Weiyi Pan

Postdoctoral Associate · Rice University

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Education

Washington University in St. Louis *St. Louis, MO*

PhD Energy, Environmental & Chemical Engineering *2017 - 2022*

- Dissertation: "Lead(IV) Oxide in Drinking Water Systems: Formation, Dissolution, Redox-driven Recrystallization, and Implications for Lead Control"

Peking University *Beijing, China*

MS Environmental Engineering *2014 - 2017*

- Thesis: "Removal of Selenium and Tellurium by $M^{II}Fe_2O_4$ Magnetic Nanomaterial: Effects of Shapes"

China University of Mining and Technology Beijing *Beijing, China*

BE Environmental Engineering *2010 - 2014*

- Thesis: "Synthesis and Application of CNTs/ $M^{II}Fe_2O_4$ for Heavy Metal Removal"

Research Experience

Yale University & Rice University *Aug. 2022 – Now*

Postdoctoral Advisor: Prof. Menachem Elimelech

- Fabricating novel processes and composite membranes for direct Li extraction
- Investigating ion exchange membrane scaling during electrodialysis operations
- Developing a novel bipolar membrane-assisted electrosorption process for boron selective removal

Washington University in St. Louis *2017–2022*

Ph.D. Advisor: Prof. Daniel Giammar

- Investigated lead corrosion products formation, dissolution, and interaction with other cations in drinking water conditions
- Unraveled the redox-driven recrystallization process of lead corrosion products
- Determined the performance of the point-of-use filter for lead removal over a range of drinking water chemistry conditions
- Developed a new drinking water lead exposure quantification method

Argonne National Laboratory *Mar. 2020*

Visiting Student

- Prepared samples for X-ray absorption spectroscopy
- Collected Cu and Zn X-ray absorption spectroscopy at Beamline 12-BM of the Advanced Photon Source
- Analyzed X-ray absorption spectroscopy with Demeter

Pacific Northwest National Laboratory *Dec. 2019*

Visiting Student

- Cut and milled single PbO_2 particles into sharp tips using focused ion beam scanning electron microscopy
- Collected data with PbO_2 tips using atom probe tomography at the Environmental Molecular Sciences Laboratory
- Reconstructed the PbO_2 tips with atom probe tomography data

Peking University *2014-2017*

Advisor: Prof. Weiling Sun

- Synthesized $M^{II}Fe_2O_4$ with different shapes
- Tested $M^{II}Fe_2O_4$'s performance on the removal of selenium and tellurium

Publications

Published (**papers = 27, total citations = 1054, h index = 13, based on Google Scholar**)

S. K. Patel, A. Iddya, **W. Pan**, J. Qian, and M. Elimelech, Approaching Infinite Selectivity in Membrane Based Aqueous Lithium Extraction via Solid-State Ion Transport, *Sci. Adv.*, accepted .

W. Pan, D. Roy, B. Uralcan Kilavuz, S. K. Patel, A. Iddya, E. Ahn, J. Kamcev, and M. Elimelech, A highly selective and energy efficient approach to boron removal overcomes the Achilles heel of seawater desalination, *Nat. Water*, 2025, 3, 99–109 .

Y. Guan, X. Hong, V. Karanikola, Z. Wang, **W. Pan**, H. Wu, F. Wang, Y. Han, and M, Elimelech, Gypsum heterogenous nucleation pathways regulated by surface functional groups and hydrophobicity, *Nat. Commun.*, 2025, 16(1), 713. .

F. Han, J. He, M. Heiranian, **W. Pan**, Y. Li, and M. Elimelech, The Physical Basis for Solvent Flow in Organic Solvent Nanofiltration, *Sci. Adv.*, 2024, 10, eado4332. .

W. Ma, S.K. Patel, M. Marcos−Hernández, X. Wang, X. Zhou, **W. Pan**, Y. Shin, D. Villagrán, and M. Elimelech, Rapid, Selective, and Chemical-Free Removal of Dissolved Silica from Water via Electrosorption: Feasibility and Mechanisms, *Environ. Sci. Technol.*, 2024, 58 (1), 947-959 .

Y. Shin, **W. Pan**, S. K. Patel, W. Ma, S. Hong, and M. Elimelech, Nanodiamond Electrodes for Capacitive Deionization of Cr(VI): A Study of Performance and Mechanism, *Chem. Eng. J.*, 2023, 474, 145756 .

A. Satpathy, N. Sharma, **W. Pan**, J. G. Catalano, and D. E. Giammar, Estimation of the Available Pool of Exchangeable Uranium in Montmorillonite Surface Bound U(VI) and in $UO_{2(s)}$: Isotope Exchange Study, *ACS Earth Space Chem.*, 7(8), 1528-1535.

L. F. Villalobos, K. Pataroque, **W. Pan**, T. Cao, M. Kaneda, C. Violet, C. L. Ritt, and M. Elimelech, Orientation Matters: Measuring the Correct Surface of Polyamide Membranes with Quartz Crystal Microbalance, *J. Membr. Sci. Lett.*, 2023, 3(2), 100048.

S. K. Sohum, **W. Pan**, Y. Shin, J. Kamcev, and M. Elimelech, Electrosorption Integrated with Bipolar Membrane Water Dissociation: A Coupled Approach to Chemical-free Boron Removal, *Environ. Sci. Technol.*, 2023, 57, 4578–4590.

E. J. Elizabth, **W. Pan***, and D. E. Giammar, Capture and Extraction of Particulate Lead from Point-of-Use Filters, *ACS ES&T Engineering*, 2022, 2, 2058–2065, ***Corresponding Author**.

G. Ledingham, **W. Pan**, D. E. Giammar, and J. C. Catalano, Exchange of adsorbed Pb(II) at the rutile surface: Rates and Mechanisms, *Environ. Sci. Technol.*, 2022, 56, 12169–12178.

W. Pan, J. C. Catalano, and D. E. Giammar, Redox-driven Recrystallization of PbO_2, *Environ. Sci. Technol.*, 2022, 56, 7864-7872.

G. Clark, **W. Pan**, D. E. Giammar and T.H. Nguyen, Influence of point-of-use filters and stagnation on water quality at a preschool and under laboratory conditions, *Water Research*, 2022, 118034

W. Pan and D. E. Giammar, Point-of-use Filters for Lead Removal from Tap Water: Opportunities and Challenges, **Viewpoint**, *Environ. Sci. Technol.*, 2022, 56, 4718-4720.

W. Pan, G. Ledingham, J. C. Catalano and D. E. Giammar, Effects of Cu(II) and Zn(II) on PbO_2 Reductive Dissolution at Drinking Water Conditions: Short Term Inhibition and Long Term Enhancement, *Environ. Sci. Technol.*, 2021, 55, 14397–14406 **Tribute to Dr. James J. Morgan special issue**.

W. Pan, E. R. Johnson and D. E. Giammar, Lead Phosphate Particles in Tap Water: Challenges for Point-of-Use Filters, *Environ. Sci. Technol. Lett.*, 2021, 8, 244–249.

G. Li, **W. Pan**, L. Zhang, Z. Wang, B. Shi and D. E. Giammar, Effect of Cu(II) on Mn(II) Oxidation by Free Chlorine to Form Mn Oxides at Drinking Water Conditions, *Environ. Sci. Technol.*, 2020, 54, 1963–1972.

W. Pan, E. R. Johnson and D. E. Giammar, Accumulation on and extraction of lead from point-of-use filters for evaluating lead exposure from drinking water, *Environ. Sci. Water Res. Technol.*, 2020, 6, 2734–2741. ***2020 Environmental Science: Water Research & Technology Best Paper Nomination***.

W. Pan, L. Schattner, J. Guilak and D. Giammar, Impact of Cu(II) and Zn(II) on the Reductive Dissolution of Pb(IV) Oxide, *Environ. Sci. Technol. Lett.*, 2019, 6, 745–751. ***Front Cover***.

S. Li, F. Wang, **W. Pan**, X. Yang, Q. Gao, W. Sun and J. Ni, Molecular insights into the effects of Cu(II) on sulfamethoxazole and 17β-estradiol adsorption by carbon nanotubes/$Co^{II}Fe_2O_4$ composites, *Chem. Eng. J.*, 2019, 373, 995–1002.

W. Pan, C. Pan, Y. Bae, and D. Giammar, Role of Manganese in Accelerating the Oxidation of Pb(II) Carbonate Solids to Pb(IV) Oxide at Drinking Water Conditions, *Environ. Sci. Technol.*, 2019, 53, 6699–6707.

X. Liu, P. Du, **W. Pan**, C. Dang, T. Qian, H. Liu, W. Liu and D. Zhao, Immobilization of uranium (VI) by niobate/titanate nanoflakes heterojunction through combined adsorption and solar-light-driven photocatalytic reduction, *Appl. Catal. B Environ.*, 2018, 231, 11-22.

J. Wei, W. Zhang, **W. Pan**, C. Li and W. Sun, Experimental and theoretical investigations on Se(IV) and Se(VI) adsorption to UiO-66-based metal–organic frameworks, *Environ. Sci. Nano*, 2018, 5, 1441–1453.

J. Wei, W. Sun, **W. Pan**, X. Yu, G. Sun and H. Jiang, Comparing the effects of different oxygen-containing functional groups on sulfonamides adsorption by carbon nanotubes: experiments and theoretical calculation, *Chem. Eng. J.*, 2017, 312, 167–179.

W. Sun, C. Wang, **W. Pan**, S. Li, and B. Chen, Effects of natural minerals on the adsorption of 17β-estradiol and bisphenol A on graphene oxide and reduced graphene oxide, *Environ. Sci. Nano*, 2017, 4, 1377–138.

F. Wang, W. Sun, **W. Pan** and N. Xu, Adsorption of sulfamethoxazole and 17β-estradiol by carbon nanotubes/$Co^{II}Fe_2O_4$ composites, *Chem. Eng. J.*, 2015, 274, 17–29.

W. Sun, **W. Pan** and N. Xu, Removal of Se(IV) and Se(VI) by $M^{II}Fe_2O_4$ nanoparticles from aqueous solution, *Chem. Eng. J.*, 2015, 273, 353–362.

Manuscripts in Preparation (***3 in preparation)***

W. Pan, D. Roy, S. K. Patel, A. Iddya, E. Ahn, J. Kamcev, and M. Elimelech, Thin-film Modification Enables Selective Boron Electrosorption, In preparation for *Water Research* .

W. Pan, Y. Duan, A. Shocron, R. Wang, and M. Elimelech, Scaling Formation during Electrodialysis Operation: Mechanism and Effect, In preparation for *Environ. Sci. Technol.* .

Y. Fan, Y. Yan, O. Nwokonkwo, D. Rivera , **W. Pan**, E. Chen, J.Y. Kim, J. Simon, M.S. Meng, X. Wang, C. Muhich, L. Winter, Ultrafast Nitrate Reduction to Ammonia via Coupling Electrofiltration Membrane with Cooperative Nitrite-Enriching Component, in preparation .

Grant Writing Experience

DOE APAR-E RECOVER *Pre-proposal Submitted*

PI: Menachem Elimelech

- Led a team of four postdocs to write this pre-proposal.

USBR DWPR Fund *Submitted*

PI: Menachem Elimelech *$250,000*

- Led a team of one postdoc and one graduate student to write this proposal.

US-Israel Binational Agricultural Research and Development Fund *Submitted*

PI: Menachem Elimelech, Co-PI: Oded Nir (Ben Gurion University) *$310,000*

- Led a team of three postdocs and one graduate student to write this proposal.

NSF and the US-Israel Binational Science Foundation *Funded in 2024*

PI Mingjiang Zhong (Yale University) Co-PI: Menachem Elimelech *$420,000*

- Contributed to the writing of this proposal

NSF Convergence Accelerator Track K *Funded in 2024*

PI: Daniel Giammar *$649,998*

- Conducted part of the preliminary experiments
- Contributed to the writing of this proposal

Patent

W. Sun, **W. Pan**, Method and application of ferrite $M^{II}Fe_2O_4$ magnetic nano particles for removing tellurium-containing wastewater (Patent Number: CN105439272B), Peking University, China

L. Zhang, Y. Shi, M. Yang, J. Pang, C. Yang, **W. Pan**, Method for treating acidic high-iron and high-manganese mine water and method for modifying fly ash (Patent Number: CN102303918B), China University of Mining and Technology Beijing, China

W. Sun, J. Wei, **W. Pan**, Method for purifying selenium-containing wastewater by using UiO-66 metal organic frame material (Grant Number: CN106750356A), Peking University, China

W. Sun, F. Wang, **W. Pan**, Magnetic carbon nanotube composite material: preparation and application for removing pollutants in water (Grant Number: CN106031862A), Peking University, China

Presentations

Contributed Oral Presentations and Posters

A Highly Selective and Energy Efficient Approach to Boron Removal Overcomes the Achilles Heel of Seawater Desalination. Gordon Research Conference, Membranes: Materials and Processes, Poster, New Hampshire, July 2024.

Engineering Porous Carbon Electrodes for Selective Boron Removal via Electrosorption. 2023 Material Research Society Fall Meeting, Oral presentation, Boston, November 2023.

Selective Boron Removal Using Bipolar Membrane Assisted Electrosorption. 2023 AEESP Research & Education Conference, Oral presentation, Boston, June 2023.

Redox-driven Recrystallization of PbO_2 at Drinking Water Conditions. Gordon Research Conference, Environmental Sciences: Water, Poster, New Hampshire, June 2022.

Interactions between PbO_2 and cations at drinking water conditions. ACS National Conference, Oral presentation, San Diego, March 2022.

Lead phosphate nanoparticles in drinking water: Challenges for point-of-use filters. ACS National Conference, Oral presentation, Atlanta, August 2021

Point-of-use Filter as Pb Exposure Evaluation Device and Its Challenges. ACS National Conference, Oral presentation, Online, March 2021

Lead-catalyzed redox-driven recrystallization of lead oxide. ACS National Conference, Oral presentation, Orlando, March 2019.

Role of Manganese in Accelerating the Oxidation of Pb(II) Carbonate Solids to Pb(IV) Oxide at Drinking Water Conditions. Annual Mid-American Environmental Engineering Conference, Oral presentation, Missouri, September 2018.

Shape-dependent Adsorption of Selenium and Tellurium by $M^{II}Fe_2O_4$. The 18th International Conference on Heavy Metals in the Environment, Oral presentation, Belgium, September 2016.

Invited Talks

Advancing Water Sustainability Through a Novel Hybrid Electrochemical-Membrane Process, **Hong Kong University of Science and Technology**, September 2024

Towards Sustainable Water: Production, Consumption, and Regeneration, **University of Illinois Chicago**, March 2024

Precise Water Quality Control: Using Chemistry to Engineer Resilient Water Systems, **University of Alabama**, March 2024

Sustainable Urban Water: Production, Consumption and Regeneration, **UTHealth Houston**, February 2024

Lead in Tap Water: Interplay Between Lead Release and Lead Corrosion Products, **University of Illinois Urbana-Champaign**, February 2022

Teaching Experience

Environmental Engineering Lab (Washington University in St. Louis) *Fall 2018 and Spring 2020*

Teaching Assistant *Undergraduate Level*

- Helped prepare syllabus and grade homework
- Led students in the lab and field
- Helped prepare videos to transfer this course online at the beginning of COVID-19
- Prepared chemicals and setting instruments before each lab session

Unit Operation (Washington University in St. Louis) *Undergraduate Level*

Teaching Assistant *Fall 2019*

- Tested instruments and preparing chemicals before class
- Led students in the lab
- Held TA sessions

Mentoring

Fall 2021	**Yihang Yuan**, Currently PhD candidate at Washington University in St. Louis
Su. 2021	**Andrea Alemán Reyes**, Currently undergraduate Student at University of Puerto Rico
2020–2021	**Elizabeth Johnson**, Currently PhD student at Northwestern University
Su. 2019	**Olivia Crowell**, Currently undergraduate Student at University of Missouri-Saint Louis
2018–2019	**Lia Schattner**, Currently testing engineer at Impossible Sensings
Su. 2018	**Justin Guilak**, Currently undergraduate Student at Rice University

Awards, Fellowships, & Grants

2023	**Paul V. Roberts/AEESP Outstanding Doctoral Dissertation Award**, Association of Environmental Engineering and Science Professors	*$ 1500*
2023	**CAPEES-Elsevier Dissertation Award**, Chinese-American Professors in Environmental Engineering and Science	*$ 500*
2023	**Dissertation Award**, Department of Energy, Environmental & Chemical Engineering at Washington University in St. Louis	*$ 1000*
2022	**Chinese Government Award for Outstanding Self-financed Students Abroad**, Ministry of Education	*$ 6000*
2022	**1st in Fresh Ideas Student Poster Competition**, Missouri AWWA conference	
2022	**Graduate Student Travel Award**, ACS Geochemistry Division	
2020	**Graduate Student Award**, ACS Environmental Chemistry Division	
2017–2022	**McDonnell Scholar Fellowship**, McDonnell International Scholars Academy	*$ 79,000/year*
2017	**Beijing Excellent Graduate (Graduate student level)**, Beijing Municipal Education Commission	
2015	**National Scholarship for Graduate students**, Ministry of Education	*RMB 20,000*
2014	**Beijing Excellent Graduate (Undergraduate student level)**, Beijing Municipal Education Commission	

Outreach & Professional Development

Service and Outreach

2023	**AEESP Research and Education Conference**, Water: Treatment-2 Session Chair	*Boston, MA*
2022	**AEESP Research and Education Conference**, Student Committee Chair	*St. Louis, MO*
2021–2022	**EnvESA**, Co-founder and Treasurer	*St. Louis, MO*
2019–2020	**EECE Graduate Student Council**, Co-founder and Social chair	*St. Louis, MO*

Peer Review

Science Advances
Environmental Science & Technology
Water Research
Environmental Science & Technology Letters
Journal of Hazardous Materials
ACS ES&T Water
ACS ES&T Engineering
Frontiers of Environmental Science & Engineering
Applied Geochemistry
npj Clean Water
Chemical Engineering Journal
Chemical Engineering Journal Advances

Professional Affiliations

American Chemical Society
Association of Environmental Engineering and Science Professors
American Water Works Association
Chinese-American Professors in Environmental Engineering and Science
Materials Research Society
Water Environment Federation