Xicheng He

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EDUCATION

Washington University in St. Louis (WashU), St. Louis, MO, USA
Doctor of Philosophy, Energy, Environmental and Chemical Engineering 09/2021–present
Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland
Visiting Student, School of Architecture, Civil and Environmental Engineering 02/2021–05/2021
Nankai University (NKU), Tianjin, China
Bachelor of Science, Environmental Science 08/2017–07/2021

RESEARCH EXPERIENCE

Tailored Reductants for Selenium Removal by Continuous Flow-Through Iron Electrocoagulation
Graduate research, advisor: Daniel Giammar, WashU 10/2022–present

- Designed and operated a laboratory-scale flow-through electrocoagulation treatment train.
- Investigated Se removal under varying water chemistry conditions that represent mining, agriculture, and flue-gas desulfurization wastewater.
- Elucidated Se removal mechanisms and evaluated the stability of Se associated with electrocoagulation-generated residual solids.
- Drafted sections for a Research Augmentation Funding Proposal (National Alliance for Water Innovation).
- Research Outputs: Two first-author papers published in *Environmental Science & Technology*; one co-author paper published in *ACS ES&T Engineering*; two co-author manuscripts in preparation.

Removal of Arsenic, Chromium, and Uranium by Flow-Through Iron Electrocoagulation
Graduate research, advisor: Daniel Giammar, WashU 05/2024–present

- Operated flow-through electrocoagulation systems to remove As(III), As(V), Cr(VI), and U(VI) under environmentally relevant conditions.
- Elucidated contaminant removal mechanisms through speciation analysis, kinetics, and solid characterization, focusing on adsorption, reduction, and precipitation.
- Evaluated the stability and mobility of removed contaminants in electrocoagulation-generated solids.
- Research Outputs: One first-author paper submitted to *Environmental Science & Technology*; two first-author manuscripts in preparation.

Structural and Interfacial Geochemistry of Critical Elements
Graduate research, advisors: Daniel Giammar and Jeffrey Catalano, WashU 09/2021–12/2024

- Investigated the adsorption behavior of rare earth elements (neodymium, dysprosium, and ytterbium) and palladium group elements to iron oxides under a broad range of water chemistry.
- Developed a reaction-based model for predicting the adsorption of rare earth elements and palladium to the iron oxide surfaces.
- Research Outputs: One first-author paper published in *ACS Earth and Space Chemistry*; one co-author paper published in *Geochimica et Cosmochimica Acta*.

Transformation of Bile Acids by *Clostridium scindens*

Undergraduate research, advisor: Rizlan Bernier-Latmani, EPFL 02/2021–05/2021

- Investigated the transformation pathway of bile acids by *Clostridium scindens* DSM 100975.
- Research Output: thesis received the Undergraduate Thesis Award.

Selective Sensing of Copper by a Biomass-Derived Carbon Dot

Undergraduate research, advisors: Tong Zhang and Wei Chen, NKU 09/2019–02/2021

- Synthesized and characterized the grapefruit skin-derived carbon dot.
- Tested the colorimetric response and selectivity of the carbon dot to metals.
- Research Output: A patent issued for selective Cu sensing.

PUBLICATIONS AND PATENTS

Published / Submitted

1. **Xicheng He**, Jenna Skanberg, Daniel E. Giammar. Arsenic removal by continuous flow-through iron electrocoagulation and downstream steps under environmentally relevant conditions. *Submitted to Environmental Science & Technology.*
2. **Xicheng He**, Yihang Yuan, Maya Mehrotra, Jeffrey G. Catalano, Daniel E. Giammar. Selenium(VI) removal from challenge waters by continuous-flow-through iron electrocoagulation. *Environmental Science & Technology*. 2025, 59, 33, 17909–17921.
3. Yihang Yuan, Maya Mehrotra, **Xicheng He**, Elaine D. Flynn, Jeffrey G. Catalano, Daniel E. Giammar. Advancing selenium(VI) removal by iron electrocoagulation: Roles of water chemistry and operating conditions. *ACS ES&T Engineering*. 2025, 5, 7, 1821–1830.
4. **Xicheng He**, Elaine D. Flynn, Jeffrey G. Catalano, Daniel E. Giammar. Selenium(VI) removal by continuous flow-through iron electrocoagulation: Effects of operating conditions and stability of selenium in residual solids. *Environmental Science & Technology*. 2025, 59, 10, 5359–5369. ***Highlighted by WashU Newsroom on May 13, 2025***
5. Emily G. Wright, **Xicheng He**, Elaine D. Flynn, Daniel E. Giammar, Jeffrey G. Catalano. Competitive and cooperative effects of chloride on palladium(II) adsorption to iron (oxyhydr)oxides: Implications for mobility during weathering. *Geochimica et Cosmochimica Acta*. 2025, 391, 203–217.
6. **Xicheng He**, Neha Sharma, Olwen Stagg, Elaine D. Flynn, Jeffrey G. Catalano, Daniel E. Giammar. Adsorption of neodymium, dysprosium, and ytterbium to goethite under varying aqueous chemistry conditions. *ACS Earth and Space Chemistry*. 2024, 8, 6, 1224–1235.
7. Tong Zhang, Panpan Zhu, **Xicheng He**. Preparation and application of a biomass-derived fluorescent carbon dot. Chinese Patent CN202110093192.5, August 26, 2022.

In preparation / In revision

8. **Xicheng He**, Daniel E. Giammar. Chemical and physical processes governing chromium(VI) removal by continuous flow-through iron electrocoagulation for drinking water treatment. *In preparation*.
9. Erika R. Yamazaki, Yihang Yuan, **Xicheng He**, Yousuf Z. Bootwala, Daniel E. Giammar, Marta C. Hatzell. Review of electrocoagulation systems: Mechanism and applications. *In preparation*.
10. Yihang Yuan, Maya Mehrotra, **Xicheng He**, Jeffrey G. Catalano, Daniel E. Giammar. Effects of common anions and natural organic matter on selenium(VI) removal by iron electrocoagulation. *In revision*.
11. Yihang Yuan, Qi Yang, **Xicheng He**, Daniel E. Giammar. Dynamics of Selenium Concentrations During and After Iron Electrocoagulation Treatment. *In revision*.

CONFERENCE PRESENTATIONS

1. **Xicheng He** and Daniel Giammar. Chromium(VI) removal by continuous flow-through iron electrocoagulation under environmentally relevant conditions. Oral presentation, Mid-America Environmental Engineering Conference, October 11, 2025, St. Louis, Missouri. ***Best Presentation Award***
2. **Xicheng He**, Jenna Skanberg, and Daniel Giammar. Effects of water chemistry and iron dose on arsenic removal from water using continuous flow-through iron electrocoagulation. Oral presentation, American Chemical Society National Meeting, March 23–27, 2025, San Diego, California.
3. **Xicheng He** and Daniel Giammar, Removal of Selenium(VI) from water by continuous-flow iron electrocoagulation. Poster presentation, Environmental Research Symposium, Washington University Center for the Environment, February 24, 2025, St. Louis, Missouri.
4. **Xicheng He**, Elaine Flynn, Jeffrey Catalano, and Daniel Giammar, Removal of Se(VI) from water using continuous flow-through iron electrocoagulation. Oral presentation, Water Innovation Symposium, Washington University Center for Water Innovation, September 9, 2024, St. Louis, Missouri. ***Best Presentation Award***
5. Jenna Skanberg, **Xicheng He**, and Daniel Giammar, Removal of arsenic from water by continuous flow-through iron electrocoagulation. Poster presentation, Summer undergraduate poster presentation, Washington University Center for the Environment, August 1, 2024, St. Louis, Missouri.
6. Yihang Yuan, Maya Mehrotra, **Xicheng He**, and Daniel Giammar. Effect of anions on selenium(VI) removal by iron electrocoagulation. Poster presentation, Gordon Research Conference on Environmental Sciences: Water. June 23–28, 2024, Holderness, New Hampshire.
7. **Xicheng He**, Elaine Flynn, Jeffrey Catalano, and Daniel Giammar, Impact of water chemistry and operating conditions on selenium(VI) removal by iron electrocoagulation in a flow-through process, Oral presentation, American Chemical Society National Meeting, March 17–21, 2024, New Orleans, Louisiana.
8. Yihang Yuan, Maya Mehrotra, **Xicheng He**, and Daniel Giammar, Effect of anions on selenium(VI) removal by iron electrocoagulation, Oral presentation, American Chemical Society National Meeting, March 17–21, 2024, New Orleans, Louisiana.
9. **Xicheng He** and Daniel Giammar, Selenium(VI) removal by iron electrocoagulation in a continuous process. Poster presentation, National Alliance for Water Innovation Annual Spring Quarterly Review Meeting, March 19–20, 2024, Denver, Colorado.
10. Daniel Giammar, **Xicheng He**, Yihang Yuan, Jeffrey Catalano, and Elaine Flynn. Removal of oxyanion contaminants by iron electrocoagulation. Oral presentation, American Chemical Society National Meeting, August 13–17, 2023, San Francisco, California.
11. Yihang Yuan, Maya Mehrotra, **Xicheng He**, and Daniel Giammar. Effect of water chemistry on selenium removal by iron electrocoagulation. Oral presentation, American Chemical Society National Meeting, March 26–30, 2023, Indianapolis, Indiana.
12. **Xicheng He**, Neha Sharma, Elaine D. Flynn, Jeffrey Catalano, and Daniel Giammar. Surface complexation modeling of neodymium adsorption to goethite. Oral presentation, American Chemical Society National Meeting, March 26–30, 2023, Indianapolis, Indiana.

HONORS AND AWARDS

- Best Presentation Award, Mid-America Environmental Engineering Conference 2025
- Graduate Student Travel Award, WashU Department of Energy, Environmental and Chemical Engineering 2025
- Second Place, WashU Center for Water Innovation student flash talk competition 2024
- Undergraduate Thesis Award, NKU College of Environmental Science and Engineering 2021
- First Prize, Environmental Innovation and Practice Competition, Tianjin 2019
- Excellence Award, The Competition of Ecological & Environmental Innovation, Tianjin 2019
- Academic Excellence Scholarship, NKU 2018 and 2020
- Yunnan Provincial Outstanding Student Scholarship 2017–2020

TECHNICAL SKILLS

- **Aqueous Sample Analysis**
  Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Ion Chromatography (IC), Fluorescence Spectroscopy, and Liquid Chromatography-Mass Spectrometry (LC-MS)
- **Solid & Electrochemical Characterization**
  Powder X-ray Diffraction (XRD), X-ray Photoelectron Spectroscopy (XPS)**,** Scanning Electron Microscopy (SEM)**,** Dynamic Light Scattering (DLS)**,** X-ray Emission Spectroscopy (XES, benchtop easyXAFS3000+), Extended X-ray Absorption Fine Structure Spectroscopy (EXAFS), and Electrochemical Impedance Spectroscopy (EIS)
- **Modeling and Software**
  Surface Complexation Modeling, Equilibrium Speciation Modeling using Visual MINTEQ, MATLAB, and R

TEACHING AND MENTORING EXPERIENCE

Teaching

- Lab session assistant, Physical and Chemical Principles in Water Treatment, WashU 2024
- Teaching assistant, Physical and Chemical Principles in Water Treatment, WashU 2023
- Teaching assistant, Introduction to Energy, Environmental and Chemical Engineering, WashU 2022
- Teaching assistant, Environmental Aquatic Chemistry, NKU 2020

Mentoring

- Liuning Kuang (WashU EECE Ph.D. student), Uranium removal by electrocoagulation 2025
- Jenna Skanberg (WashU EECE undergrad), Arsenic removal by electrocoagulation 2024
- Maya Mehrotra (WashU EECE undergrad), Selenium removal by electrocoagulation 2023

PROFESSIONAL SERVICE AND MEMBERSHIP

- Reviewer, *ACS ES&T Engineering* (1), *Chemical Geology* (2), *Environmental Science & Technology* (3), *Journal of Hazardous Materials* (3), and *Water Research* (1)
- Peer Mentor for First-Year Ph.D. Students, WashU EECE Graduate Student Council 2023–2024
- Volunteer, Association of Environmental Engineering and Science Professors conference 2022
- Member, American Chemical Society 2022–present
- Member, Association of Environmental Engineering and Science Professors 2022–present