. Hollas, B. Pan, R. S. Assary, I. A. Shkrob, X. Wei,* Z. Zhang, Spatially Constrained Organic Diquat Anolyte for Stable Aqueous Flow Batteries. *ACS Energy Letters*, 2018, 3, 2533-2538.
2. A. Hollas, X. Wei,* M. Vijayakumar, Z. Nie, B. Li, D. Reed, J. Liu, V. Sprenkle, W. Wang, A biomimetic high-capacity phenazine-based anolyte for aqueous organic redox flow batteries. *Nature Energy*, 2018, 3, 508-514.
3. J. Huang, W. Duan, J. Zhang, I. A. Shkrob, R. S. Assary, B. Pan, C. Liao, Z. Zhang, X. Wei,* L. Zhang, Substituted Thiazines as Energy-Rich Anolytes for Nonaqueous Redox Flow Cells. *Journal of Materials Chemistry A*, 2018, 6, 6251-6254.
4. W. Duan, B. Li, D. Lu, X. Wei, Z. Nie, M. Vijayakumar, J. P. Kizewski, A. Hollas, V. Sprenkle, W. Wang, Towards an all-vanadium redox flow battery with higher theoretical volumetric capacities by utilizing the VO²⁺/V³⁺ couple. *Journal of Energy Chemistry*, 2018, 27, 1381-1385.
5. J. Huang, Z. Yang, M. Vijayakumar, W. Duan, A. Hollas, B. Pan, W. Wang, X. Wei,* L. Zhang, A Two-Electron Nonaqueous Organic Redox Flow Battery. *Advanced Sustainable Systems*, 2018, 2, 1700131.
6. X. Wei,* W. Pan, W. Duan, A. Hollas, Z. Yang, B. Li, Z. Nie, J. Liu, D. Reed, W. Wang, V. Sprenkle, Materials and Systems for Organic Redox Flow Batteries: Status and Challenges. *ACS Energy Letters*, 2017, 2, 2187. *Invited review*.
7. J. Zhang, Z. Yang, I. A. Shkrob, R. S. Assary, S. Tung, B. Silcox, W. Duan, J. Zhang, C. Liao, Z. Zhang, W. Wang, L. A. Curtiss, L. Thompson, X. Wei,* L. Zhang, Annulated dialkoxybenzenes as catholyte materials for nonaqueous redox flow batteries: achieving high chemical stability through bicyclic substitution. *Advanced Energy Materials* 2017, 7, 1701272.

8. J. Luo, A. Sam, B. Hu, C. DeBruler, X. Wei, W. Wang, T. L. Liu, Unraveling pH dependent cycling stability of ferricyanide/ferrocyanide in redox flow batteries. **Nano Energy**, 2017, 42, 215.
9. W. Duan, J. Huang, J. A. Kowalski, I. A. Shkrob, M. Vijayakumar, E. Walter, B. Pan, Z. Yang, J. D. Milshtein, B. Li, C. Liao, Z. Zhang, W. Wang, J. Liu, J. S. Moore, F. Brushett, L. Zhang, X. Wei,* “Wine-dark sea” in an organic flow battery: storing negative charge in 2,1,3-benzothiadiazole radicals leads to improved cyclability. **ACS Energy Letters** 2017, 2, 1156. (*Highlighted in ACS Energy Letters Editorial*)
10. W. Duan, R. S. Vemuri, D. Hu, Z. Yang, X. Wei,* A protocol for electrochemical evaluations and state of charge diagnostics of a symmetric organic redox flow battery. **Journal of Visualized Experiments**, 2017, Article Number 55171. (*Invited*)
11. K. S. Han, N. N. Rajput, M. Vijayakumar; X. Wei, W. Wang, J. Hu, K. Persson, K. Mueller, Preferential solvation of an asymmetric redox molecule. **Journal of Physical Chemistry C** 2016, 120, 27834.
12. M. Vijayakumar, Q. Luo, R. Lloyd, Z. Nie, X. Wei, B. Li, V. Sprenkle, J. Londono, M. Unlu, W. Wang, Tuning the perfluorosulfonic acid membrane morphology for vanadium redox flow batteries. **ACS Applied Materials & Interfaces**, 2016, 8, 34327.
13. X. Wei,* W. Duan, J. Huang, L. Zhang, B. Li, D. Reed, V. Sprenkle, W. Xu, W. Wang, A stable, high-current nonaqueous organic redox flow battery. **ACS Energy Letters**, 2016, 1, 705. (*Most Read Article*)
14. W. Duan, R. S. Vemuri, J. D. Milshtein, S. Laramie, R. D. Dmello, J. Huang, L. Zhang, D. Hu, M. Vijayakumar, W. Wang, J. Liu, L. Thompson, K. Smith, J. S. Moore, F. R. Brushett, X. Wei,* A symmetric organic-based nonaqueous redox flow battery and its state of charge diagnostics by FTIR. **Journal of Materials Chemistry A**, 2016, 4, 5448. (*Hot Article for 2016, Web of Science Highly Cited Paper*)
15. X. Wei,* G. Xia, B. Kirby, E. Thomsen, B. Li, Z. Nie, G. G. Graff, J. Liu, V. Sprenkle, W. Wang, An aqueous redox flow battery based on neutral alkali metal ferri/ferrocyanide and polysulfide electrolytes. **Journal of the Electrochemical Society** 2016, 163, A5150.
16. T. Liu, X. Wei, Z. Nie, V. Sprenkle, W. Wang, A total organic aqueous redox flow battery employing low cost and sustainable methyl viologen (MV) anolyte and 4-HO-TEMPO catholyte. **Advanced Energy Materials**, 2016, 6, 1501449. (*Web of Science Highly Cited Paper, highlighted by Nature, Science Daily, C&EN News, and MaterialsViews*)
17. X. Deng, M. Hu, X. Wei, W. Wang, K. T. Mueller, Z. Chen, J. Hu, Nuclear magnetic resonance studies on the solvation structures of a high-performance nonaqueous redox flow electrolyte. **Journal of Power Sources**, 2016, 308, 172.
18. J. Huang, B. Pan, W. Duan, X. Wei, R. Assary, F. R. Brushett, M. S. Ferrandon, C. Liao, Z. Zhang, W. Wang, A. K. Burrell, L. A. Curtiss, J. S. Moore, I. A. Shkrob, L. Zhang, The lightest organic radical cation for charge storage in redox flow batteries. **Scientific Reports**, 2016, 5, 32102.
19. X. Wei, L. Cosimbescu, W. Xu, J. Hu, M. Vijayakumar, J. Feng, M. Y. Hu, X. Deng, J. Xiao, J. Liu, V. Sprenkle, W. Wang, Towards high-performance nonaqueous redox flow electrolyte via ionic modification of active species. **Advanced Energy Materials** 2015, 5, 1400678. (*Cover Story*)
20. X. Wei,* W. Xu, J. Huang, L. Zhang, E. Walter, C. Lawrence, M. Vijayakumar, W. A. Henderson, T. Liu, L. Cosimbescu, B. Li, V. Sprenkle, W. Wang, Radical compatibility with nonaqueous electrolytes and its impact on an all-organic redox flow battery. **Angewandte Chemie International Edition** 2015, 54, 8684. (IF=11.994)
21. X. Wei, B. Li, W. Wang, Porous polymeric composite separators for redox flow batteries. **Polymer Reviews** 2015, 55, 247. (IF=6.459)

22. H. Pan, X. Wei, W. A. Henderson, Y. Shao, J. Chen, P. Bhattacharya, J. Xiao, J. Liu, On the way toward understanding solution chemistry of lithium polysulfides for high energy Li-S redox flow batteries. **Advanced Energy Materials** 2015, 5, 1500113. (IF=16.721)
23. L. Cosimbescu, X. Wei, M. Vijayakumar, W. Xu, M. L. Helm, S. D. Burton, C. M. Sorensen, J. Liu, V. Sprenkle, W. Wang, Anion-tunable properties and electrochemical performance of functionalized ferrocene compounds. **Scientific Reports** 2015, 5, 14117.
24. D. Reed, E. Thomsen, W. Wang, Z. Nie, B. Li, X. Wei, B. Koeppel, V. Sprenkle, Performance of Nafion N115, Nafion NR-212, and Nafion NR-211 in a 1 kW class all vanadium mixed acid redox flow battery. **Journal of Power Sources** 2015, 285, 425. (IF=6.395)
25. X. Deng, M. Y. Hu, X. Wei, W. Wang, Z. Chen, J. Liu, J. Hu, Natural abundance ¹⁷O nuclear magnetic resonance and computational modeling studies of lithium based liquid electrolytes. **Journal of Power Sources** 2015, 285, 146.
26. M. Vijayakumar, N. Govind, B. Li, X. Wei, Z. Nie, S. Thevuthasan, V. Sprenkle, W. Wang, Aquavanadyl ion interaction with Nafion membranes. **Frontiers in Energy Research** 2015, 3:10.
27. X. Wei, W. Xu, M. Vijayakumar, L. Cosimbescu, T. Liu, V. Sprenkle, W. Wang, TEMPO-based catholyte for high energy density nonaqueous redox flow batteries. **Advanced Materials** 2014, 26, 7649. (IF=19.791, **Web of Science Highly Cited Paper**)
28. B. Li, M. Gu, Z. Nie, X. Wei, C. Wang, V. Sprenkle, W. Wang, Nanorod niobium oxide as powerful catalysts for an all vanadium redox flow battery. **Nano Letters** 2014, 14, 158. (IF=12.712)
29. B. Li, Q. Luo, X. Wei, Z. Nie, E. Thomsen, B. Chen, V. Sprenkle, W. Wang, Capacity decay mechanism of microporous separator-based all-vanadium redox flow batteries and its recovery. **ChemSusChem** 2014, 7, 577. (IF=7.226)
30. K. S. Han, N. N. Rajput, X. Wei, W. Wang, J. Hu, K. Persson, K. T. Mueller, Diffusional motion of redox centers in carbonate electrolytes. **Journal of Chemical Physics** 2014, 141, 104509.
31. X. Wei, Z. Nie, Q. Luo, B. Li, B. Chen, K. Simmons, V. Sprenkle, W. Wang, Nanoporous polytetrafluoroethylene/silica composite separator as a high-Performance all-vanadium redox flow battery membrane. **Advanced Energy Materials** 2013, 3, 1215. (IF=16.721)
32. X. Wei, Z. Nie, Q. Luo, B. Li, V. Sprenkle, W. Wang, Polyvinyl chloride/silica nanoporous composite separator for all-vanadium redox flow battery applications. **Journal of the Electrochemical Society** 2013, 160, A1215.
33. X. Wei, Q. Luo, B. Li, Z. Nie, E. Miller, J. Chambers, V. Sprenkle, W. Wang, Performance valuation of microporous separator in Fe/V redox flow battery. **ECS Transactions** 2013, 45, 17.
34. B. Li, M. Gu, Z. Nie, Y. Shao, Q. Luo, X. Wei, X. Li, J. Xiao, C. Wang, V. Sprenkle, W. Wang, Bismuth nanoparticle decorating graphite felt as high-performance electrode for all-vanadium redox flow battery. **Nano Letters** 2013, 13, 1330. (IF=12.712)
35. Q. Luo, L. Li, W. Wang, Z. Nie, X. Wei, B. Li, Z. Yang, V. Sprenkle, Capacity decay and remediation of nafion-based all-vanadium redox flow batteries. **ChemSusChem** 2013, 6, 268.
36. S. Kim, E. Thomsen, G. Xia, Z. Nie, J. Bao, K. Recknagle, W. Wang, V. Viswanathan, Q. Luo, X. Wei, A. Crawford, G. Coffey, V. Sprenkle, 1 kW/1 kWh advanced vanadium redox flow battery utilizing mixed acid electrolytes. **Journal of Power Sources** 2013, 237, 300.
37. B. Li, L. Li, W. Wang, Z. Nie, B. Chen, X. Wei, Q. Luo, Z. Yang, V. Sprenkle. Fe/V redox flow battery electrolyte investigation and optimization. **Journal of Power Sources** 2013, 229, 1.
38. X. Wei, L. Li, Q. Luo, Z. Nie, W. Wang, B. Li, G. Xia, E. Miller, J. Chambers, Z. Yang, Microporous separators for Fe/V redox flow batteries. **Journal of Power Sources** 2012, 218, 39.
39. W. Wang, Q. Luo, B. Li, X. Wei, L. Li, Z. Yang, Recent progress in redox flow battery research and development. **Advanced Functional Materials** 2012, 23, 970. (IF=12.124, **Invited, Web of Science Highly Cited Paper**)

40. W. Wang, Z. Nie, B. Chen, F. Chen, Q. Luo, X. Wei, G. Xia, M. Skyllas-Kazacos, L. Li, Z. Yang, A new Fe/V redox flow battery using a sulfuric/chloric mixed-acid supporting electrolyte. **Advanced Energy Materials** 2012, 2, 487. (IF=16.721)
41. Q. Luo, L. Li, Z. Nie, W. Wang, X. Wei, B. Li, B. Chen, Z. Yang, *In-situ* investigation of vanadium ion transport in redox flow battery. **Journal of Power Sources** 2012, 218, 15.
42. W. Wang, L. Li, Z. Nie, B. Chen, Q. Luo, Y. Shao, X. Wei, F. Chen, .G. Xia, Z. Yang, A new hybrid redox flow battery with multiple redox couples **Journal of Power Sources** 2012, 216, 99.
43. C. Fujimoto, S. Kim, R. Stains, X. Wei, L. Li, Z. G. Yang, Vanadium redox flow battery efficiency and durability studies of sulfonated Diels Alder poly(phenylene)s. **Electrochemistry Communications** 2012, 20, 48.
44. X. Wei,* W. Tong, V. Fidler, M. B. Zimmt, Reactive capture of gold nanoparticles by strongly physisorbed monolayers on graphite. **Journal of Colloid and Interface Science** 2012, 387, 221.
45. W. Tong, X. Wei, and M. B. Zimmt, Dipolar control of monolayer morphology on graphite: self-assembly of anthracenes with odd length diether side chains. **Journal of Physical Chemistry C** 2009, 113, 17104.
46. Y. Wei, W. Tong, C. Wise, X. Wei, K. Armbrust, M. B. Zimmt, Dipolar control of monolayer morphology: spontaneous SAM patterning. **Journal of the American Chemical Society** 2006, 128, 13362. (IF=13.858)
47. H. Li, C. Xia, M. Zhu, Z. Zhou, X. Wei, and G. Meng, Increasing the sinterability of tape cast oxalate-derived doped ceria powder by ball milling. **Ceramics International** 2007, 33, 201.
48. H. Li, C. Xia, X. Fang, X. He, X. Wei, and G. Meng, Co-sintering of SDC/NiO-SDC bi-layers prepared by tape casting. **Key Engineering Materials** 2005, 280-283, 779.

BOOK CHAPTER

1. W. Wang, X. Wei, D. Choi, X. Lu, Z. Yang, C. Sun, “Electrochemical cells for medium- and large-scale energy storage: fundamentals”, Chapter 1 in “Advances in Batteries for Medium and Large-Scale Energy Storage”, edited by C. Menictas, M. Skyllas-Kazacos and L. T. Mariana, 2014. ISBN: 978-1-78242-013-2. Woodhead Publishing Limited, Cambridge, UK.

PATENTS

1. Highly stable phenazine derivatives for aqueous redox flow batteries. US patent application, 2017.
2. All-vanadium sulfate acid redox flow battery system. US20160099480A1, 2016.
3. Aqueous Electrolytes for Redox Flow Battery Systems. US9793566B2, 2017.
4. Composite separators and redox flow batteries based on porous separators. US9236620B2, 2016.
5. Hybrid anodes for redox flow batteries. US9214695B2, 2015.
6. High-energy-density, nonaqueous, redox flow batteries having iodine-based species. US20150349369, 2015.
7. Ionic conductive chromophores and nonaqueous redox flow batteries. US20130273459, 2013.

CONFERENCE ATTENDANCES

1. 2020 MRS Fall Meeting, Boston, MA. *Invited*.
2. 2020 Telluride Science Research Center (TSRC) Workshop on Molecular Chemistry in Electrochemical Energy Storage (MCEES), Telluride, CO. *Invited*.
3. 2020 International Coalition for Energy Storage and Innovation (ICESI), Sydney, Australia. *Invited*.
4. 2019 DOE-OE Nonaqueous Workshop, Santa Fe, NM. *Invited*.
5. 2019 MRS Spring Meeting, Pheonix, AZ. *Invited*.

6. 2019 International Coalition for Energy Storage and Innovation and Pacific Power Source Symposium joint meeting (ICESI- PPSS 2019), Hawii. *Invited.*
7. 2018 AiMES Conference, Cancun, Mexico. *Invited.*
8. 2018 Beyond Lithium-Ion XI (BLI-XI) Meeting, Westlake, OH. *Invited.*
9. 2018 Telluride Science Research Center (TSRC) Workshop on Molecular Chemistry in Electrochemical Energy Storage (MCEES), Telluride, CO. *Invited.*
10. 2018 ECS Spring Meeting, Seattle, WA
11. 2018 MRS Spring Meeting, Phoenix, AZ
12. 2017 ECS Fall Meeting, National Harbor, MD
13. 2017 EITA-New Materials Workshop, Ann Arbor, MI. *Invited.*
14. 2017 ECS Spring Meeting, New Orleans, LA.
15. 2016 MRS Fall Meeting, Boston, MA. *Invited.*
16. DOE-OE Program Review Meeting, Washington DC, 2016. *Invited.*
17. Seminar presentation at University of Wisconsin – Madison, 2016. *Invited*
18. TechConnect World Innovation Conference, Washington DC, 2016. *Invited.*
19. The 229th ECS Meeting, San Diego, CA, 2016.
20. The 2016 JCESR Full Program Meeting, Lemont IL. *Invited.*
21. DOE-OE Program Review Meeting, Portland, OR, 2015. *Invited.*
22. Pacific Northwest Energy Storage Symposium, Seattle, WA, September 11, 2015. *Invited.*
23. DOE-BES Annual Science Review for JCESR, Argonne, IL, 2015. *Invited.*
24. The 227th ECS Meeting, Chicago, IL, 2015.
25. The 2015 JCESR Full Program Meeting, Lisle, IL. *Invited.*
26. Seminar presentation at University of Michigan, Ann Arbor, MI, 2015. *Invited.*
27. OMICS Materials Science 2014, San Antonio, TX. *Invited.*
28. DOE-OE Program Review Meeting, Washington DC, 2014. *Invited*
29. The 225th ECS Meeting, Orlando, FL, 2014.
30. The 2014 JCESR Full Program Meeting, Bolingbrook, IL. *Invited.*
31. The 224th ECS Meeting, San Francisco, CA, 2013.
32. MRS Spring Meeting 2013, San Francisco, CA.
33. AIChE Annual Meeting 2012, Pittsburgh, PA.
34. The 221st ECS, Seattle, WA, 2012.