

Bang Du, PhD

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Research Discipline

Biological treatment and resource recovery in waste/wastewater, microbial interactions and electron transfer mechanisms, modelling and bioinformatics analysis, particularly in:

- 1) applying ecological theory in pollutant removal, microbial enrichment, and metabolic pathway regulation with engineering approaches, and
- 2) integrating thermodynamic-kinetic-metabolic models to reveal the dynamics of microorganisms, substrates, energy, and electrons in biological process.

Education

Ph.D. , Civil Engineering (Environmental Engineering) University of Galway, Ireland Supervisor: Dr Guangxue Wu Thesis: <i>Deciphering Anaerobic Ethanol Oxidation for Better Recovery of Renewable Energy from Wastewater</i>	06/2021–03/2024
M.Eng. , Civil Engineering (Environmental Engineering) Hefei University of Technology, China Supervisor: Prof. Li Liu Thesis: <i>Effects of Bacterial Mobility on Biofilm Formation under Environmental Stresses</i>	09/2016–04/2019
B.Eng. , Water Supply and Drainage Engineering Hefei University of Technology, China	09/2012–07/2016

Working experience

Lecturer Civil and Environmental Engineering, School of Engineering, University of Surrey, UK MSc module: ENGM304 Wastewater Treatment, ENGM044 Dissertation Project	04/2025–present
Research Fellow School of Engineering, University of Surrey, UK Bioinformatics; Anaerobic microbiome modelling; Life cycle assessment	05/2024–03/2025
Lab Manager Centre for Environmental Health and Engineering (CEHE) Civil and Environmental Engineering, University of Surrey, UK	09/2024–present
Teaching Assistant Civil engineering, University of Galway, Ireland Module: Design of Sustainable Environmental Systems, Civil Engineering Materials and Design, Engineering Computing, Fundamentals of Engineering.	2022–2023
Research Assistant Institute of Hydrobiology, Chinese Academy of Sciences, China Reactor operation, experiments in molecular and cellular biology	08/2020–12/2020
Civil Design Engineer CITIC General Institute of Architectural Design and Research, China Construction Drawing Design and Building Information Modelling (BIM) for “Water Supply, Drainage, Wastewater Treatment Module, and Fire-Fighting System”	07/2019–05/2021

Research Publications

1. **Du, B.**, Zhan, X., Lens, P.N.L., Zhang, Y., Wu, G., 2024a. Deciphering anaerobic ethanol metabolic pathways shaped by operational modes. *Water Research*, 249, 120896.
2. **Du, B.**, Wang, Z., Lens, P.N.L., Zhan, X., Wu, G., 2024b. New insights into syntrophic ethanol oxidation: effects of operational modes and solids retention times. *Environmental Research*, 241, 117607.
3. **Du, B.**, Gu, M., Hu, Z., Zhan, X., Wu, G., 2023. Thermodynamic analysis of extracellular electron transfer during ethanol oxidation in anaerobic digestion systems. *Biomass and Bioenergy*, 172, 106755.
4. **Du, B.**, Wang, S., Chen, G., Wang, G., Liu, L., 2022. Nutrient starvation intensifies chlorine disinfection-stressed biofilm formation. *Chemosphere*, 295, 133827.
5. **Du, B.**, Gu, Y., Chen, G., Wang, G., Liu, L., 2020a. Flagellar motility mediates early-stage biofilm formation in oligotrophic aquatic environment. *Ecotoxicology and Environmental Safety*, 194, 110340.
6. **Du, B.**, Hu, Q., Gu, Z., Shan, R., Liu, L., 2020b. Kinetic simulation of nutrient conditions on bacterial motility and surface attachment in drinking water distribution system. *Journal of Huazhong Agricultural University*, 39(2), 56–62.
7. Shu, W., **Du, B.**, Wu, G., 2025. Deciphering microbial responses to H₂S inhibition of typical functional microorganisms in anaerobic digestion ecosystems. *Chemical Engineering Journal*, 513, 162766.
8. Shu, W., **Du, B.**, Wu, G., 2024. Strategies for enriching targeted sulfate-reducing bacteria and revealing their microbial interactions in anaerobic digestion ecosystems. *Water Research*, 270, 122842.
9. Chang, H., **Du, B.**, He, K., Yin, Q., Wu, G., 2024. Mechanistic understanding of acclimation and energy metabolism of acetoclastic methanogens under different substrate to microorganism ratios. *Environmental Research*, 252, 118911.
10. Wang, Y., **Du, B.**, and Wu, G., 2024. Powdered activated carbon facilitated degradation of complex organic compounds and tetracycline in stressed anaerobic digestion systems. *Bioresource Technology*, 400, 130672.
11. Adams, M., Wang, Y., **Du, B.**, Olbert, I., Wu, G., 2024. Operational mode and powdered activated carbon promoting syntrophic propionate oxidation during anaerobic digestion of complex organic substances. *Journal of Environmental Management*, 356, 120593.
12. Wu, G., Chang, H., **Du, B.**, 2024. Kinetic modelling of typical biological reactions during anaerobic digestion. In *anaerobic digestion: fundamentals, modelling, and applications*, 203–223. Springer Nature Switzerland.
13. Bai, Y., Hu, H., Lee, P.H., Zhussupbekova, A., Shvets, I. V., **Du, B.**, Terada, A., Zhan, X., 2023. Nitrate removal in iron sulfide-driven autotrophic denitrification biofilter: biochemical and chemical transformation pathways and its underlying microbial mechanism. *Science of the Total Environment*, 901, 165908.
14. Wang, Z., Wang, S., Hu, Y., **Du, B.**, Meng, J., Wu, G., Liu, H., Zhan, X., 2022. Distinguishing responses of acetoclastic and hydrogenotrophic methanogens to ammonia stress in mesophilic mixed cultures. *Water Research*, 224, 119029.

15. Yu, J., **Du, B.**, Shi, H., Chen, G., Liu, L., 2018. Impacts of residual chlorine concentration on bacterial attachment to particles in drinking water distribution system. *Acta Scientiae Circumstantiae*, 38(5), 1804–1811.

Academic Projects

Marie Skłodowska-Curie Actions Postdoc Fellowship	Ethanol-nexus two-stage anaerobic digestion integrated with biochar in leveraging eco-treatment of agricultural wastes (ENABLE, Project No. 101212217)	Principal Investigator 2025-2027
UKRI-Engineering and Physical Sciences Research Council	Artificial Intelligence Enabling Future Optimal Flexible Biogas Production for Net Zero	Participant 2024-2025
Sustainable Energy Authority of Ireland (SEAI)	NovBioEnergy: Development of a novel methanogenic biotechnology incorporating conductive carriers for the efficient recovery of energy from wastewater	Participant 2021-2024
Science Foundation Ireland (SFI)	Alleviation mechanisms and microbial interactions induced by conductive materials in sulphate-stressed anaerobic digestion ecosystems	Participant 2023
National Natural Science Foundation of China	Analysis and Numerical Simulation of Microbial Aggregation Behaviours in Water Supply Networks under Microscopic Hydraulic Conditions (Project No. 51479046)	Participant 2016-2019
Major National Science and Technology Project “Water Pollution Control and Treatment”	Research and Demonstration Project on Low-Impact Development and Water Environment Improvement Technology in Binhu New District, Hefei: Subproject “Hydrological and Water Quality Mathematical Model and Hydraulic Control Technology Plan for Tangxi River Basin” (Project No. 2011ZX07303.001)	Participant 2013-2015
Student Innovation and Entrepreneurship Project	"Diffusion and Distribution Model of Microorganisms in Tangxi River" (Project No. 2014CXCXY253)	Principal Investigator 2014-2015

Engineer Design Project

Shopping Mall	Joy City Interior Fit-out, Wuhan, China (700,000 m ²)	2020
Industrial Park	Gedian Innovation Valley Phase I, Ezhou, China (808,800 m ²)	2020
Public Building	Wugang Hotel, Wuhan, China (31,500 m ²)	2020
Public Building	Binjiang Experimental Primary School, Wuchang District, Wuhan, China (24,000 m ²)	2020
Public Building	Wuhan Mental Health Centre, Wuhan, China (81,435 m ²)	2020
Public Building	Liuzhou Nationality Senior High School, Liuzhou, China (105,336.70 m ²)	2020
Public Building	Wuhan Traditional Chinese Medicine Hospital, Wuhan, China (67,950.80 m ²)	2020
Public Building	CSCEC Guanggu Star, Wuhan, China (1,050,000 m ²)	2020
Public Building	Liudong Cultural Plaza, Liuzhou, China (81,771.03 m ²)	2020
Public Building	Liuzhou Civic Centre, Liuzhou, China (195,000 m ²)	2020

Public Building	CITIC Science & Technology Park (Wuhan Chuanggu Phase III EPC), Wuhan, China (27,000 m ²)	2020
Residential	Sheng Qian An Phase II, Wuhan, China	2020
Residential	Li Tianxia Residential Project, Lichuan, China (256,648.00 m ²)	2020
Residential	CITIC Taifu Erqi Riverside Building 18# Block, Wuhan, China (122,689.08 m ²)	2019
Residential	CITIC Taifu Erqi Riverside Building 24# Block, Wuhan, China (1,170,000 m ²)	2019

Professional Service

Reviewer, Bioresource Technology (Elsevier); Environmental Research (Elsevier); Frontiers of Environmental Science and Engineering (Springer)

Member, Ireland Chinese Association of Environment, Resources & Energy (ICAERE); Environmental Biotechnology Network (EBNet), Biotechnology and Biological Sciences Research Council (BBSRC); The Carbon Recycling Network, BBSRC

Junior Utility Engineer, Water Supply and Drainage Engineering, China

Conference presentations

1. The 5th International Conference on Biogas Microbiology (ICBM5), 2025, Galway, Ireland. (Oral presentation, Session co-chair)
2. The IWA World Water Congress & Exhibition 2024, 2024, Toronto, Canada. (Oral presentation)
3. 18th IWA World Conference on Anaerobic Digestion, 2024, Istanbul, Turkey. (Poster)
4. Early Career Researcher Regional Symposium on Electrochemistry 2023, Galway, Ireland. (Oral presentation)
5. Workshop on Water-Energy-Food Nexus 2023, Galway, Ireland. (Oral presentation)
6. The 1st Forum for Chinese PhD Students in Ireland 2022, Dublin, Ireland. (Oral presentation)
7. College of Science and Engineering Research and Innovation Day 2023, Galway, Ireland. (Poster, Poster Award)
8. Workshop on Anaerobic Digestion and Conductive Materials 2022, Galway, Ireland. (Oral presentation)
9. The 10th Annual General Meeting of the Ireland Chinese Association of Environment, Resources & Energy 2021, Galway, Ireland. (Poster, Excellent Presentation Award)

Awards

1. ECR travel bursaries (£2000), EBNET, UKRI, 2024
2. Poster Award, College Research and Innovation Day, University of Galway, Ireland, 2023
3. Excellent Presentation Award, The 10th Annual General Meeting of ICAERE, 2021
4. PhD International Merit Scholarship, University of Galway, Ireland, 2021
5. College Scholarship, University of Galway, Ireland, 2021

Academic Event organizing

1. RECLAIM Network Plus Workshop - Adapting Hybrid GBGI Approaches for Better Wastewater Processing, 2024, Guildford, UK
2. 11th International Conference on Environment, Resources & Energy, 2024, Galway, Ireland
3. 2024 China Scholarship Council (Galway) Annual Symposium, 2024, Galway, Ireland
4. Workshop on Water-Energy-Food Nexus, 2023, Galway, Ireland
5. The 10th Annual General Meeting of ICAERE, 2021, Galway, Ireland