

## Curriculum Vitae

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#### I. EDUCATION

2019.2-2019.2 Short Visiting, Harvard University, USA

2011 – 2012 Visiting Scholar, Georgia Institute of Technology, USA

2004 – 2009 Ph.D., Environmental Engineering, Harbin Institute of Technology, PR China

2000 – 2004 B.S., Environmental Engineering, Wuhan University, PR China

#### II. RESEARCH INTERESTS

Water and Wastewater Treatment Processes; Advanced Membranes for Water and Wastewater Reuse; Shale Gas Wastewater Reuse; Water-Energy Nexus.

#### III. AWARDS & HONORS

- Beijing Capital Group *Gold Medal* for Technological Progress in 2021
- Nanjing University Zijin Quanxing Award in 2020
- Outstanding Scientific Research Talent Award of Sichuan University in 2020
- Royal Society of Chemistry 2020 RSC Science Video Outstanding Instructor Award
- Thirteenth national college student energy conservation and emission reduction social practice and science and technology competition first prize instructor, 2020

- Good Future Scholar of Sichuan University in 2019
- Sichuan University excellent undergraduate graduation thesis (design) third prize instructor, 2019
- Sichuan University excellent undergraduate student thesis (design) second prize instructor, 2018
- Sichuan University excellent undergraduate student thesis (design) third prize instructor, 2017
- Sichuan University excellent undergraduate student thesis (design) first prize instructor, 2016
- Classroom Teaching Quality Excellence Award for undergraduate teaching work in 2014
- Undergraduate Mentor Award of science and technology practice, 2012, 2014
- Outstanding Young Teachers Award by Sichuan University, 2009,2012,2013
- Distinguished Ph.D. Graduation Award by Heilongjiang Province, 2009
- Ph.D. Visiting Scholarship Funded by Ministry of Education of the PR China, 2007-2008

#### IV. PUBLICATIONS

##### Articles

155. Li, X.; Li, X.; Liang, Q.; Chen, G.; Wang, W.; Bao, J.; Qin, J.; Tang, S.; Lin, X.; Tiraferri, A.; **Liu, B.\***, Efficient recovery of lithium from the reverse osmosis concentrate of shale gas wastewater treatment: Adsorption performance and mechanism of Al-doped manganese-based adsorbent particles prepared via hydrophilic modification. *Desalination* 2025, 613, 118997.

154. Wang, Y.; Chen, L.; Chen, X.; Yang, C.; Cheng, X.; Liu, W.; Tiraferri, A.; Ma, J.; **Liu, B.\***, Overlooking the effect of alcohol quenchers can mislead mechanistic understanding in ferrate-based advanced oxidation processes. *Separation and Purification Technology* 2025, 370, 133193.

153. Chen, L.; Cheng, X.\*; Chen, G.; Wang, Y.; Chen, X.; Yang, C.; Liu, W.; Kalonji, G.; Ma, J.; **Liu, B.\***, Binding interaction between chlorine and powder activated carbon driving nonradical oxidation toward diclofenac abatement: Surface-bound complexes generating on diverse sites performing diverse duties. *Water Research* 2025, 282, 123620.

152. Wang, Y.; Chen, X.; Chen, L.; Cheng, X.; Yang, C.; Chen, G.; Shu, J.; Liu, W.; Tiraferri, A.; **Liu, B.\***, Ultra-efficient degradation of isoquinoline from shale gas

wastewater with the diethylamine-ferrate(VI) system: The key role of Fe(IV)/Fe(V) active species. *Journal of Hazardous materials* 2025, 492, 138215.

151. Chen, X.; Wang, Y.; Chen, L.; Yang, C.; Cheng, X.\*; Liu, W.; **Liu, B.\***, Trace amino-containing indoline-mediated Fe(VI) activation toward effective abatement of 6-methylquinoline: A new application scenario of Fe(VI) without the involvement of external activators. *Journal of Water Process Engineering* 2025, 72, 107618.

150. Zhou, G.; Chen, G.; Tang, P.; Li, X.; Ma, J.; **Liu, B.\***, Revealing the removal behavior of five neglected microplastics in coagulation-ultrafiltration processes: Insights from experiments and predictive modeling. *Journal of Hazardous materials* 2025, 491, 137857.

149. Li, C.; Tiraferri, A.; Tang, P.; Ma, J.; **Liu, B.\***, Current status, potential assessment, and future directions of biological treatments of unconventional oil and gas wastewater. *Water Research* 2025, 275, 123217.

148. Shi, S.; Tang, P.; Zhang, X.; Chen, G.; Yang, C.\*; Zhang, D.; Li, F.; Zhu, M.; Yang, P.; **Liu, B.\***, Enhanced removal of TN in shale gas wastewater by a novel porous polymer monolith immobilized microorganisms. *Biochemical Engineering Journal* 2025, 216, 109650.

147. Li, X.; Chen, G.; Li, X.; Song, Z.; Liu, W.; **Liu, B.\***, Research on the extraction mechanism of dibenzo-14-crown-4 ether to specific recovery Li<sup>+</sup> from spent lithium-ion battery raffinate. *Desalination* 2025, 601, 118581.

146. Li, F.; Yu, X.; Yang, Y.; Tao, W.; Zhu, M.; Zhang, D.; Shi, S.; Li, H.; Tang, P.; Tiraferri, A.; **Liu, B.\***, Impacts of shale gas wastewater leaks on neighboring crops: Physiological and morphological responses of tomatoes. *Process Safety and Environmental Protection* 2025, 195, 106786.

145. Shu, J.#; Tang, P.#; Ji, X.; Liu, P.; Zhou, G.; Gan, Z.; Ma, J.; **Liu, B.\***, Molecular insights into transformation of dissolved organic matter in treating shale gas wastewater by the UV/H<sub>2</sub>O<sub>2</sub>-ultrafiltration-reverse osmosis combined process. *Separation and Purification Technology* 2025, 360, 131110.

144. Chen, G.; Li, X.; Li, X.; Song, Z.; **Liu, B.\***, Active-passive synergistic alleviation of membrane scaling from groundwater by grafting charged positive monomers on the surface of nanofiltration membranes. *Desalination* 2025, 599, 118436.

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142. Tang, P.#; Shi, J.#; He, C.; Li, X.; Chen, G.; Deng, Y.; Qin, J.; **Liu, B.\***, Mitigation effect and mechanism of different pretreatment methods on reverse osmosis membrane fouling in coal chemical wastewater treatment. *Desalination* 2025, 598, 118437.
141. Chen, G.; Li, S.; Li, X.; Li, X.; **Liu, B.\***, Enhanced gravity-driven membrane filtration for purifying roof rainwater using multi-walled carbon nanotubes tuned PVDF hollow fiber membranes. *Separation and Purification Technology* 2025, 356, 129869.
140. Li, X.; Li, X.; Chen, G.; Zhang, D.; Tian, L.; Chen, J.; Liu, C.; Li, B.; Tiraferri, A.; **Liu, B.\***, Efficient recovery of lithium from shale gas wastewater: Fe, Ni, and Al doping of H<sub>1.33</sub>Mn<sub>1.67</sub>O<sub>4</sub> for improved adsorption capacity and manganese loss reduction. *Journal of Cleaner Production* 2024, 473, 143554.
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137. Zhong, C.\*; Chen, R.; **Liu, B.**; Pu, S.; Hou, D., Trends in polyacrylamide utilization and treatment for hydraulic fracturing. *npj Materials Sustainability* 2024, 2, (1), 15.
136. Rusli, A.; Hedenqvist, M. S.; Yin, H.; Feng, Z.; **Liu, B.**; Wei, X.-F.\*, Eco-Friendly fabrication of nanoplastic particles and fibrils using polymer blends as templates. *Chemical Engineering Journal* 2024, 495, 153615.
135. Zhu, M. #; Tang, P. #; Yu, X.; Li, F.; Shi, S.; Zhang, D.; Shi, J.; Tao, W.; Ruan, X.; Liu, L.; **Liu, B.\***, Effective and mechanistic insights into shale gas wastewater reverse osmosis concentrate treatment using ozonation-biological activated carbon process. *Science of the Total Environment* 2024, 945, 174080.
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133. Ye, J.; Wang, Y.; Cheng, X.; Chen, G.; Zhang, D.; Chen, X.; Chen, L.; Tang, P.\*; Xie, W.; **Liu, B.\***, Removal of 6-methylquinoline from shale gas wastewater using electrochemical carbon nanotubes filter. *Chemosphere* 2024, 359, 142259.

132. Wu, Q.; Chen, C.; Shu, J.; Ren, X.; Zhang, Y.; Tiraferri, A.; **Liu, B.\***, Efficiency of a combined biological aerated filter and ultrafiltration process for removal of odor compounds in rural drinking water. *Separation and Purification Technology* 2024, 342, 126991.
131. Qu, W.; Fu, Y.; Zhang, Y.; Wang, W.; Xu, C.; Liu, C.; Zhang, Y.; Wang, Q.\*; **Liu, B.\***, Structural/surficial dual regulated granular H<sub>2</sub>TiO<sub>3</sub> lithium-ion sieves for lithium extraction from salt lake brine. *Journal of Cleaner Production* 2024, 449, 141789.
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129. Tang, P.; Zhong, C.; Zhang, D.; Wang, J.; Su, Y.; **Liu, B.\***, Microbial Insights into Shale Gas Wastewater from the Sichuan Basin: Diversity, Potential Functions, and Implications. *Energy & Fuels* 2024, 38 (4), 2992-3001. DOI: 10.1021/acs.energyfuels.3c04325. **(Front Cover)**
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127. Liao, Q.#; Zhang, C.#; Tang, P.\*; Shu, J.; Wu, Q.; **Liu, B.\***, Exploration of ferrate (VI) pretreatment and ultrasonication combined with gravity-driven membrane filtration for shale gas wastewater treatment. *Journal of Cleaner Production* 2024, 435, 140425. DOI: <https://doi.org/10.1016/j.jclepro.2023.140425>.
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125. Yang, Y.; Tian, L.; Shu, J.; Wu, Q.; **Liu, B.\***, Potential hazards of typical small molecular organic matters in shale gas wastewater for wheat irrigation: 2-butoxyethanol and dimethylbenzylamine. *Environmental Pollution* 2024, 340, 122729.
124. Shi, J.; Tang, P.; Chen, G.; Tian, L.; Ji, X.; He, C.; **Liu, B.\***, Mechanism of organic fouling in the reverse osmosis process of coal chemical wastewater. *Journal of Water Process Engineering* 2023, 56, 104413.

123. Wang, L.; Luo, T.\*; Jiao, J.; Liu, G.; **Liu, B.**; Liu, L.; Li, Y.\*, One-step modification of MIL-88A(Fe) enhanced electro-Fenton coupled membrane filtration system for the removal of bisphenol A. *Separation and Purification Technology* 2024, 329, 125091.
122. Wang, L.; Wang, S.; Chen, C.; Tang, Y.; **Liu, B.\***, Multi-omics analysis to reveal key pathways involved in low C/N ratio stress response in *Pseudomonas* sp. LW60 with superior nitrogen removal efficiency. *Bioresource Technology* 2023, 389, 129812.
121. Tian, L.; Yang, Y.; Chen, G.; Tiraferri, A.; **Liu, B.\***, Efficient Lithium Extraction from Shale Gas Wastewater Using Sodium Alginate/H1.33Mn1.67O4 Composite Granular Adsorbents. *ACS ES&T Engineering* 2023, 3, (11), 1676-1685.(**Front Cover**)
120. Ren, X.; Wu, Q.; Shu, J.; Chen, C.; Tiraferri, A.; **Liu, B.\***, Efficient removal of organic matters and typical odor substances in rural drinking water using Ozone-BAC-UF combined system to meet new water quality standards in China. *Separation and Purification Technology* 2023, 327, 124899.
119. Zhou, G.; Wu, Q.; Wei, X.-F.; Chen, C.; Ma, J.; Crittenden, J. C.; **Liu, B.\***, Tracing microplastics in rural drinking water in Chongqing, China: Their presence and pathways from source to tap. *Journal of Hazardous materials* 2023, 459, 132206.
118. Wang, L.; Chen, C.; Tang, Y.; **Liu, B.\***, Efficient nitrogen removal by a novel extreme strain, *Pseudomonas reactans* WL20-3 under dual stresses of low temperature and high alkalinity: Characterization, mechanism, and application. *Bioresource Technology* 2023, 385, 129465.
117. Jiao, J.; Li, Y.\*; Luo, T.\*; Song, Q.; Liu, L.; **Liu, B.**, High performance of graphene oxide (GO)-thiosemicarbazide (TSC) modified membrane for pervaporation desalination with TSC performed as a novel cross-linker. *Separation and Purification Technology* 2023, 124415.
116. Wang, L.; Chen, C.; Tang, Y.; **Liu, B.\***, A novel hypothermic strain, *Pseudomonas reactans* WL20-3 with high nitrate removal from actual sewage, and its synergistic resistance mechanism for efficient nitrate removal at 4 °C. *Bioresource Technology* 2023, 385, 129389.
115. Zhang, N.; Zhang, J.; Yang, X.; Zhou, C.; Zhu, X.; **Liu, B.**; Chen, Y.; Lin, S.; Wang, Z.\*, Janus Membrane with Hydrogel-like Coating for Robust Fouling and Wetting Resistance in Membrane Distillation. *ACS Applied Materials & Interfaces* 2023, 15, (15), 19504-19513.

114. Liu, Y. #; An, N. #; Tian, L.; Yang, P.; Wang, W.\*; **Liu, B.\***, Multifunctional carbon aerogel granules designed for column reactor for efficient treatment of shale gas flowback and produced water. *Chemical Engineering Journal* 2023, 459, 141544.
113. Ji, X.; Tiraferri, A.; Zhang, X.; Liu, P.; Gan, Z.; Crittenden, J. C.; Ma, J.; **Liu, B.\***, Dissolved organic matter in complex shale gas wastewater analyzed with ESI FT-ICR MS: Typical characteristics and potential of biological treatment. *Journal of Hazardous materials* 2023, 447, 130823.
112. Zhong, C.\*; Hou, D.; **Liu, B.**; Zhu, S.; Wei, T.; Gehman, J.; Alessi, D. S.; Qian, P.-Y.\*, Water footprint of shale gas development in China in the carbon neutral era. *Journal of Environmental Management* 2023, 331, 117238.
111. Wu, Q.; Chen, C.; Zhang, Y.; Tang, P.; Ren, X.; Shu, J.; Liu, X.; Cheng, X.; Tiraferri, A.; **Liu, B.\***, Safe purification of rural drinking water by biological aerated filter coupled with ultrafiltration. *Science of the Total Environment* 2023, 868, 161632.
110. Chen, G.; Xie, W.; Chen, C.; Wu, Q.; Qin, S.; **Liu, B.\***, Preparation of High Flux Chlorinated Polyvinyl Chloride Composite Ultrafiltration Membranes with Ternary Amphiphilic Copolymers as Anchor Pore-Forming Agents and Enhanced Anti-Fouling Behavior. *Industrial & Engineering Chemistry Research* 2023, 62, (3), 1390-1403.
109. Song, Q.; Li, Y.\*; Xie, W.; Gao, C.; Liu, L.; **Liu, B.\***, Catalytic degradation of carbamazepine by metal organic frameworks (MOFs) derived magnetic catalyst Fe@PC in an electro-Fenton coupled membrane filtration system: Performance, pathway, and mechanism. *Separation and Purification Technology* 2023, 309, 122988.
108. Xie, W.; Chen, G.; Chen, C.; Song, Z.; Wu, Q.; Tian, L.; Dai, Z.; Liang, S.; Tang, P.; Zhang, X.; Ma, J.; **Liu, B.\***, Polydopamine/ polyethyleneimine/ MOF ternary-coated poly (vinyl chloride) nanocomposite membranes based on green solvent for shale gas wastewater treatment. *Journal of Membrane Science* 2023, 665, 121100.
107. Zhou, G.; Wu, Q.; Tang, P.; Chen, C.; Cheng, X.; Wei, X.; Ma, J.; **Liu, B.\***, How Many Microplastics Do We Ingest When Using Disposable Drink Cups? *Journal of Hazardous Materials.* 2023, 441, 129982.
106. Wang, X.-S.; Liu, Y.-L.; Li, M.; Song, H.; Huang, X.; Gao, Z.; Zhang, J.; Cui, C.-W.; **Liu, B.-C.**; Ma, J.; Wang, L.\*, Occurrence of Iodophenols in Aquatic Environments and the Deiodination of Organic Iodine with Ferrate(VI). *Environmental Science & Technology* 2022, 56, (22), 16104-16114.

105. Yang, Y.; Tian, L.; Borch, T.; Tariq, H.; Li, T.\*; Bai, Y.; Su, Y.; Tiraferri, A.; Crittenden, J.; **Liu, B.\***, Safety and Technical Feasibility of Sustainable Reuse of Shale Gas Flowback and Produced Water after Advanced Treatment Aimed at Wheat Irrigation. *ACS Sustainable Chemistry & Engineering*. 2022, 10 (38), 12540-12551.
104. Tian, L.; Liu, Y.; Tang, P.; Yang, Y.; Wang, X.; Chen, T.; Bai, Y.; Tiraferri, A.; **Liu, B.\***, Lithium extraction from shale gas flowback and produced water using H<sub>1.33</sub>Mn<sub>1.67</sub>O<sub>4</sub> adsorbent. *Resources, Conservation and Recycling* 2022, 185, 106476.
103. Xie, W.; Tian, L.; Tang, P.; Cui, J.; Wang, T.; Zhu, Y.; Bai, Y.; Tiraferri, A.; Crittenden, J.C.; **Liu, B.\***, Shale gas wastewater characterization: comprehensive detection, evaluation of valuable metals, and environmental risks of heavy metals and radionuclides. *Water Research*. 2022, 118703.
102. Song, Z.; Tiraferri, A.; Yuan, R.; Cao, J.; Tang, P.; Xie, W.; Crittenden, J.C.; **Liu, B.\***, Theoretical evaluation of the evaporation rate of 2D solar-driven interfacial evaporation and of its large-scale application potential. *Desalination*. 2022, 537, 115891.
101. Liang, J. #; Xie, T. #; Liu, Y.; Wu, Q.; Bai, Y.; **Liu, B.\***, Granular activated carbon (GAC) fixed bed adsorption combined with ultrafiltration for shale gas wastewater internal reuse. *Environmental Research* 2022, 212, 113486.
100. Tang, P.; Xie, W.; Tian, L.; Tan, B.; Zhang, Y.; Yang, Z.\*; Chen, C.; Zhang, W.; **Liu, B.\***, Oxidation-biotreatment-membrane combined process for external reuse of shale gas wastewater. *Separation and Purification Technology* **2022**, 120920.
99. Luo, J.\*; Maier, R.M.; Yu, D.; **Liu, B.**; Zhu, N.; Amy, G.L.; Crittenden, J.C., Double-network Hydrogel: A Potential Practical Adsorbent for Critical Metals Extraction and Recovery from Water. *Environmental Science & Technology* **2022**, 56, (8), 4715-4717.
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97. Wei, X.-F.\*; Capezza, A. J.; Cui, Y.; Li, L.; Hakonen, A.; **Liu, B.**; Hedenqvist, M. S.\*, Millions of microplastics released from a biodegradable polymer during biodegradation/enzymatic hydrolysis. *Water Research* **2022**, 211, 118068.
96. Zhao, Y.; Yang, Q.; Yan, B.; **Liu, B.**; Gu, Y.; Lin, Y.; Shang, J.; Liu, W.; Chen, S.\*; Lan, J.\*, Aminated Polyacrylonitrile Nanofiber Membranes for the Removal of Organic Dyes. *ACS Applied Nano Materials* **2022**, 5, (1), 1131-1140.

95. Liu, Y.; Wu, Q.; Chen, C.; Li, T.; Liu, S.; He, Q.; Yang, P.\*; Bai, Y.; **Liu, B.\***, An efficient system of aerogel adsorbent combined with membranes for reuse of shale gas wastewater. *Desalination* **2022**, 526, 115545.
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treatment of ultrafiltration for shale gas wastewater reuse. *Chemical Engineering Journal Advances* **2020**, 2, 100011.

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## VI. Patents

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9. Chen Chen, **Baicang Liu**, Shuai Wang, A method for preparing high-flux polyvinylidene fluoride ultrafiltration membrane. Application No. 201510187432.2
10. Jun Ma, **Baicang Liu**, Multi-layer variable inclination inclined plate or inclined tube sedimentation tank with enhanced treatment effect. Application No. 200610151198.9
11. **Baicang Liu**, Yuanhui Liu, Chen Chen, Shi Liu, Qiping He, A method of internal reuse of shale gas wastewater based on adsorption and membrane technology. Application No. 202111418129.0
12. **Baicang Liu**, Yuhua Bai, Xinyu Liu, A method for removing organic matter in shale gas wastewater. Application No. 202110672122.5
13. **Baicang Liu**, Zhaoyang Song, Jinzhi Cao, Ruihong Yuan, Xuanyu Ji, Hong Yue, Jin Zhu, Jing Li, Dong Lin, Safe recovery of shale gas industrial wastewater based on solar evaporation. Application No. 202121312114.1

## VII. Research Grants

1.PI: Baicang Liu; Title: "An integrated system for efficient desalination and organic removal of shale gas wastewater"; Funding Source: National Science Foundation of China; Award Date: 01/01/2021 – 31/12/2024; Award Amount: ¥ 580,000.

2.PI: Baicang Liu; Title: "Mechanism of self-assembling high flux defect-free membrane and its water purification performance"; Funding Source: National Science Foundation of China; Award Date: 01/01/2017 – 31/12/2020; Award Amount: ¥ 610,000.

3.PI: Baicang Liu; Title: "Membrane performance and efficiency under the coupling effect of multiphase flow in coagulation-air lift-ultrafiltration system"; Funding Source: National Science Foundation of China; Award Date: 01/01/2013 – 31/12/2016; Award Amount: ¥ 800,000.

4.PI: Baicang Liu, Title: "Treatment of shale gas flowback water"; Funding Source: Applied Basic Research of Sichuan Province; Award Date: 01/03/2017 – 01/03/2018;

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