



环境科学系
环境工程系
环境科学研究所
实验中心
专职科研人员
博士后



单位：中山大学

院系：环境科学与工程学院

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研究方向：微生物介导的重金属污染修复及地化循环过程

教育背景

2005.09-2009.09 萨瓦大学（法国），过程工程学博士（环境工程类）

2002.09-2005.07 中山大学，环境科学专业，理学硕士

1998.09-2002.07 中山大学，环境科学专业，理学学士，辅修计算机及应用专业

工作经历

2010.05迄今 中山大学环境科学与工程学院，讲师、副教授、教授



2021.01迄今 中山大学环境科学与工程学院副院长

2018.02迄今 广东省土壤重金属污染修复工程技术研究中心, 副主任

2018.02迄今 教育部土壤环境污染控制与修复学科创新引智基地, 副主任

2016.01迄今 中-法土壤环境联合实验室, 副主任 (中方)

2016.08-2020.12 中山大学环境科学与工程学院, 院长助理 (分管国际合作与交流)

2019.05- 2020.12 中山大学国际科技合作处, 副处长 (主持工作)

2018.12-2019.12 中山大学国际合作与交流处, 副处长 (挂职)

2012.08-2013.07 环境保护部自然生态保护司 (借调), 干部 (负责全国土壤调查及立法相关工作)

2010.11-2010.12 法国国家农业科学院第戎土壤与微生物技术研究中心, 访问学者

教学经历

2010.5迄今 本科课程教学: 环境土壤学、环境土壤学实验、环境社会学、环境社会与伦理学、环境信息系统-VB
编程、专业英语、环境学概论、生态学-自然地理基础-环境土壤学联合 野外实
习、欧亚各国城市建
设与环保理念

研究生课程教学: 环境污染控制技术方法、土壤污染修复案例分析

2018.07迄今 《环境土壤学》校级慕课、省级在线开放课程建设

2015.08 中山大学、华南农业大学、广东外语外贸大学本科生赴日交流, 指导老师

2011.07 中山大学环境科学与工程学院研究生国际暑期学校, 指导老师

2011.03-2011.04 中山大学 - 普利茅斯大学联合野外考察课程 (英国康沃尔), 指导老师

2010.03-2010.04 中山大学 - 香港城市大学 - 普利茅斯大学联合野外考察课程 (香港), 指导老师

成果奖励

• 科技奖励

2022.06 第二十三届中国专利优秀奖: 一种修复重金属污染酸性土壤的钙铁硅基
复合材料及其应用 (ZL201510602213.6) (4/6)

2021.09 “十三五”广东省农业科技十大标志性成果: 多金属污染土壤植物联合
修复技术体系及应用 (广东省农业农村厅) (3/15)

2021.03 高等学校科学研究优秀成果奖 (科学技术) 一等奖: 多金属污染土壤植
物联合修复技术体系及应用 (教育部) (3/15)

2020.06 广东省环境保护科学技术奖一等奖: 电子废物高附加值绿色回收关键技
术及装备 (广东省环境科学学会) (4/15)

2019.10 第十四届中国土壤学会科学技术奖一等奖: 多金属污染土壤植物联合修
复技术体系及应用 (中国土壤学会) (4/15)

2019.12 广东土壤学会科技奖一等奖: 多金属污染土壤植物联合修复技术体系及
应用 (广东省土壤学会) (4/15)

2018.08



广东省环境保护科学技术奖一等奖：华南多金属污染土壤修复技术体系与应用（广东省环境科学学会）（3/15）

• 教学奖励

- 2021.09 第九届广东省教育教学成果奖（高等教育）二等奖：基于SIM育人理念的环境学科本研贯通人才培养体系的构建与创新实践（4/10）
- 2021.03 中山大学第十届教学成果奖一等奖：基于SIM育人理念的环境学科本研贯通人才培养体系的构建与创新实践（4/10）
- 2021.03 中山大学第十届教学成果奖二等奖：基于“理论-实践-认知”三位一体的教学模式的构建及应用——以《环境化学》为例（4/5）
- 2018.07 广东省青年教师教学大赛二等奖
- 2018.05 第八届广东省教育教学成果奖（高等教育）二等奖：以《环境土壤学》为核心，构建理论-实验-认知实践相结合的课程体系（2/8）
- 2017.11 中山大学第八届教学成果一等奖：以《环境土壤学》为核心，构建理论-实验-认知实践相结合的课程体系（2/8）
- 2017.06 中山大学青年教师授课大赛一等奖
- 2013.12 中山大学青年教师授课大赛二等奖

研究经历

• 主持项目

1. 有色金属矿区地下水污染防控技术体系（2019YFC1805300），国家重点研发计划，2320万，2020.1-2023.12
2. 华南多金属尾矿库生物结皮对重金属的固定机制（41977118），国家自然科学基金面上项目，61万，2020.1-2023.12
3. 湿地植物根表微生物膜调控尾矿库铁硫循环及重金属沉淀的机制（41671313），国家自然科学基金面上项目，66万，2017.1-2020.12
4. 根际菌铁载体降低酸性土壤金属生物有效性的机制研究（41101483），国家自然科学基金青年项目，26万，2012.1-2014.12
5. 面向2035年的广东科技创新开放合作新格局研究（2019B101003004），广东省科技计划软科项目，30万，2019.12-2020.11
6. 基于无底土环境下的植物修复技术及速生植物修复地砖产品的研究（2017B020216008），广东省科技计划重点项目，100万，2017.1-2019.12
7. 翅荚决明（*Cassia alata*）和生物炭联合修复多金属尾矿污染土壤的理论与应用研究（2016A020221012），广东省科技计划民生公益项目，30万，2016.1-2018.12
8. 内生菌诱导宿主植物重金属系统抗性的关键机制研究（2015A030313159），广东省自然科学基金，10万，2016.1-2017.12
9. 多金属污染土壤无底土修复过程中微生物介导的生物地球化学过程研究，广州市科技计划重点项目（201804020021），200万，2018.4-2021.3
10. 异化铁还原过程对矿业废弃地重金属迁移性的影响（16lgjc57），中央高校基本科研业务费重大项目培育和新兴、交叉学科项目，20万，2016-2017
11. 酞酸酯（PAEs）污染土壤的植物和微生物联合修复技术研究（12lgpy18），中央高校基本科研业务费青年教师培育项目，15万，2012-2014



12. 铁载体对根际微区金属离子的解毒机制研究 (20110171120028), 教育部博士点基金新教师基金, 4万, 2012-2014
13. 铁载体DFOB与草酸协同作用对赤铁矿溶铁及Pb²⁺解吸的影响, 广东省环境污染控制与修复技术重点实验室开放基金, 4万, 2013-2014
14. 南海区土壤污染防治行动计划实施方案编制, 政府委托项目, 19.5万, 2017.4-2017.12
15. 荔湾区土壤环境质量现状调查, 政府委托项目, 19.6万, 2014.9-2015.1

• 参与项目

16. 环境污染控制与生态修复研究, 企业委托项目, 1000万, 2018.12-2022.12
17. 中山大学-致胜土壤环境修复研究中心建设 (2017-0405), 企业委托项目, 1000万, 2017.12-2020.12
18. 铅锌矿尾矿库重金属污染生态控制与环境管理研究 (201509037), 环保公益性行业科研专项, 520万, 2015.04-2018.03
19. 佛山市土壤污染防治行动计划, 地方政府委托项目, 2016-0279, 240.62万, 2016.08-2017.03

论文发表

1. AO Ming, SUN Shengsheng, DENG Tenghaobo, ZHANG Feng, LIU Ting, TANG Yetao, LI Jingjing, **WANG Shizhong***, QIU Rongliang. Natural source of Cr(VI) in soil: The anoxic oxidation of Cr(III) by Mn oxide. *Journal of Hazardous materials*, 2022, 433: 128805.
2. ZHOU Ying, WEI Ting, CHEN Shaoqing*, **WANG Shizhong**, QIU Rongliang*, Pathways to a more efficient and cleaner energy system in Guangdong-Hong Kong-Macao Greater Bay Area: A system-based simulation during 2015-2035. *Resources, Conservation and Recycling*, 2021, 174: 105835.
3. YAO Aijun, LIU Ying, LUO Xiaoli, LIU Chong; TANG Yetao, **WANG Shizhong**, HUANG Xiongfei, QIU Rongliang*, Mediation effects of different sulfur forms on solubility, uptake and accumulation of Cd in soil-paddy rice system induced by organic carbon and liming. *Environmental Pollution*, 2021, 279: 116862.
4. AO Ming, CHEN Xiaoting, DENG Tenghaobo, SUN Shengsheng, TANG Yetao, MOREL Jean Louis, QIU Rongliang*, **WANG Shizhong***, Chromium biogeochemical behaviour in soil-plant systems and remediation strategies: A critical review. *Journal of Hazardous materials*, 2022, 424(Pt A): 127233.
5. CHEN Ziwu, ZHONG Xi, ZHENG Mengyuan, LIU Wenshen, FEI Yingheng, DING Kengbo, LI Yaying, LIU Ye, CHAO Yuanqing*, TANG Yetao, **WANG Shizhong**, QIU Rongliang*, Indicator species drive the key ecological functions of microbiota in a river impacted by acid mine drainage generated by rare earth elements mining in South China. *Environmental Microbiology*, 2022, 24(2): 919-937.
6. CHEN Ziwu, LIU Wenshen, ZHONG Xi, ZHENG Mengyuan, FEI Yingheng, HE Huan, DING Kengbo, CHAO Yuanqing*, TANG Yetao, **WANG Shizhong**, QIU Rongliang*, Genome- and community-level interaction insights into the ecological role of archaea in rare earth element mine drainage in South China. *Water research*, 2021, 201: 117331.
7. LI Fazhi, CHEN Jingqiu, ENGEL Bernard A., LIU Yaoze, **WANG Shizhong**, SUN Hua*, Assessing the Effectiveness and Cost Efficiency of Green Infrastructure Practices on Surface Runoff Reduction at an Urban Watershed in China. *Water*, 2021, 13(1): 24.
8. WANG Guobao, YUAN Yongqiang, MOREL Jeanlouis, FENG Zekai, CHEN Daijie, LU Chunfeng, GUO Meina, LIU Chong, **WANG Shizhong***, CHAO Yuanqing, TANG



- Yetao, ZHAO Dongye, XIAO Shi, ZHANG Weixian, QIU Rongliang*. Biological aqua crust mitigates metal(loid) pollution and the underlying immobilization mechanisms. Water Research, 2021, 190:116736.
9. CHEN Lei, DAI Yuya, ZHOU Can, HUANG Xiongfei*, **WANG Shizhong**, YU Hang, LIU Yun, MOREL Jeanlouis, LIN Qingqi*, QIU Rongliang. Robust matrix effect-free method for simultaneous determination of legacy and emerging per- and polyfluoroalkyl substances in crop and soil matrices. Journal of Agricultural and Food Chemistry. 2020, 68, 8026-8039.
 10. LIU Ye, ZHONG Xi, HUOT Hermine, LIU Wenshen, LIU Chang, GUO Meina, LI Yaying, FEI Yingheng, CHAO Yuanqing*, **WANG Shizhong**, TANG Yetao, QIU Rongliang. Reclamation with organic amendments and plants remodels the diversity and structure of bacterial community in ion-adsorption rare earth element mine tailings. Journal of Soils and Sediments, 2020, 10, 3669-3680.
 11. LIN Qingqi, ZHOU Can, CHEN Lei, LI Yafei, HUANG Xiongfei, **WANG Shizhong***, QIU Rongliang, TANG Changyuan*. Accumulation and associated phytotoxicity of novel chlorinated polyfluorinated ether sulfonate in wheat seedlings. Chemosphere, 2020, 249:126447.
 12. WANG Guobao, ZHAO Wanying, YUAN Yongqiang*, MOREL Jeanlouis, CHI Haochun, FENG Wenling, **WANG Shizhong***, ZHANG Jianxiang, FENG Zekai, TAN Haoran, CHEN Daijie, DING Wenge, LIU Chong, QIU Rongliang. Mobility of metal(loid)s in Pb/Zn tailings under different revegetation strategies. Journal of Environmental Management, 2020, 263:110323.
 13. FENG Wenling, LI Yaying*, LIN Zhiyun, LUO Yang, **WANG Shizhong**, QIU Rongliang. The influence on biosorption potentials of metal-resistant bacteria *Enterobacter* sp. EG16 and *Bacillus subtilis* DBM by typical red soil minerals. Journal of Soils and Sediments, 2020, 20(8): 3217-3229.
 14. CAI Dan, LI Qingqing, CHU Chu, **WANG Shizhong**, TANG Yetao, APPLETON Allison A., QIU Rongliang, YANG Boyi, HU Liwen, DONG Guanghui, ZENG Xiaowen*. High trans-placental transfer of perfluoroalkyl substances alternatives in the matched maternal-cord blood serum: Evidence from a birth cohort study. Science of the Total Environment, 2020, 705: 135885.
 15. AO Ming, XU Xiaohang, WU Yonggui, ZHANG Chao, MENG Bo, SHANG Lihai, LIANG Longchao, QIU Rongliang, **WANG Shizhong**, QIAN Xiaoli, ZHAO Lei, QIU Guangle*. Newly deposited atmospheric mercury in a simulated rice ecosystem in an active mercury mining region: High loading, accumulation, and availability. Chemosphere, 2020, 238: 124630.
 16. A Dan, ZHANG Nichen, QIU Rongliang, LI Charlie, **WANG Shizhong**, NI Zhuobiao*. Accelerated biodegradation of p-tert-butylphenol in the *Phragmites australis* rhizosphere by phenolic root exudates. Environmental and Experimental Botany, 2020, 169: 103891.
 17. LI Yuanyuan, FENG Wenling, CHI Haochun, HUANG Yunxi, RUAN Dishen, CHAO Yuanqing, QIU Rongliang, **WANG Shizhong***. Could the rhizoplane biofilm of wetland plants lead to rhizospheric heavy metal precipitation and iron-sulfur cycle termination? Journal of Soils and Sediments. 2019, 19: 3760-3772.
 18. LI Yuanyuan, ZENG Jiahui, **WANG Shizhong**, LIN Qingqi*, RUAN Dishen, CHI Haochun, ZHENG Mengyuan, CHAO Yuanqing, QIU Rongliang, YANG Yanhua. Effects of cadmium-resistant plant growth-promoting rhizobacteria and *Funneliformis mosseae* on the cadmium tolerance of tomato (*Lycopersicon esculentum* L.). International Journal of Phytoremediation, 2019. DOI: 10.1080/15226514.2019.1671796



19. WANG Yu, CHEN Siyuan, YANG Xin*, WU Yingxin, HUANG Xiongfei, HE Erkai, QIU Rongliang, **WANG Shizhong***. Enhanced removal of Cr(VI) in the Fe(III)/natural polyphenols system: role of the in situ generated Fe(II). Journal of Hazardous materials, 2019, 377: 321-329.
20. LI Yafei, ZHOU Can, **WANG Shizhong**, LIN Qingqi*, NI Zhuobiao, QIU Hao, MOREL Jean Louis, QIU Rongliang. Phytotoxicity and oxidative effects of typical quaternary ammonium compounds on wheat (*Triticum aestivum* L.) seedlings. Environmental Science and Pollution Research, 2019, 26: 25985-25999.
21. HE Erkai, YANG Yuxi, XU Zibo, QIU Hao*, YANG Fulin, PEIJENBURG W.J.G.M., ZHANG Weihua, QIU Rongliang, **WANG Shizhong**. Two years of aging influences the distribution and lability of metal(loid)s in a contaminated soil amended with different biochars. Science of the Total Environment, 2019, 673: 245-253.
22. LI Fazhi, CHEN Jingqiu, LIU Yaoze, XU Peng, SUN Hua, ENGEL Bernard A., **WANG Shizhong**. Assessment of the Impacts of Land Use/Cover Change and Rainfall Change on Surface Runoff in China. Sustainability, 2019, 11(13):3535.
23. YAO Aijun, JU Lin, LING Xiaodan, LIU Cong, WEI Xiange, QIU Hao*, TANG Yetao, MOREL Jean Louis, QIU Rongliang, LI Charlie, **WANG Shizhong**. Simultaneous attenuation of phytoaccumulation of Cd and As in soil treated with inorganic and organic amendments. Environmental Pollution, 2019, 250: 464-474.
24. BAI Jun, CHAO Yuanqing*, CHEN Yanmei, **WANG Shizhong***, QIU Rongliang. The effect of interaction between *Bacillus subtilis* DBM and soil minerals on Cu(II) and Pb(II) adsorption. Journal of Environmental Sciences, 2019, 78: 328-337.
25. WANG Yujie, WEI Zikai, LUO Xianda, WAN Quan, QIU Rongliang, **WANG Shizhong***. An ultrasensitive homogeneous aptasensor for carcinoembryonic antigen based on upconversion fluorescence resonance energy transfer. Talanta, 2019, 195: 33-39.
26. CHEN Yanmei, DING Qiaobei, CHAO Yuanqing*, WEI Xiange, **WANG Shizhong**, QIU Rongliang. Structural development and assembly patterns of the root-associated microbiomes during phytoremediation. Science of the Total Environment, 2018, 644: 1591-1601.
27. CHI Haochun, YANG Lu, YANG Wenjing, LI Yuanyuan, CHEN Ziwu, HUANG Lige, CHAO Yuanqing, QIU Rongliang, **WANG Shizhong***. Variation of the bacterial community in the rhizoplane iron plaque of the wetland plant *Typha latifolia*. International Journal of Environmental Research and Public Health, 2018, 15(12): 2610.
28. WU Yingxin, WANG Yu, HUANG Xiongfei, SIMONNOT M O, WU Wencheng, CAI Xinde, CHEN Siyuan, **WANG Shizhong***, QIU Rongliang*, ZHANG Weihua. Surfactant-facilitated dechlorination of 2,2',5,5'-tetrachlorinated biphenyl using zero-valent iron in soil/sediment solution: Integrated effects of plausible factors. Chemosphere, 2018, 212: 845-852.
29. WEI Hang, ZHANG Weihua, ZHUANG Luwen, **WANG Shizhong***, TSANG Daniel C W, QIU Rongliang*. Two-stage multi-fraction first-order kinetic modeling for soil Cd extraction by EDTA. Chemosphere, 2018, 211: 1035-1042.
30. HUANG Lige, LI Yuanyuan, ZHAO Man, CHAO Yuanqing, QIU Rongliang, YANG Yanhua, **WANG Shizhong***. Potential of *Cassia alata* L. coupled with biochar for heavy metal stabilization in multi-metal mine tailings. International Journal of Environmental Research and Public Health, 2018, 15(3): 494-508.
31. LIN Qingqi, WANG Yingli, YANG Xiuhong, RUAN Dishen, **WANG Shizhong***, WEI Xiange, QIU Rongliang*. Effect of low-molecular-weight organic acids on



- hematite dissolution promoted by desferrioxamine B. Environmental Science and Pollution Research, 2018, 25(1): 163-173.
32. DING Kengbo, WU Qing*, WEI Hang, YANG Wenjun, SERE Geoffroy, **WANG Shizhong**, ECHEVARRIA Guillaume, TANG Yetao, TAO Juan, MOREL Jean Louis, QIU Rongliang. Ecosystem services provided by heavy metals contaminated soils in China. Journal of Soils and Sediments. 2018(2): 380-390.
33. CHEN Zhe, TANG Yetao*, YAO Aijun, CAO Jian, WU Zhuohao, PENG Zheran, **WANG Shizhong**, XIAO Shi, BAKER A J M, QIU Rongliang. Mitigation of Cd accumulation in paddy rice (*Oryza sativa* L.) by Fe fertilization. Environmental Pollution. 2017, 231: 549-559.
34. CHEN Yanmei, YANG Wenjun, CHAO Yuanqing*, **WANG Shizhong**, QIU Rongliang*. Enhanced phytostabilization by the metal-tolerant *Enterobacter* sp. strain EG16 via siderophore-mediated plant growth promotion under metal contamination. Plant and Soil. 2017, 413: 203-216.
35. BAI Jun, CHEN Yanmei, QIU Rongliang, CHAO Yuanqing*, **WANG Shizhong***. Immobilization of Cu by *Bacillus subtilis* DBM and the role of extracellular polymeric substances. Water, Air, & Soil Pollution, 2017, 228: 86.
36. CAI Dan, YANG Xiuhong, **WANG Shizhong***, CHAO Yuanqing, MOREL JL, QIU Rongliang*. Effects of dissolved organic matter derived from forest leaf litter on biodegradation of phenanthrene in aqueous phase. Journal of Hazardous Materials. 2017, 324(Part B): 516–525.
37. LIN Qingqi, CHEN Siyuan, CHAO Yuanqing, HUANG Xiongfei, **WANG Shizhong***, QIU Rongliang*. Carboxylesterase- involved metabolism of di-n-butyl phthalate in pumpkin (*Cucurbita moschata*) seedlings. Environmental Pollution. 2017, 220: 421-430.
38. LIN Qingqi, YANG Xiuhong, HUANG Xiongfei, **WANG Shizhong***, CHAO Yuanqing, QIU Rongliang*. Subcellular distribution and uptake mechanism of di-n-butyl phthalate in roots of pumpkin (*Cucurbita moschata*) seedlings. Environmental Science and Pollution Research, 2016, 23(1): 329-337.
39. CHAO Yuanqing, LIU Wenshen, CHEN Yanmei, CHEN Wenhui, ZHAO Lihua, DING Qiaobei, **WANG Shizhong**, TANG Yetao*, ZHANG Tong, QIU Rongliang* . Structure, Variation, and Co-occurrence of Soil Microbial Communities in Abandoned Sites of a Rare Earth Elements Mine. Environmental Science & Technology, 2016, 50 (21): 11481–11490.
40. CHEN Yanmei, CHAO Yuanqing*, LI Yaying, LIN Qingqi, BAI Jun, TANG Lu, **WANG Shizhong**, YING Rongrong, QIU Rongliang*. Survival strategies of the plant-associated bacterium *Enterobacter* sp. strain EG16 under cadmium stress. Applied and Environmental Microbiology, 2016, 82(6): 1734-44.
41. HUANG Juan, ZHANG Wen, MO Jiangming, **WANG Shizhong**, LIU Juxiu, CHEN Hao. Urbanization in China drives soil acidification of *Pinus massoniana* forests. Scientific Reports, 2015, 5: 13512.
42. DIAO Zenghui, XU Xiangrong*, LIU Fuming, SUN Yuxin, ZHANG Zaiwang, SUN Kaifeng, **WANG Shizhong**, CHENG Hefa. Photocatalytic degradation of malachite green by pyrite and its synergism with Cr(VI) reduction: Performance and reaction mechanism. Separation and Purification Technology, 2015, 154: 168-175.
43. ZHANG Dongdong*, QIU Rongliang, WEI Aibin, **WANG Shizhong**. Influences of organic compounds on the visible light induced photocatalytic reduction of Cr(VI). Kinetics and Catalysis, 2014, 55(6): 793-797.
44. YANG Xiuhong, GARNIER P., **WANG Shizhong**, BERGHEAUD V., HUANG Xiongfei, QIU Rongliang*. PAHs sorption and desorption on soil influenced by pine needle



- litter-derived dissolved organic matter. *Pedosphere*, 2014, 24(5): 575-584.
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学术会议

• 邀请报告

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学术兼职

- 《农业环境科学学报》编委 (2021.01-2024.12)
- 广东省环境科学学会理事 (2019.11-2023.10)
- 广东省环境学会农业环境委员会副主任委员 (2020.11-2024.10)
- 中国有色金属产业技术创新战略联盟专家委员会委员 (2019.09-2024.08)
- 中国环境科学学会生态环境修复专业委员会委员 (2022.06-2027.05)
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- 国际学术期刊审稿人: Water Research、Journal of Hazardous Materials、Environmental Pollution、Science of the Total Environment、Chemosphere、Journal of Soils and Sediments、Environmental Science and Pollution Research、Journal of Cleaner Production、Journal of Rare Earths、International Journal of Biological Macromolecules
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