

Dr. Yaochun Yu

Department of Environmental Chemistry
Eawag, Swiss Federal Institute of Aquatic Science and Technology
Überlandstrasse 133, 8600 Dübendorf, Switzerland
Email: yaochun.yu@eawag.ch
Tel.: +41-78 244 9999 | Google Scholar
Eawag Website: <https://www.eawag.ch/en/about-us/portrait/organisation/staff/profile/yaochun-yu/show/>

RESEARCH INTERESTS

My research interests lie in investigating the **Fate and Biotransformation of Emerging Contaminants** and the roles of **Functional Environmental Microbiome in bioremediation**. Specifically, (1) I apply advanced analytical chemistry approaches (i.e., High-Resolution Mass Spectrometry) and non-targeted metabolomics analysis to study the occurrence of contaminants, their transformation products, and transformation pathways; (2) I use the Next-Generation Sequencing and Biochemical techniques to gain functional insights into responsible microorganisms, genes, and enzymes.

SCIENTIFIC SKILLS

Analytical Chemistry: HPLC-HRMS/MS, GC-MS, GC-TCD/FID, Environmental-SEM
Molecular Biology: DNA/RNA extraction, PCR, (RT-)qPCR, Sequencing library preparation
Biochemistry: Functional gene expression and induction, Protein extraction and purification
Laboratory: Solid-phase extraction (SPE), aerobic/anaerobic microbes' cultivation and isolation
Data analysis: Target and non-target analysis, bioinformatics (Whole genome seq, RNA-seq, 16S rRNA gene seq, meta-genomic/transcriptomic seq, based on Kbase and QIIME2 platform)

EDUCATION AND TRAINING

02.2022- present| **Postdoctoral Scientist**, Department of Environmental Chemistry
Swiss Federal Institute of Aquatic Science and Technology (Eawag/ETH), Dübendorf, CH
Supervisor: Prof. Dr. Kathrin Fenner

01.2018-12.2021| **Ph.D., Environmental Science and Engineering**
University of Illinois Urbana-Champaign (UIUC), Champaign, IL, U.S.
Supervisor: Prof. Dr. Yujie Men (for both M.S. thesis and Ph.D. dissertation)
Dissertation: When chemistry meets microbiology: Biotransformation of emerging organic contaminants, <https://www.ideals.illinois.edu/items/123457>

01.2016-12.2017| **M.S., Environmental Science and Engineering**
University of Illinois Urbana-Champaign (UIUC), Champaign, IL, U.S.
Thesis: Ammonia-monooxygenase-mediated cometabolic biotransformation and abiotic transformation of micropollutants, <https://www.ideals.illinois.edu/items/105448>

09.2011-07.2015| **B.Eng., Hydrology and Water Resources Engineering (honor graduation)**
Jilin University (JLU), Jilin, China
Supervisor: Prof. Changchun Duan, Emeritus Professor in Isotope Hydrogeology
Thesis: Application of fuzzy mathematics and neural network methods in water quality evaluation

OTHER PROFESSIONAL APPOINTMENTS

07.2019- 01.2022| *Visiting Project Scientist*, Water Center, Department of Chemical and Environmental Engineering, University of California, Riverside, CA, U.S.

Roles: Responsible for conducting HPLC-HRMS/MS measurement and data analysis, with specialized focuses on LC methods development and PFAS analysis. Measure and analyze more than 40,000 samples for various collaborative projects.

05.2016- 12.2021| *Graduate Research Assistant*, Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign, Champaign, IL, U.S.

PUBLICATIONS

First/co-first authorship

6. **Yu Y**, Trottman N, Schärer M, Fenner K, Robinson S*. (2023) Substrate promiscuity of xenobiotic-transforming hydrolases from stream biofilms impacted by treated wastewater. *BioRxiv*. DOI: [10.1101/2023.09.27.559296](https://doi.org/10.1101/2023.09.27.559296) (Submitted to *Water Res.*, under review)
5. **Yu Y**, Xu F, Zhao W, Thoma C, Che S, Richman J, Jin B, Zhu Y, Xing Y, Wackett L, Men Y*. (2023) Electron-bifurcation and fluoride efflux systems in *Acetobacterium* spp. drive defluorination of perfluorinated unsaturated carboxylic acids. (submitted to *Nature Microbiology*)
4. **Yu Y**, Che S, Ren C, Jin B, Tian Z, Liu J, Men Y*. (2022) Microbial defluorination of unsaturated per- and polyfluorinated carboxylic acids under anaerobic and aerobic conditions: a structure specificity study. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.1c05509](https://doi.org/10.1021/acs.est.1c05509) ([Open access](#))
3. **Yu Y**, Zhang K, Li Z, Ren C, Chen J, Lin Y-H, Liu J, Men Y*. (2020) Microbial cleavage of C–F bonds in two C₆ per- and polyfluorinated compounds via reductive defluorination *Environ. Sci. Technol.* DOI: [10.1021/acs.est.0c04483](https://doi.org/10.1021/acs.est.0c04483)
2. Han P, **Yu Y**, Zhou LJ, Tian Z, Li Z, Hou L, Liu M, Wu QL, Wagner M, Men Y*. (2019) Specific micropollutant biotransformation pattern by the comammox bacterium *Nitrospira inopinata*. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.9b01037](https://doi.org/10.1021/acs.est.9b01037)
1. **Yu Y**, Han P, Zhou LJ, Li Z, Wagner M, Men Y*. (2018) Ammonia monooxygenase-mediated cometabolic biotransformation and abiotic transformation of micropollutants in an AOB/NOB coculture. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.8b02801](https://doi.org/10.1021/acs.est.8b02801)

First/co-first, corresponding/co-corresponding authorship in preparation

3. **Yu Y**, Zhang K, Steiner V-M, Trottman N, Robinson S, Statoh H, Hutter J, Fenner K. Combining Experimental Observation, Quantum Chemical Calculation, and Machine Learning Prediction for a Metatranscriptomics-Derived Laccase-Mediator System in Organic Pollutant Removal. (Postdoc Project, in prep.)
2. **Yu Y**, Zhang K, Che S, Men Y. Impaired Microbial Defluorination Activity of an Unsaturated Perfluorinated Carboxylic Acid Due to Co-exposure with Trichloroethylene (TCE) (Ph.D. Dissertation, ready to be submitted to *ES&T Lett.*)
1. **Yu Y**, Liu H, Che S, Guan X, Zhao W, Davis C, Jin B, Liu J, Liu C, Men Y. Community dynamics of an anaerobic defluorinating culture revealed a synergistic microbial reductive defluorination pattern. (Ph.D. Dissertation, in prep.)

Co-authorship

14. Jin B, Liu H, Shun C, Gao J, **Yu Y**, Liu J, Men Y*. (2023) Substantial defluorination of polychlorofluorocarboxylic acids triggered by anaerobic microbial hydrolytic dechlorination. *Nature Water*. DOI: [10.1038/s44221-023-00077-6](https://doi.org/10.1038/s44221-023-00077-6)

13. Li M, Durkin D.P, Waller G, **Yu Y**, Men Y, Ye T, Chen H*, Shuai D*. (2022) Transformation of graphitic carbon nitride by reactive chlorine species: “weak” oxidants are the main players. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.2c06381](https://doi.org/10.1021/acs.est.2c06381)
12. Che S, Guan X, Rodrigues R, **Yu Y**, Xie Y, Liu C*, Men Y*. (2023) Synergistic material-microbe interface towards deeper reductive defluorination of a C₆ perfluorinated compound. *ChemRxiv*. DOI: [10.26434/chemrxiv-2023-4f14q](https://doi.org/10.26434/chemrxiv-2023-4f14q) (Submitted to *Nature Water*, in revision)
11. Han P*, Rios-Miguel AB, Tang X, **Yu Y**, Zhou LJ*, Hou LJ, Liu M, Zhao Q, Sun D, Jetten M, Welte C, Men Y*, Lückner S. (2023) Benzimidazole fungicide biotransformation pathways and products by comammox *Nitrospira* bacteria. *J. Hazard. Mater.* <https://doi.org/10.1016/j.jhazmat.2022.130558>
10. Liu Z, Chen Z, Gao J, **Yu Y**, Men Y, Gu C, Liu J*. (2022) Accelerated Degradation of Perfluorosulfonates (PFSA) and Perfluorocarboxylates (PFCAs) by UV/Sulfite+Iodide: Reaction Mechanisms and System Efficiencies. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.1c07608](https://doi.org/10.1021/acs.est.1c07608) ([Open access](#))
9. Gao J, Liu Z, Bentel M, **Yu Y**, Men Y, Liu J*. (2022) Defluorination of ω-hydroperfluorocarboxylates (HPFCAs): distinct reactivities from perfluoro and fluorotelomeric carboxylates. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.1c04429](https://doi.org/10.1021/acs.est.1c04429)
8. Che S, Jin B, Liu Z, **Yu Y**, Liu J, Men Y*. (2021) Structure-specific aerobic defluorination of short-chain fluorinated carboxylic acids by activated sludge communities. *Environ. Sci. Technol. Lett.* DOI: [10.1021/acs.estlett.1c00511](https://doi.org/10.1021/acs.estlett.1c00511) ([Open access](#))
7. Liu Z, Bentel M, **Yu Y**, Ren C, Gao J, Pulikkal V, Sun M, Men Y, Liu J*. (2021) Near-Quantitative Defluorination of Perfluorinated and Fluorotelomer Carboxylates and Sulfonates with Integrated Oxidation and Reduction. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.1c00353](https://doi.org/10.1021/acs.est.1c00353) ([Open access](#))
6. Zhou LJ, Han P*, Zhao M, **Yu Y**, Sun D, Hou L, Tang X, Klümper U, Gu JD, Wu QL, Wagner M, Men Y. (2021) Biotransformation of lincomycin and three fluoroquinolone antibiotics by the ammonia oxidizers AOA, AOB and comammox: a comparison on removal rate, pathway, and mechanism *Water Res.* <https://doi.org/10.1016/j.watres.2021.117003>
5. Bentel M, Liu Z, **Yu Y**, Gao J, Men Y, Liu J*. (2020) Enhanced degradation of perfluorocarboxylic acids (PFCAs) by UV/Sulfite treatment: reaction mechanisms and system efficiencies at pH 12. *Environ. Sci. Technol. Lett.* DOI: [10.1021/acs.estlett.0c00236](https://doi.org/10.1021/acs.estlett.0c00236)
4. Bentel M, **Yu Y**, Xu L, Kwon H, Li Z, Wong B, Men Y, Liu J*. (2019) Degradation of perfluoroalkyl ether carboxylic acids (PFECAs) with hydrated electrons: structure-reactivity relationship and environmental implications. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.9b05869](https://doi.org/10.1021/acs.est.9b05869) ([ACS Editors' Choice](#), [Open access](#))
3. Zhou LJ, Han P*, **Yu Y**, Wang B, Men Y, Wagner M, Wu QL*. (2019) Cometabolic biotransformation and microbial-mediated abiotic transformation of sulfonamides by three ammonia oxidizers. *Water Res.* <https://doi.org/10.1016/j.watres.2019.05.031>
2. Bentel M, **Yu Y**, Xu L, Li Z, Wong B, Men Y, Liu J*. (2019) Defluorination of per- and polyfluoroalkyl substances (PFASs) with hydrated electrons: structural dependence and implications to PFAS remediation and management. *Environ. Sci. Technol.* DOI: [10.1021/acs.est.8b06648](https://doi.org/10.1021/acs.est.8b06648) ([Open access](#))
1. Xing Y, **Yu Y**, Men Y*. (2018) Occurrence and fate of emerging organic contaminants in wastewater treatment plants with an enhanced nitrification step. *Environ. Sci.: Water Res. Technol.* DOI: [10.1039/C8EW00278A](https://doi.org/10.1039/C8EW00278A)

RESEARCH PROJECTS

5. Molecular mechanisms of microbiological degradation of pollutants in wastewater treatment and natural water environments. (Swiss National Science Foundation, 2022-2025) (Postdoc Project)
4. Pollutant biotransformation by metagenomic hydrolases (Eawag Discretionary Funds, 2021-2023) (Postdoc Project)
3. Identification, characterization, and application of reductive defluorinating microorganisms. (SERDP, Project No.: ER20-1541, 2020-2024), (Ph.D. Dissertation)
2. Cobalt-catalyzed Defluorination of Branched Perfluorinated Compounds. (NSF_ECS SusChEM: Collaborative Research, Award No. NSF CHE 1709286, 2017-2020), (Ph.D. Dissertation)
1. Roles of nitrifying microorganisms on biotransformation of emerging contaminants in wastewater treatment plants (University of Illinois Urbana-Champaign, 2016-2019) (M.S. Thesis & Ph.D. Dissertation)

CONFERENCE PRESENTATION(as the presenter)

19. (Oral) **Yu Y.** Exploring the Functional Environmental Microorganisms and Emerging Contaminants Biotransformation. The 2nd Europe-China Eco-Environmental Forum for Young Scholars Special Topics on Water Environment, 2023, Virtual Conference. (*Invited Talk*)
18. (Oral) **Yu Y.** Exploring the roles of environmental functional microbes in organic contaminants biotransformation: insights from a molecular perspective. The 2nd Europe-China Eco-Environmental Forum for Young Scholars, 2023, Leuven, Belgium. (*Invited Talk*)
17. (Oral) **Yu Y.**, Zhang K, Steiner VZ, Trottman T, Robinson S, Satoh H, Hutter J, Fenner K. A Unified Approach to Bioremediation: Combining Experimental Observation, Quantum Chemical Calculation, and Machine Learning Prediction, ICCE 2023, Venice, Italy.
16. (Oral) **Yu Y.**, Steiner VZ, Trottman T, Robinson S, Satoh H, Hutter J, Fenner K. Metatranscriptomics-derived laccase-mediator system for organic pollutants biotransformation: from experimental observations to quantum chemical predictions, BioRemid 2023, Muttenz, Switzerland.
15. (Oral) **Yu Y.** The identification of PFAS degradation microorganisms. Europe-China Eco-Environmental Forum for Young Scholars, 2022, Virtual Conference. (*Invited Talk*)
14. (Poster & Poster Pitch) **Yu Y.**, Trottman N, Scharer M, Zhang K, Kalt M, Ceppi E, Robinson S, Fenner K. Omics-based discovery of novel pollutant-degrading enzymes: from metagenomics data mining to enzyme functionality validation, ISME18, 2022, Lausanne, Switzerland.
13. (Poster) **Yu Y.** Liu H, Guan X, Che S, Zhao W, Jin B, Davis C, Liu C, Liu J, Men Y. Community dynamics and identification of functional genes during the enrichment of an anaerobic defluorinating culture, ISME18, 2022, Lausanne, Switzerland. (*Selected as a poster presentation but later withdrawn due to the time conflict with the ISME poster pitch*)
12. (Oral) **Yu Y.** Microbial cleavage of C-F bonds in PFAS: Promises and Challenges, Jilin University Water Resources & Environment Online Forum for International Young Scholars, 2022. (*Invited Talk*)
11. (Oral) **Yu Y.** Microbial Cleavage of C–F Bonds in PFAS. Department of Environmental Chemistry Seminar, Swiss Federal Institute of Aquatic Science and Technology (EAWAG)
10. (Oral) **Yu Y.**, Che S, Ren C, Jin B, Tian Z, Liu J, Men Y. Microbial defluorination of unsaturated per- and polyfluorinated carboxylic acids under anaerobic and aerobic conditions: A structure specificity study. Spring ACS National Meeting & Exposition, 2022, San Diego, CA.

9. (Oral) **Yu Y**, Davis C, Ran M, Liu J, Men Y. Metaomics analyses revealed the community dynamics and functional genes of an anaerobic enrichment culture during the defluorination processes. Spring ACS National Meeting & Exposition, 2022, San Diego, CA.
8. (Oral) **Yu Y**, Microbial cleavage of C–F bonds in PFAS. Department of Chemical and Environmental Engineering, University of California, Riverside, CA. (*Invited Talk*).
7. (Oral) **Yu Y**, Zhang K, Li Z, Ren C, Liu J, Men Y. Reductive defluorination of per- and polyfluoroalkyl substances by a dechlorinating microbial community. 258th Fall ACS National Meeting & Exposition, 2019, San Diego, CA. (*Invited Talk*).
6. (Oral) **Yu Y**, Zhou LJ, Han P, Wang B, Men Y, Wagner M, Wu QL. Biotransformation of sulfonamides by ammonia oxidizers. Emerging Contaminants in Environment Conference, 2019, Urbana. IL.
5. (Oral) **Yu Y**, Han P, Zhou LJ, Tian Z, Li Z, Hou L, Liu M, Wu QL, Wagner M, Men Y. Distinctive capabilities of micropollutant biotransformation by comammox bacterium *Nitrospira inopinata*. 257th Spring ACS National Meeting & Exposition, 2019, Orlando, FL.
4. (Oral) **Yu Y**, Han P, Zhou LJ, Tian Z, Li Z, Hou L, Liu M, Wu QL, Wagner M, Men Y. Biotransformation of carbendazim exclusively by a complete ammonia oxidizer *Nitrospira inopinata* among three ammonia-oxidizers. Emerging Contaminants in the Aquatic Environment Conference, 2018, Urbana, IL.
3. (Oral) **Yu Y**, Han P, Zhou LJ, Li Z, Wagner M, Men Y. Ammonia monooxygenase-mediated cometabolic biotransformation and hydroxylamine-mediated abiotic transformation of micropollutants in an AOB/NOB co-culture. 255th ACS Spring National Meeting & Exposition, 2018, New Orleans, LA.
2. (Poster) **Yu Y**, Han P, Zhou LJ, Tian Z, Li Z, Hou L, Liu M, Wu QL, Wagner M, Men Y. Biotransformation of carbendazim exclusively by a complete ammonia oxidizer *Nitrospira inopinata* among three ammonia-oxidizers. AEESP Distinguished Lecturer Conference at Purdue University, 2018, West Lafayette, IN.
1. (Oral) **Yu Y**, Han P, Zhou LJ, Li Z, Wagner M, Men Y. From correlation to causation: evidence of micropollutant biotransformation by ammonia-oxidizing bacteria using a nitrifying co-culture. Emerging Contaminants in the Aquatic Environment Conference, 2017, Urbana, IL.

SELECTED AWARDS AND GRANTS

From Graduate School and Postdoc

- ISME Travel Awards for Young Scientist Members, ISME18, 2022
- Chinese Government Award for Outstanding Self-financed Students Abroad (\$6000), China Scholarship Council, 2021
- Graduate College Grants (\$5000), UIUC, 2021
- CAPEES Founding President Best Paper Awards, CAPEES, 2021
- C. Ellen Gonter Environmental Chemistry Award, Division of Environmental Chemistry, ACS, 2019
- Graduate Student Awards in Environmental Chemistry, Division of Environmental Chemistry, ACS, 2019
- Racheff Student Travel Award, Environmental Engineering & Science Program, UIUC, 2018 & 2019
- Certificate of Merit, Division of Environmental Chemistry, ACS, 2018

From Undergraduate Study

- Outstanding Graduation Award for Bachelor Students, Jilin University, 2015
- National Scholarship, China Scholarship Council (Top 1 in department), 2014

- Li Siguang Geosciences Scholarship, (highest honor for students majoring in geology-related subjects), 2014
- First-class Scholarship, Jilin University (2012)

SERVICES AND OURREACH ACTIVITIES

- Peer-reviewer for journals: Environmental Science and Technology; Environmental Science and Technology Letters; Environmental Microbiology; Water Research; Water Research X; ACS EST Water; Aquatic Toxicology; Environmental Pollution; Science of the Total Environments, etc.
- Program Committee, Environmental Engineering and Science Symposium, UIUC (2017&2018)
- Chair of Cultural Awareness and Speech Enhancement (CASE) Program, Department of Civil and Environmental Engineering, UIUC (2018)
- Member of Cultural Awareness and Speech Enhancement (CASE) Program, Department of Civil and Environmental Engineering, UIUC (2016-2019)

CONTACT INFORMATION OF REFERENCES

1. Prof. Dr. Kathrin Fenner

Affiliation: Swiss Federal Institute of Aquatic Science and Technology/University of Zurich

Job title: Senior scientist/ Professor

Email: kathrin.fenner@eawag.ch

Mailing address: Eawag, Überlandstrasse 133, Office BU F18, 8600 Dübendorf, Switzerland

Phone number: +41 58 765 5085

Relationship: Postdoctoral supervisor

2. Prof. Dr. Yujie Men

Affiliation: University of California, Riverside/ University of Illinois Urbana-Champaign (Adjunct)

Job title: Associate Professor

Email: [ymen@engr.ucr.edu](mailto:y-men@engr.ucr.edu)

Mailing address: A235 Bourns Hall, 900 University Ave, University of California, Riverside, Riverside, CA 92521, USA

Phone number: (951) 827-1019

Relationship: M.S. and Ph.D. supervisor

3. Prof. Dr. Jinyong Liu

Affiliation: University of California, Riverside

Job title: Associate Professor

Email: jinyongli@ucr.edu

Mailing address: B321 Bourns Hall, 900 University Ave, University of California, Riverside, Riverside, CA 92521, USA

Phone number: (951) 827-1481

Relationship: Committee member for Ph.D. thesis; Project collaborator (UV-based PFAS destruction methods development)

4. Dr. Serina Robinson

Affiliation: Swiss Federal Institute of Aquatic Science and Technology

Job title: Group Leader in the Department of Environmental Microbiology

Email: serina.robinson@eawag.ch

Mailing address: Eawag, Überlandstrasse 133, Office: BU F05, 8600 Dübendorf, Switzerland

Phone number: +41 58 765 6423

Relationship: Project collaborator (Biochemistry and bioinformatics on identifying functional enzymes for emerging contaminants biotransformation from meta'omics dataset)

5. Prof. Dr. Lawrence Wackett

Affiliation: University of Minnesota

Job title: Distinguished McKnight University Professor

Email: wacke003@umn.edu

Mailing address: 1479 Gortner Avenue, Minneapolis, MN 55108, USA

Phone number: (612) 625-3785

Relationship: Project collaborator (Biochemistry and bioinformatics on identifying the occurrence of PFAS degradation genes and enzymes)