Hanyu WANG

Neutron Scattering Scientist

Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, USA | wangh5@ornl.gov

Education Background

Ph.D. Physical Chemistry University of California Santa Cruz, USA 2015

Research Experiences

- *2021-Present Neutron Scattering Scientist, Oak Ridge National Laboratory, Oak Ridge, TN*
  - Using neutron scattering, electrochemistry, and surface chemistry to investigate surface and interfacial structures of thin films.
- *2019-2020 Senior Research Chemist, Element Solutions Inc., Waterbury, CT*
  - R&D focused on the formulation of surface treatment products for advanced electronics.
- *2016-2019 Postdoctoral Research Associate, Oak Ridge National Laboratory, Oak Ridge TN*
  - Studied the surface of minerals (nanowires and thin films), and investigated interface between minerals and microbes, by combining nanoscience, neutron scattering, electrochemistry, and sputtering deposition system.
- *2015-2016 Research Volunteer, University of California, Santa Cruz, CA*
  - Investigated the microbial electrohydrogenesis system for chemical fuel generation through energy conversion.
- *2010-2015 Graduate Student Researcher, University of California, Santa Cruz, CA*
  - Synthesized, surface modified and characterized nanostructured metal oxides (utilizing CVD) for renewable energy conversion and storage;
  - Investigated the interface between nanostructured metal oxides and microbes for solar-assisted microbial fuel cell;
  - Designed and fabricated electrochemical cells, microbial fuel cells and flexible energy storage devices (with conducting polymers);
  - Conducted electrochemical bio-sensing for organic molecules (e.g., glucose and urea).

Patents

US 9825321, Y. Li, H. Wang and G. Wang, "Self-biased and Sustainable Microbial Electrohydrogenesis Device".

CA2914759A1, Y. Li, H. Wang and G. Wang, "Self-biased and Sustainable Microbial Electrohydrogenesis Device".

CN105308782A, Y. Li, H. Wang and G. Wang, "Self-biased and Sustainable Microbial Electrohydrogenesis Device".

WO2014204772A1, Y. Li, H. Wang and G. Wang, "Self-biased and Sustainable Microbial Electrohydrogenesis Device".

Honors & Awards

Neutron Scattering Division Best Paper finalist, 2023

Neutron Scattering Division Best Experiment finalist, 2021

Chancellor's Dissertation Year Fellowship, University of California, Santa Cruz, 2014/09-2015/06

Tony Fink Graduate Student Award, University of California, Santa Cruz, October 2014

Outstanding Master's Degree Thesis, Shandong University, June 2008

Outstanding Student Award, Qingdao University, July 2005, 2004 & 2003

Professional Activities

- Guest Editor of the Special Issue "Recent Developments in Polymer Composites for Photoelectrocatalytic Applications" for Journal "Polymers", September 2023 – February 2024
- Mentor for undergraduate student from UC LEADS program (Linda Munoz, 2013) and high school summer students (Marion Lepert, 2011, and Sarah Dunn, 2014)
- Advisor of UC-Santa Cruz-BioE team for iGEM 2014
- Member of Material Research Society (MRS), American Chemical Society (ACS), Electrochemical Society (ECS), and Neutron Scattering Society of America (NSSA)

Publications (Total citation times: 7440, h-index: 20 based on Google Scholar 01/10/2024)

1. M. Aguilella-Arzo, D. P. Hoogerheide, M. Doucet, H. Wang and V. M. Aguilella* "Charged Biological Membranes Repel Large Neutral Molecules by Surface Dielectrophoresis and Counterion pressure" *JACS*, accepted
2. R. Candeago, H. Wang, M.-T. Nguyen, M. Doucet, V.-A. Glezakou, J. F. Browning and X. Su* "Unraveling the Role of Solvation and Ion Valency on Redox-Mediated Electrosorption through in situ Neutron Reflectometry and Ab initio Molecular Dynamics", *JACS Au*, (2023)
3. R. Chen, H. Wang, M. Doucet, J. F, Browning and X. Su* "Thermo-Electro-Responsive Redox-Copolymers for Amplified Solvation, Morphological Control, and Tunable Ion Interactions", *JACS Au*, 3(12), 3333-3344 (2023)
4. J. Chen,* J. Keum, Y. Wang, H. Wang, B. Lokitz, G. Yang, Y. Yuan, R. Kumar and R. Advincula "Interface-Enhanced Conductivities in Surfactant-mediated, Solution-Grown Ionic Crystalline Complexes" *Front. Nanotechnol.*, 5:1293801 (2023)
5. Z. Chen, C. Steinmetz, M. Hu, B. Coughlin, H. Wang, W. T. Heller, W. Bras and T. P. Russell* "Star Block Copolymers at Homopolymer Interfaces: Conformation and Compatibilization" *Macromolecules*, 56(20), 8308-8322 (2023)
6. H. Wang,* E. C. Self, S. J. Addamane, C. M. Rouleau, R. R. Wixom, K. Browning, G. M. Veith, L. Liang and J. F. Browning* "Deposition and Characterization of α-Fe_2O_3/Pd Layers for Neutron Reflectometry Studies", *J. Vac. Sci. Technol. A*, 41, 053202 (2023)
7. S. J. Blair, M. Doucet, V. A. Niemann, K. H. Stone, M. E. Kreider, J. F. Browning, C. E. Halbert, H. Wang, P. Benedek, E. J. McShane, A. C. Nielander, A. Gallo and T. F. Jaramillo* "Combined, Time-Resolved, in situ Neutron Reflectometry and X-ray Diffraction Analysis of Dynamic SEI Formation during Electrochemical N_2 Reduction" *Energy Environ. Sci.*, 16, 3391-3406 (2023)
8. H. Wang,* A. Johs, G. Veith, E. C. Self, R. L. Sacci, N. Yamada, D. A. Tennant and J. F. Browning* "Characterization of Cytochrome *c* on Hematite Surfaces by Neutron Reflectometry", *in preparation*
9. J. M. Klein, H. Wang, R. Sacci, J. F. Browning, B. Gurkan* "Smooth Modified Surfaces of Silicon for the Study of Ionic Liquid Interfaces by Neutron Reflectometry" *ACS Applied Electron Mater.*, 4(5), 2217-2226 (2022)
10. L. Rong, X. Cheng, J. Ge, H. Wang, P. Cao, E. B. Caldona and R. C. Advincula* "On the Interfacial Behavior of Catenated Poly(L-lactide) at the Air-Water Interface" *Langmuir*, 38(32), 9751-9759 (2022)
11. S. J. Blair, M. Doucet, J. F. Browning, K. Stone, H. Wang, C. Halbert, A. C. Nielander,* A. Gallo* and T. F. Jaramillo* "Tracking dynamic electrode-electrolyte interfaces under Li-mediated electrochemical nitrogen reduction conditions via neutron reflectometry" *ACS Energy Lett.*, 7(6), 1939-1946 (2022)
12. H. Wang, A. Johs, J. F. Browning, D. A. Tennant and L. Liang* "Electrochemical Properties of the Interaction between Cytochrome *c* and a Hematite Nanowire Array Electrode", *Bioelectrochemistry*, 129, 162-169 (2019)
13. M. Phan, K. Lee, H. Wang, J. Browning, S. Satija, J. Ankner* "Membrane-Bound Structures and Associated Electron Transport Functions of Cytochrome *c*" *Biophysical Journal*, 116, 519a (2019)
14. Y. Yang, T. Liu, H. Wang, X. Zhu, D. Ye, Q. Liao, K. Liu, S. Chen and Y. Li* "Reduced Graphene Oxide Modified Activated Carbon for Improving Power Generation of Air-Cathode Microbial Fuel Cells", *J.*

Mater. Res., 33 (9), 1279-1287 (2018)

15. G. Wang, Y. Yang, Y. Ling, H. Wang, X. Lu, Y. Pu, J. Z. Zhang, Y. Tong and Y. Li* "An Electrochemical Method to Enhance the Performance of Metal Oxides for Photoelectrochemical Water Oxidation" *J. Mater. Chem. A*, 4, 2849-2855 (2016)
16. T. Zhai, X. Lu, H. Wang, G. Wang, T. Mathis, T. Liu, C. Li, Y. Tong* and Y. Li* "An electrochemical capacitor with applicable energy density of 7.4 Wh/kg at average power density of 3000 W/kg" *Nano Lett.*, 15, 3189-3194 (2015)
17. H. Wang, F. Qian and Y. Li* "Solar-Assisted Microbial Fuel Cells for Bioelectricity and Chemical Fuel Generation" *Nano Energy*, 8, 264-273 (2014)
18. F. Qian,† H. Wang,†(equal contribution) Y. Ling, G. Wang, M. P. Thelen and Y. Li* "Photo-Enhanced Electrochemical Interaction between *Shewanella* and a Hematite Photoanode" *Nano Lett.*, 14, 3688-3693 (2014)
19. G. Wang, H. Wang, X. Lu, Y. Ling, M. Yu, Y. Tong and Y. Li* "Solid-State Supercapacitor Based on Activated Carbon Cloths Exhibits Excellent Rate Capability" *Adv. Mater.*, 26, 2676-2682 (2014)
20. G. Wang, Y. Ling, H. Wang, X. Lu and Y. Li* "Chemically Modified Nanostructures for Photoelectrochemical Water Splitting" *J. Photochem. Photobiol. C*, 19, 39-51 (2014)
21. Y. Ling, G. Wang, H. Wang, Y. Yang and Y. Li* "Low-Temperature Activation of Hematite Nanowires for Photoelectrochemical Water Oxidation" *ChemSusChem*, 7, 848-853 (2014)
22. T. Liu, L. Finn, M. H. Yu, H. Wang, T. Zhai, X. H. Lu, Y. Tong and Y. Li* "Polyaniline and Polypyrrole Pseudocapacitor Electrode with Execellent Cycling Stability" *Nano Lett.*, 14, 2522–2527 (2014)
23. H. Wang, F. Qian, G. Wang, Y. Jiao, Z. He and Y. Li* "Self-Biased Solar-Microbial Device for Sustainable Hydrogen Generation" *ACS Nano*, 7, 8728-8735 (2013)

This work was highlighted by UCSC University News, *UCSC Uncommon People*, *Santa Cruz Sentinel*, *Santa Cruz Good Times (Cover Story)*, *Yahoo! News*, *ScienceDaily*, *Technology.org*, *Phys.org*, *Vice Magazine*, *Materials360*, *the Johns Hopkins News-Letter*, *Bohemian*, *Technology Museum*, *Xinhua Net, Sina, China Digital Science, People's Daily, China Daily and ScienceNet.cn, etc.*

24. H. Wang, G. Wang, Y. Ling, F. Qian, Y. Song, X. Lu, S. Chen, Y. Tong and Y. Li* "High Power Density Microbial Fuel Cell with Flexible 3D Graphene-Nickel Foam as Anode" *Nanoscale*, 5, 10283-10290 (2013)
25. F. Luan, G. Wang, Y. Ling, X. Lu, H. Wang, Y. Tong, X. X. Liu* and Y. Li* "High Energy Density Asymmetric Supercapacitors with Nickel Oxide Nanoflake Cathode and 3D Reduced Graphene Oxide Anode" *Nanoscale*, 5, 7984-7990 (2013)
26. Y. Ling, J. K. Cooper, Y. Yang, G. Wang, L. Munoz, H. Wang, J. Z. Zhang* and Y. Li* "Chemically Modified Titanium Oxide Nanostructures for Dye-sensitized Solar Cells" *Nano Energy*, 2, 1373-1382 (2013)
27. H. Wang, G. Wang, Y. Ling, M. Lepert, C. Wang, J. Z. Zhang and Y. Li* "Photoelectrochemical Study of Oxygen Deficient TiO_2 Nanowire Arrays with CdS Quantum Dots Sensitization" *Nanoscale*, 4, 1463-1466 (2012)
28. G. Wang, Y. Ling, H. Wang, X. Yang, C. Wang, J. Z. Zhang and Y. Li* "Hydrogen Treated WO_3 Nanoflakes Show Enhanced Photostability" *Energy Environ. Sci.*, 5, 6180-6187 (2012)
29. G. Wang, Y. Ling, X. Lu, H. Wang, F. Qian, Y. Tong and Y. Li* "Solar Driven Hydrogen Releasing from Urea and Human Urine" *Energy Environ. Sci.*, 5, 8215-8219 (2012)
30. G. Wang, X. Lu, Y. Ling, T. Zhai, H. Wang, Y. Tong and Y. Li* "LiCl/PVA Gel Electrolyte Stabilizes Vanadium Oxide Nanowire Electrodes for Pseudocapacitors" *ACS Nano*, 6, 10296-10302 (2012)
31. G. Wang, X. Lu, T. Zhai, Y. Ling, H. Wang, Y. Tong and Y. Li* "Free Standing Nickel Oxide Nanoflake Arrays: Synthesis and Application for Highly Sensitive Non-Enzymatic Glucose Sensor" *Nanoscale*, 4, 3123-3127 (2012)
32. G. Wang, H. Wang, Y. Ling, X. Yang, F. Qian, C. Wang, J. Z. Zhang and Y. Li* "Hydrogen Treated TiO_2

Nanowire Arrays for Photoelectrochemical Water Splitting" *Nano Lett.*, 11, 3026-3033 (2011)

33. H. Sun, X. Jiao, H. Wang, Z. Jiang, and D. Chen* "Solvothermal Preparation of Pd Nanostructures under Nitrogen and Air Atmospheres and Electrocatalytic Activities for the Oxidation of Methanol" *ACS Appl. Mater. Interfaces*, 3(7), 2425-2430 (2011)
34. H. Wang, X. Jiao* and D. Chen "Monodispersed Nickel Nanoparticles with Tunable Phase and Size: Synthesis, Characterization and Magnetic Properties" *J. Phys. Chem. C*, 112, 18793-18797 (2008)
35. X. Jia, D. Chen,* X. Jiao, T. He, H. Wang and W. Jiang "Monodispersed Co, Ni-Ferrite Nanoparticles with Tunable sizes: Controlled Synthesis, Magnetic Properties, and Surface Modification" *J. Phys. Chem. C*, 112, 911-917 (2008)