2018 土壤与地下水国际研讨会

2018 Symposium on Soil and Groundwater

会 议 手 册

Program & Abstracts

中 国 成 都

Chengdu　China

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组织机构/Organization

主办单位/Organized by:

中国环境科学学会
Chinese Society for Environmental Sciences (CSES)

地质灾害防治与地质环境保护国家重点实验室（成都理工大学）
State Key Laboratory of Geohazard Prevention and Geoenvironment Protection（Chengdu University of Technology）

国家环境保护土壤环境管理与污染控制重点实验室
Key Laboratory of Soil Environmental Management and Pollution Control, MEE

国家环境保护水土污染协同控制与联合修复重点实验室
Key Laboratory of Groundwater and Soil Pollution Synergetic Control and Remediation, MEE

国家环境保护地下水污染模拟与控制重点实验室
Key Laboratory of simulation and control of groundwater pollution, MEE

国家环境保护流域地表水—地下水污染综合防治重点实验室
Key Laboratory of Comprehensive Prevention and Control of Surface Water and Groundwater Pollution，MEE

国家环境保护影响评价数值模拟重点实验室
Key Laboratory of surface water and groundwater pollution prevention and control, MEE

农业部可再生能源清洁化利用技术重点实验室
Key Laboratory of Clean Production and Utilization of Renewable Energy

联合主办单位/Co-organized by:

中国环境科学研究院
Chinese Research Academy of Environmental Sciences

上海市环境科学研究院
Shanghai Academy of Environmental Sciences

四川省环境保护科学研究院
Sichuan Academy of Environmental Sciences

四川大学
Sichuan University

地下水污染防控与修复产业联盟
Groundwater Pollution Control And Remediation Industry Alliance

上海污染场地修复产业技术创新战略联盟
Shanghai Contaminated Site Remediation Technology Innovation Strategic Alliance

国际协办单位/International Association by:

《Environmental Science and Pollution Research》

匈牙利罗兰大学
Eötvös Lorànd University

法国波城大学
Université de Pau et des Pays de l'Adour

瑞典吕勒奥理工大学
Luleå tekniska universitet

匈牙利圣伊斯特万大学
Szent Istvan University

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塔贾纳 努森 Tatjana KNUDSEN	塞尔维亚贝尔格莱德大学教授 Professor，University of Belgrade

会议概览/Symposium Overview

时间/Time		内容/Program	地点/Venue
10月25日 25th October		注册报道/Registration	成都金韵酒店 Jinyun Hotel Chengdu
10月26日 26th October	9:00-9:20	开幕式/Opening Ceremony	维也纳厅 Vienna Hall
	9:20-12:05	主旨报告/Keynote Address (P11)	
		对话：科技创新与土壤与地下水产业发展(P12) Dialogue：Technology Innovation *Vs* Soil and Groundwater Industry Development	
	12:10-14:00	午餐/Lunch	西雅图厅 Seattle Hall
	14:00-18:30	专题论坛:金属矿山污染防治与生态修复 (P13) Forum on Metal Mine Pollution Prevention & Control and Ecological Restoration (P13)	维也纳厅 1 Vienna 1
		专题论坛:工业场地土壤污染修复(Ⅰ)(P15) Forum on Remediation of Soil Pollution in Industrial Sites (P15)	维也纳厅 2 Vienna 2
	17:30-	晚餐/Dinner	西雅图厅 Seattle Hall
	19:00-20:00	环境保护国家重点实验室工作会议 Workshop on State key laboratory of environmental protection Development	

时间/Time		内容/Program	地点/Venue
10月27日 27th October	9:00-12:30	专题论坛:工业场地土壤污染修复(Ⅱ) (P17) Forum on Metal Mine Pollution Prevention & Control and Ecological Restoration (P17)	维也纳厅 1 Vienna 1
		平行分会场:地下水污染防控与修复技术 (P19) Paralleled Session on Groundwater Pollution Control and Remediation Technologies (P19)	维也纳厅 2 Vienna 2
	12:00-13:30	午餐/Lunch	西雅图 Seattle Hall
	14:00-18:00	平行分会场:农用地土壤污染防控与修复技术 (P21) Paralleled Session on Agricultural Land Soil Pollution Control and Remediation Technologies (P21)	维也纳厅 1 Vienna 1
		土壤与地下水修复高级研修班 (P23) Soil & Groundwater Training Course (P23)	维也纳厅 2 Vienna 2

日程安排/Daily Schedule

时间：2018 年 10 月 26 日

Date: 26th October, 2018

<table>
<tr><th>时间
Time</th><th>安排
Programme</th></tr>
<tr><td rowspan="2">09:00-09:20</td><td>开幕式/Opening Ceremony
主持人：姚俊 中国地质大学（北京）教授
Chair: Jun YAO, Professor of China University of Geosciences(Beijing)</td></tr>
<tr><td>领导和嘉宾致辞/Speech by VIP person
彭宾 中国环境科学学会副秘书长
Bin PENG, Deputy secretary of CSES</td></tr>
<tr><td colspan="2">主旨报告/Plenary Session
主持人：姚俊 中国地质大学（北京）教授
Chair: Jun YAO, Professor of China University of Geosciences（Beijing）</td></tr>
<tr><td>09:20-09:55</td><td>土壤污染防治法解读
Interpretation on Soil Pollution Prevention and Control Law
付莎 全国人大环境与资源保护委员会法案
Sha FU, Act Office of the Environment and Resources Protection Committee, NPC</td></tr>
<tr><td>09:55-10:30</td><td>京津冀长三角珠三角三大区战略环境评价中的土壤与地下水
Soil and Groundwater in Strategic Environment Assessment of Such Three Major Regions as Beijing-Tianjin-Hebei, the Yangtze River Delta and the Pearl River Delta
任景明 生态环境部环境工程评估中心副总工
Jingming REN, Deputy Chief Engineer of Appraisal Center for Environment and Engineering, MEE</td></tr>
<tr><td>10:30-11:00</td><td>矿山尾矿系统微生物多样性与污染的自然衰减
Microbial diversity and natural attenuation of pollution in mine tailings systems
罗伯特 杜润法国波城大学教授
Robert DURAN, Professor of University of Pau</td></tr>
</table>

对话/ Dialogue 主持人：刘 国　成都理工大学教授 Chair: **Guo LIU**, Professor of Chengdu University of Technology	
11:00-12:00	付莎　全国人大环境与资源保护委员会法案 **Sha FU,** The Environment and Resources Protection Committee NPC 任景明　生态环境部环境工程评估中心副总工 **Jingming REN**, Deputy Chief Engineer of Appraisal Center for Environment and Engineering，MEE 罗伯特 杜润　法国波城大学教授 **Robert DURAN,** Professor of University of Pau 马烈　上海格林曼环境技术有限公司总裁 **Lie MA**, President of Shanghai Greenment Environmental Technology Co., Ltd 艾迪 欧文斯　University of Heriot-Watt, UK **Eddie OWENS**　英国赫瑞瓦特大学教授

金属矿山污染防治与生态修复论坛（地点：维也纳 1 厅）

Forum on Metal Mine Pollution Prevention & Control and Ecological Restoration (Venue: Vienna Hall)

时间 Time	安排 **Programme**
主持人：**姚 俊** 中国地质大学（北京）教授 Chair: **Jun YAO** Professor China University of Geosciences (Beijing)	
14:00-14:20	典型矿区土壤中污染物历史演化记录研究 Historical Evolution Record of Pollutants in Soil of Typical Mining Area **刘桂建** 中国科技大学教授 **Guijian LIU,** Professor of China University of Science and Technology
14:20-14:40	矿山废弃地污染风险评价与微生物修复——中匈联合项目的经验 Contamination risk assessment and microbiological remediation of mining waste sites. Experience of the Sino-Hungarian Joint Project **久佐 乔丹** 匈牙利圣伊斯特万大学教授 **Gyozo JORDAN,** professor of Szent Istvan University, Hungary
14:40-15:00	微生物固化技术用于矿山重金属污染治理与生态修复 Microbial Solidification Technology Applied in Mine Heavy Metal Pollution Control and Ecological Restoration **刘兴宇** 北京有色金属研究总院教授级高工 **Xingyu LIU**, Professor of General Research Institute for Nonferrous Metals
15:00-15:20	金属矿山采冶区域污染植物修复 Gentle phytoremediation of soil contaminated by former mining and smelting activities **帕维尔·特鲁斯托斯** 捷克生命科学大学教授 **Pavel TRUSTOS**, Professor of Czech University of Life Sciences Prague
15:20-15:40	酸性矿山排水中的微生物及硫代谢过程 Microorganisms and sulfur metabolism in acid mine drainage **姜成英** 中国科学院微生物研究所研究员 **Chengying JIANG,** Researcher of Institute of Microbiology, CAS
15:40-15:45	茶歇/Break

主持人：**刘兴宇** 北京有色金属研究总院教授级高工 Chair: **Xingyu LIU**, Professor of General Research Institute for Nonferrous Metals	
15:45-16:05	金属矿山采冶区域植物的重金属效应 Heavy Metal Effect of Plants in Mining and Smelting Areas of Metal Mines **吉瑞纳·斯扎科娃** 捷克生命科学大学教授 **Jirina SZYKOVA**，Professor of Czech University of Life Sciences Prague
16:05-16:25	矿山废弃物管理：可持续矿山的挑战 Mine Waste Management: the Challenge of Sustainable Mines **努里亚 · 卡拉皮纳** 土耳其矿物研究与勘探总局教授 **Nuria KARAPINA,** Professor of General Administration of Mineral Research and Exploration, Turkey
16:25-16:45	美国废弃矿山酸性废水污染治理与修复 Acidic Waste Water Pollution Control and Remediation in Abandoned Mines of USA **李佳** 生态环境部环境保护对外合作中心土壤业务主管 **Jia LI**, Superintendent of soil business, Foreign Economic Cooperation Office，MEE
16:45-17:05	变矿山废物为可利用资源 Waste as a Resources **莱娜 阿拉贡** 瑞典吕勒奥大学教授 **Lena Alakangas,** professor of Lulea University
17:07-17:25	工业活动引起地表和地下污染的综合治理方法 Integrated remediation approach of surface, and subsurface contamination arising from Industrial activity **索博尔奇 科萨** 匈牙利矿业公司 **Szabolcs Kozar**，Envirotis Holding Ltd

工业场地土壤污染修复论坛I（地点：维也纳 2 厅）

Forum on Remediation of Soil Pollution in Industrial Sites (Venue: Vienna Hall 2)

时间 Time	安排 **Programme**
主持人：**任景明** 生态环境部环境工程评估中心副总工 **Chair : Jingming REN**, Deputy Chief Engineer of Appraisal Center for Environment and Engineering, MEE	
14:00-14:20	长江经济带石化行业场地土壤污染防治技术研究 Study on Prevention and Control Technology of Soil Pollution in Petrochemical Industry of Yangtze River Economic Belt **林匡飞** 华东理工大学教授 **Kuangfei LIN**, Professor of East China University
14:20-14:40	Biodegradation of polycyclic aromatic hydrocarbons and polycyclic aromatic sulfur heterocycles in crude oil contaminated soils 原油污染土壤中多环芳烃和多环芳烃硫杂环化合物的生物降解 **塔贾纳 努森** 塞尔维亚贝尔格莱德大学教授 **Tatjana KNUDSEN**, Professor of university of Belgrade
14:40-15:00	农药污染土壤生物修复技术研究进展 Research progress on Bioremediation Technology of Pesticide Contaminated Soil **高士祥** 南京大学教授 **Shixiang GAO,** Professor of Nanjing University
15:00-15:20	Relative toxicity studies of non-ferrous metalliferous mine tailings 有色金属矿山尾矿相对毒性研究 **杰弗里 松原** 加拿大麦吉尔大学教授 **Geoffrey SUNAHARA,** Professor of McGill University
15:20-15:40	丹麦化工污染场地原位修复技术研究 Study on in-situ Remediation Technology of Chemical Pollution Sites in Denmark **牟子申** 成都理工大学教授 **Zishen Mu,** Professor of Chengdu University of Technology
15:40-15:45	茶 歇/Break

主持人：**林匡飞** 华东理工大学教授 **Chair: Kuangfei LIN** Professor of East China University	
15:45-16:05	人工湿地沼气池沼液生态处理 Treatment of digestate in constructed wetland as ecological solution for biogas plant **杰西克 达赫** 波兰波兹南生命科学大学教授 **Jacek DACH,** Professor of Poznan university of Life Science
16:05-16:25	区域土壤污染源分析方法与实证研究 Analysis Method and Empirical Study of Regional Soil Pollution Source **肖荣波** 广东工业大学教授 **Rongbo XIAO,** Professor of Guangdong University of Technology
16:25-16:45	工业场地多环芳烃污染土壤的生物修复 Bioremediation of polycyclic aromatic hydrocarbons contaminated soils in industrial sites **斯维特兰娜 苏什科娃** 俄罗斯南联邦大学教授 **Svetlana Sushkova,** Russian Federal University
16:45-17:05	城市再开发场地风险管控研究及实践-以上海市为例 Research and Practice on Risk Control of Urban Redevelopment Sites -- Taking Shanghai as An Example **施夏夫** 上海市环境科学研究院工程师 **Xiafu SHI**, Engineer of Shanghai Academy of Environmental Sciences
17:05-17:25	缓冲带土壤重金属的新方法研究 Studying of heavy metals in soils of impact zones using new methods **塔蒂亚娜 明基纳** 俄罗斯南联邦大学教授 **Tatiana Minkina,** Russian Federal University
17:25-17:45	在产企业土壤污染风险管控和修复技术及实践 Technology and Practice of Soil Pollution Risk Control and Remediation for Enterprises in Production **马烈** 上海格林曼环境技术有限公司总裁 **Lie MA**，President of Shanghai Greenment Environmental Technology Co., Ltd.
17:45-18:05	六价铬污染场地稳定化修复过程中存在的问题及展望 Problems and prospects in stabilizing remediation of chromium^{6+} contaminated sites **张琢** 中国地质大学讲师 **Zuo ZHANG**，Lecture of China University of Geosciences

时间：**2018** 年 **10** 月 **27** 日

Date:27th October, 2018

工业场地土壤污染修复论坛 II（地点：维也纳 2 厅）

Forum on Remediation of Soil Pollution in Industrial Sites (Venue: Vienna Hall 2)

时间 Time	安排 **Programme**
主持人：**黄沈发** 上海市环境科学研究院副院长 Chair: **Shenfa HUANG**, Vice President of Shanghai Academy of Environmental Sciences	
09:00-09:25	重金属污染土壤的固化稳定化：从工程实践看未来的研发和政策取向 Solidification and Stabilization of Heavy Metal Contaminated Soil: Judging the Future Development and Policy Orientation from the Engineering Practice **李发生** 中国环境科学研究院总工程师 **Fasheng LI**, Chief Engineer of Chinese Research Academy of Environmental Sciences
09:25-09:50	土壤环境质量标准解读 Interpretation on Environmental Quality of Soil **林玉锁** 生态环境部南京环境科学研究所研究员 **Yusuo LIN**, Researcher of Nanjing Institute of Environmental Sciences, MEE
09:50-10:15	载铁生物炭耦合材料降解修复氯代烃污染场地 Degradation and Remediation of Chlorinated Hydrocarbon Contaminated Sites with Iron-loaded Biological Carbon Coupling Material **李辉** 上海大学教授 **Hui LI**, Professor of Shanghai University

10:15-10:40	工业企业污染场地环境风险和管控实践 Practice on Environmental Risk Management and Control of Contaminated Sites in Industrial Enterprises **谢辉** 生态环境部环境规划院研究员 **Hui XIE**, Researcher of Environmental Planning Institute, MEE
10:40-10:45	茶歇/Break
主持人：**李发生** 中国环境科学研究院总工程师 **Fasheng LI**, Chief Engineer of Chinese Research Academy of Environmental Sciences	
10:45-11:10	在产企业土壤与地下水预防与自行监测探讨 Discussion on Soil and Groundwater Prevention and Self-monitoring in Production Enterprises **姜林** 北京市环境保护科学研究院院长 **Lin JIANG**, President of Beijing Municipal Research Institute of Environmental Protection
11:10-11:35	污染场地“绿色可持续修复”的探索与实践 Exploration and Practice of "Green and Sustainable Restoration" for Contaminated Sites **杨勇** 中科鼎实环境工程股份有限公司技术总监 **Yong YANG**, Technical Director of China State Science Dingshi Environmental Engineering Co., Ltd.
11:35-12:00	安全填埋场调查及应急修复 Investigation and emergency repair of safe landfill site **甘平** 中节能大地环境修复有限公司技术总监 **Ping GAN**, Technical Director of China Energy Conservation DADI Environmental Remediation Co., Ltd.

地下水污染防控与修复技术专题分会场（地点：维也纳 1 厅）
Paralleled Session on Groundwater Pollution Control and Remediation Technologies (Venue: Vienna Hall 1)

时间 Time	安排 **Programme**
主持人：**易树平** 南方科技大学研究员 Chair: **Shuping Yi**, Researcher of South University of Science and Technology	
09:00-09:20	多级强化地下水污染原位修复技术 Multi-stage Enhanced in-situ Remediation Technology of Groundwater Pollution **姜永海** 中国环境科学研究院研究员 **Yonghai JIANG**, Researcher of Chinese Research Academy of Environmental Sciences
09:20-09:40	水土污染协同控制理念及内涵 Concept and Connotation of Soil and Water Pollution Coordinated Control **刘国** 成都理工大学教授 **Guo LIU**, Professor of Chengdu University of Technology
09:40-10:00	紫色土丘陵区浅层地下水硝酸盐污染机理 Pollution Mechanism of Nitrate in Shallow Groundwater of Purple Soil Hilly Areas **朱波** 中国科学院水利部成都山地灾害与环境研究所研究员 **Bo ZHU**, Reaearcher of Chengdu Institute of Mountain Hazards and Environment of CAS Water Conservancy Department
10:00-10:20	水源地水质风险预测预警技术研究 Research on Water Quality Risk Prediction and Warning Technology of Water Sources **左锐** 北京师范大学教授 **Rui ZUO**, Professor of Beijing Normal University
10:40-10:45	茶歇/Break

主持人：**席北斗** 中国环境科学研究院研究员 Chair**: Beidou XI**, Researcher of Chinese Research Academy of Environmental Sciences	
10:45-11:05	工业园区地下水污染在线监控与决策支持系统研究 Study on online monitoring and decision support system for groundwater pollution in industrial parks **易树平** 南方科技大学研究员 **Shuping Yi**, Researcher of South University of Science and Technology
11:25-11:45	地下水六价铬污染 PRB 修复技术示范 Demonstration of PRB Remediation Technology For Hexavalent Chromium Contamination of Groundwater **蔡五田** 中国地调局水环地调中心教授级高级工程师 **Wutian CAI**, Professor of China Geological Survey Hydrogeology and Environmental Geology Investigation Center
11:45-12:05	我国多水源补充地下水的环境风险及建议 Environmental Risks and Suggestions of Groundwater Replenishment with Multiple Water Sources in China **李淼** 清华大学副教授 **Miao LI**, Associate Professor of Tsinghua University

农用地土壤污染防控与修复技术专题分会场

（地点：维也纳 1 厅）

Paralleled Session on Agricultural Land Soil Pollution Control and Remediation Technologies (Venue: Vienna Hall 1)

时间 Time	安排 **Programme**
主持人：**李云祯** 四川省环境保护科学院高工 Chair: **Yunzhen LI**, Senior Engineer of Sichuan Academy of Environmental Sciences	
14:00-14:20	面向重金属污染农地修复的土壤调理 Soil Conditioning Oriented to Remediation of Heavy Metal Contaminated Farmland **陈能场** 广东省生态环境与土壤研究所研究员 **Nengchang CHEN**, Researcher of Guangdong Institute of Eco-environmental Science & Technology
14:20-14:40	农田土壤重金属修复挑战与模式 Challenge and Model for Heavy Metal Remediation of Farmland Soil **陈卫平** 中国科学院生态环境研究中心研究员 **Weiping CHEN**, Researcher of Institute of Ecological Environment, CAS
14:40-15:00	四川农田土壤重金属修复技术及作物安全生产措施 Technology for Farmland Soil Heavy Metal Remediation and Safety Production Measures for Crops in Sichuan **李廷轩** 四川农业大学教授 **Tingxuan LI** , Professor of Sichuan Agricultural University
15:00-15:20	土壤污染综合防治先行示范区与农田土壤修复治理建设方案案例分析与思考 Case study on the project of comprehensive prevention and control of soil pollution in the first demonstration area and farmland soil remediation project 余江 四川大学副教授 **Jiang YU**, Associate professor of Sichuan University

15:20-15:40	农用地污染防控及修复的技术与应用 Technology of Agricultural Land Soil Pollution Control and Remediation and Its Application 王　飞　郑州永丰生物肥业有限公司董事长 **Fei WANG**, Chairman of Zhengzhou Yongfeng Biological Fertilizer Co., Ltd.
16:00-16:05	茶歇/Break
主持人：**陈卫平**　中国科学院生态环境研究中心研究员 Chair: **Weiping CHEN**, Researcher of Institute of Ecological Environment, CAS	
16:05-16:25	基于风险管控思路的土壤污染治理研究 Study on Soil Pollution Control Based on Risk Control Thinking **李云祯**　四川省环境保护科学院高工 **Yunzhen LI,** Senior Engineer of Sichuan Academy of Environmental Sciences
16:25-16:45	典型棕（褐）地生态风险及修复效益研究 Study on Ecological Risk and Remediation Benefit of Typical Brown Land **孙华**　南京农业大学教授 **Hua SUN,** Professor of Nanjing Agricultural University
16:45-17:05	健康风险评估判断敏感用地土壤污染危害案例研究 Case Study on Risk Assessment and Judgment of Soil Pollution Hazards for Sensitive Land **张耿榕**　台境企业股份有限公司执行长 **Gengrong ZHANG**, CEO of Taiwan Environment Scientific Co., Ltd.
17:05-17:25	青藏高原土壤—植物关系与国家生态安全屏障建设 Soil-plant Relationship of Qinghai-Tibet Plateau and Building of National Ecological Safety Barrier **王小丹**　中国科学院水利部成都山地灾害与环境研究所研究员 **Xiaodan WANG**, Research Fellow of Institute of Mountain Hazards and Environment, CAS Water Conservancy Department

17:25-17:45	西部寒冷荒漠区灌溉后土壤砷的空间变化趋势 Spatial variation Trend of Arsenic in Soil After Irrigation of Cold Desert Areas in Western China 肖明 青海省农林科学院副研究员 **Ming XIAO,** Associate Researcher of Qinghai Academy of Agriculture and Forestry
17:45-18:05	不同耕作模式下生物炭对 PAHs 的阻控效果及机制 The Blocking and Control Effect and Mechanism for Biochar on PAHs Under Different Cultivation Models 倪妮 生态环境部南京环境科学研究所 **Ni NI**，Nanjing Institute of Environmental Sciences，MEE

土壤与地下水修复高级研修班（地点：维也纳 2 厅）

Soil & Groundwater Training Course (Venue: Vienna Hall 2)

时间 Time	安排 **Programme**
14:00-15:00	场地污染调查基础 Foundation of site pollution investigation 蔡五田　中国地调局水环地调中心教授级高级工程师 **Wutian CAI**，Professor of China Geological Survey Hydrogeology and Environmental Geology Investigation Center
15:00-16:00	日本污染农田的重金属修复技术概述 Overview of heavy metal remediation technologies for Contaminated Farmland in Japan 陈能场　广东省生态环境与土壤研究所研究员 **Nengchang CHEN**，Research Fellow of Guangdong Institute of Eco-environmental Science & Technology

同期活动/Events

产业发展对话(Industry Development Dialogue)

环保产业化就是按产业化运作的方式来进行环境保护，将环境保护当作一个产业来发展。环保产业化就是以市场为导向、以科技为先锋、以企业为主体、以效益为依托，把环保被动治理变为主动创效，从而提高各经济主体环境保护的积极性、主动性和效益性。本次国际会议设置了产业发展对话环节，将邀请政府主管部门代表、国内外学者、国内外知名场地修复企业、资本管理企业的，从政、产、学、研、资等五个方面展开对话，充分交流各自的需求与资源，达到促进产业发展的目的。

Environmental protection industrialization means carrying out environmental protection according to the way of industrial operation and developing environmental protection as an industry. Industrialized Environmental protection which is market-oriented , steered by science and technology，main constructed by enterprises and primly relying on efficiency， targets improving the enthusiasm ，initiative and effectiveness to protect the environment of every economic entities and turning the passive governance mode into an active benefit creating mode. Thus, an Industry Development Dialogue section will take place during this international conference which will invite representatives of government departments, scholars at home and abroad, well-known domestic and international sites remediation enterprises and capital management enterprises. This dialogue will fully exchange and discuss the respective needs and resources in five aspects including administration, production, study, research and funding, to achieve the goal of promoting industrial development.

会务信息/Logistics

- 请凭餐券就餐 Meal
- Please take your vouchers for the meal

- 地图/Map

成都最佳西方成都金韵酒店（成都市金牛区金府路668号）

交通路线：

成都双流国际机场约 29.7 公里，出租车约 80 元

成都东站约约 16.9 公里，出租车约 43 元

- 会务组联系方式：

会场交流及 PPT 拷贝：杨乔 186-1015-4092

吴蕾 186-1191-0554

饶阳 186-0129-7669

部分演讲人简介/Speakers Introduction

姓名	刘兴宇	**NAME**	XingYu LIU
职务/职称	教授级高工	**OCCUPATION**	Professor
工作单位	北京有色金属研究总院		
ORGANISATION	General Research Institue for Nonferrous Metals		
个人简介	中国科学院微生物研究所微生物专业博士毕业，获理学博士学位。同年 8 月进入北京有色金属研究总院工作；生物冶金国家工程实验室主任研究员（2014.12～）。 发表 SCI、EI 论文 40 余篇；授权国家发明专利 13 项; 2010 年获中央企业青年岗位能手称号；获省部级一等奖 1 项，二等奖 2 项（1 项个人排名第一）。 《Frontiers in Microbiotechnology, Ecotoxicology and Bioremediation》编辑（Review Editors），国际杂志《Hydrometallurgy》、《Applied and Environmental Microbiology》、《Environment Science & Technology》审稿人（Reviewer）		
INDIVIDUAL RESUME	XingYu Liu, professor, engaged in the development of mine environmental biotechnology, related basic theoretical research and technical consulting work, presided over six vertical research projects, as the first participant or backbone to participate in more than 10 items; presided and completed 6 technical development projects for enterprise. Published more than 40 papers in SCI and EI; authorized 13 national invention patent; 1 first prize and 2 second prize of provincial and ministerial level. Editor of 《Frontiers in Microbiotechnology, Ecotoxicology and Bioremediation》, reviewer of 《Hydrometallurgy》、《Applied and Environmental Microbiology》、《Environment Science & Technology》.		

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<tr><td>姓名</td><td>姜成英</td><td>Name</td><td>Chengying JIANG</td></tr>
<tr><td>职务/职称</td><td>研究员</td><td>OCCUPATION</td><td>Researcher</td></tr>
<tr><td>工作单位</td><td colspan="3">中国科学院微生物所</td></tr>
<tr><td>ORGANISATION</td><td colspan="3">Institute of Microbiology CAS</td></tr>
<tr><td>个人简介</td><td colspan="3">主要研究内容为，极端嗜酸嗜热古菌及嗜酸细菌的硫代谢过程对硫元素地球化学生物循环和生物冶金、环境修复技术的应用具有重要意义。研究工作主要集中于：1）极端环境微生物菌种资源调查，菌种资源收集及功能评价；2）极端嗜酸热古菌及嗜酸细菌铁、硫代谢机制及环境适应机制探究；3）生物冶金技术及矿山污染环境修复治理应用基础研究。承担或完成了多项国家自然科学基金面上项目、科技部“973”及“863”计划项目、国家科技基础条件平台项目及中国科学院项目等。</td></tr>
<tr><td>INDIVIDUAL RESUME</td><td colspan="3">The main research conclude: the sulfur metabolic process of extreme acidophilic thermophilic archaea and acidophilic bacteria is of great significance to the application of sulfur geochemical biocycle, Biometallurgy and environmental remediation technology. The research work mainly focuses on: 1) investigation of microbial resources in extreme environment, collection and function evaluation of microbial resources; 2) exploration of iron and sulfur metabolism mechanism and environmental adaptation mechanism of extreme acidophilic Archaea and acidophilic bacteria; 3) basic research on Biometallurgical technology and application of mine pollution remediation. Undertaken and completed a number of projects on the National Natural Science Foundation, the "973" and "863" projects of the Ministry of Science and Technology, the National Science and Technology Foundation Platform and the Chinese Academy of Sciences.</td></tr>
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<tr><td>姓名</td><td>姜林</td><td>Name</td><td>Lin JIANG</td></tr>
<tr><td>职务/职称</td><td>院长</td><td>OCCUPATION</td><td>President</td></tr>
<tr><td>工作单位</td><td colspan="3">北京市环境保护科学研究院</td></tr>
<tr><td>ORGANISATION</td><td colspan="3">Beijing Municipal Institute of Environmental Protection</td></tr>
<tr><td>个人简介</td><td colspan="3">在国内较倡导基于风险的场地污染管理框架体系，并出版了国内第一部场地环境评价专著《场地环境评价指南》（2004 年中国环境科学出版社）；重点研究领域：重金属和多环芳烃污染物在环境中的迁移性和生物有效性、风险评估的不确定性与层次化风险评估方法；挥发性有机污染物在包气带中的迁移、生物降解规律及风险控制技术、生物修复及其强化技术；
主持承担国家环保部、市科委和市环保局大量的研究项目，包括国家环保部与 GEF（全球环境基金）合作项目《中国污染场地治理项目--项目准备活动之 POPs 污染场地国家优先清单和场地调查、环境和社会风险评估技术支持》,环保部公益项目《污染场地土壤气体中挥发性有机物监测与评估方法及关键控制技术研究》，北京市科委重大攻关研发项目《污染场地典型异位修复技术研发及示范研究》及中意合作“污染场地评价与修复技术研究”一期、二期等项目</td></tr>
<tr><td>INDIVIDUAL RESUME</td><td colspan="3">According to risk-based management framework, published thefirst Site Environmental Assessment Monograph "Guide for Site Environmental Assessment " in China, Priority research areas: the mobility and bio-availability of heavy metals and PAHs, the uncertainty of risk assessment, hierarchical methodologies for risk assessment, migration of volatile organic contaminants in the vadose zone, biodegradation and risk. The cooperation project of Ministry of Environmental Protection (MEP) and the Global Environment Facility(GEF)-The management project in contaminated site of China -preparation activities --priority list in POPs contaminated sites and site investigation, environmental and social risk assessment technical support.</td></tr>
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<tr><td>姓名</td><td>高士祥</td><td>NAME</td><td>Shixiang GAO</td></tr>
<tr><td>职务/职称</td><td>教授</td><td>OCCUPATION</td><td>Professor</td></tr>
<tr><td>工作单位</td><td colspan="3">南京大学</td></tr>
<tr><td>ORGANISATION</td><td colspan="3">Nanjing University</td></tr>
<tr><td>个人简介</td><td colspan="3">主要研究领域：有机污染化学和污染生态化学，有机污染物对大气、水体和土壤的污染机制研究；污染土壤和地下水的修复机理及技术研究；有机污染物生物降解及生物有效性调控研究等；和(2)污染生态化学：水生生物对富营养化水体 N、P 的吸收转化和拦截研究；富营养化水体水生植物的资源化利用研究；污染物生态毒性及生态风险评价研究。主持国家自然科学基金和教育部博士点基金项目各一项；作为主要成员参国际、国内和地方研究项目多项。有机污染物的生物降解和污染水体、土壤的修复将是本人未来几年的主要研究方向。</td></tr>
<tr><td>INDIVIDUAL RESUME</td><td colspan="3">The main research fields are: organic pollution chemistry and pollution ecochemistry, the pollution mechanism of organic pollutants to atmosphere, water and soil, the remediation mechanism and technology research of polluted soil and groundwater, the biodegradation of organic pollutants and the regulation of bioavailability, etc. and (2) pollution ecochemistry: aquatic organisms to enrichment. Studies on the absorption, transformation and interception of N and P in nutrient water, the utilization of aquatic plants in eutrophic water, the ecotoxicity and ecological risk assessment of pollutants. He presided over the projects of the National Natural Science Foundation and the Doctoral Foundation of the Ministry of Education, and participated in many international, domestic and local research projects as a major member. Biodegradation of organic pollutants and remediation of polluted water and soil will be my main research direction in the next few years.</td></tr>
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姓名	林匡飞	**NAME**	Kuangfei LIN
职务/职称	教授	**OCCUPATION**	Professor
工作单位	华东理工大学		
ORGANISATION	East China University of Science and Technology		
个人简介	现任华东理工大学资源与环境工程学院副院长，危险物质风险评价与控制研究中心主任。国家环境保护化工过程环境风险评价与控制重点实验室副主任。国务院长江三峡工程建设委员会农业生态与环境监测系统专家组专家。主要从事水环境化学和水体生态修复技术，生态毒理学和生态风险评价方面的研究。国务院三峡建设委员会和农业部环境保护研究方面重要专家。		
INDIVIDUAL RESUME	He is currently the Vice-Dean of the School of Resources and Environmental Engineering of East China University of Technology and the Director of the Research Center for Risk Assessment and Control of Hazardous Substances. Deputy director, National Key Laboratory of environmental risk assessment and control of environmental protection and chemical process. Expert group of agricultural ecology and environment monitoring system of the Yangtze River Three Gorges Project Construction Committee. Mainly engaged in water environment chemistry and water ecological restoration technology, ecological toxicology and ecological risk assessment. The State Council Three Gorges Construction Committee and the Ministry of agriculture environmental protection research important experts.		

姓名	李发生	**NAME**	Fasheng LI
职务/职称	总工	**OCCUPATION**	Chief Engineering
工作单位	中国环境科学研究院		
ORGANISATION	Chinese Research Academy of Environmental Sciences		
个人简介	现任中国环境科学研究院 总工程师，土壤污染与控制研究室主任 首席专家。第九届“中国青年科技奖”获得者，享受国务院政府特殊津贴专家，研究领域为工业污染土地风险评估与环境修复。主要研究方向为土壤环境修复与工业污染场地风险控制，主持制定多个有关污染场地环境修复与管理的技术规范、指南和标准并负责一些大型污染场地环境修复的总体方案制定。撰写出版了有关污染场地环境修复和风险控制的学术专著 7 部，发表研究论文 160 余篇，其中 70 多篇在国际期刊发表。		
INDIVIDUAL RESUME	He is currently the chief engineer of the Chinese Academy of Environmental Sciences and the chief expert of the Department of Soil Pollution and Control. The winner of the 9th "China Youth Science and Technology Award" enjoys the special allowance from the State Council. The research fields are risk assessment of industrial polluted land and environmental restoration. The main research direction is soil environmental remediation and risk control of industrial polluted sites, presiding over the formulation of technical specifications, guidelines and standards for environmental remediation and management of several polluted sites, and responsible for the formulation of overall plans for environmental remediation of some large-scale polluted sites. He has written and published seven academic monographs on environmental remediation and risk control of contaminated sites and more than 160 research papers, of which more than 70 have been published in international journals.		

姓名	林玉锁	**NAME**	Yusuo LIN
职务/职称	研究员	**OCCUPATION**	Researcher
工作单位	生态环境部南京环境科学研究所		
ORGANISATION	Nanjing Institute of Environmental Sciences, MEE		
个人简介	生态环境部南京环境科学研究所研究员，农村环境管理与污染防治研究中心主任，国家环境保护土壤环境管理与污染控制重点实验室主任，环境保护部科技创新体系土壤污染防治学科首席专家，全国土壤环境质量标准化技术委员会副主任，中国农业生态环境保护协会理事，全国自然与生态保护分会理事等职·长期从事农村环境问题与土壤污染防治等研究。主持完成国家攻关计划、973 计划、863 计划、国家科技支撑计划等项目近 20 项，发表论文 70 多篇，主编和参编专著 9 部，获得省部级奖励 5 项。		
INDIVIDUAL RESUME	Researcher, Nanjing Institute of Environmental Sciences, MEE, Director, Research Center of Rural Environmental Management and Pollution Prevention and Control, Director, Key Laboratory of Soil Environmental Management and Pollution Control, Chief Expert of Soil Pollution Prevention and Control, Scientific and Technological Innovation System, Ministry of Environmental Protection, National Technical Committee of Soil Environmental Quality Standardization Deputy Director of the Committee, Director of China Agricultural Eco-environmental Protection Association, Director of National Natural and Ecological Protection Branch, has been engaged in research on rural environmental problems and soil pollution prevention and control for a long time. He has presided over nearly 20 projects, including the National Key Research Program, 973 Program, 863 Program and National Science and Technology Support Program, published more than 70 papers, edited and edited 9 monographs, and won 5 provincial and ministerial awards.		

姓名	刘　国	**NAME**	Guo LIU
职务/职称	教授	**OCCUPATION**	Professor
工作单位	成都理工大学		
ORGANISATION	Chengdu University of Technology		
个人简介	中国环境科学学会理事；中国土壤学会土壤修复专委会委员；四川省环境科学学会土壤与地下水环境专委会主任委员；成都市环境科学学会副理事长。环境保护部环境工程评估中心建设项目评估专家。主要研究方向：地下水污染物迁移过程与效应；水土污染协同控制与联合修复；毒害有机污染物控制与资源化。发表论文 60 余篇，出版专著 1 部，教材 1 部，发明专利 9 项。		
INDIVIDUAL RESUME	He is a member of the Chinese Society of Environmental Sciences, a member of the Special Committee on Soil Restoration of the Chinese Soil Society, a member of the Special Committee on Soil and Groundwater Environment of the Sichuan Society of Environmental Sciences, and a vice-chairman of the Chengdu Society of Environmental Sciences. Environmental protection department environmental engineering evaluation center construction project evaluation expert. The main research directions are: migration process and effect of groundwater pollutants; synergistic control and joint remediation of water and soil pollution; control and resource utilization of toxic organic pollutants. More than 60 papers have been published, 1 monographs, 1 teaching materials, and 9 invention patents.		

论文摘要目录

Efficient degradation of chloramphenicol using persulfate activated by nZVI and MNBs

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Abstract: The broad use of antibiotics in anthropogenic activities such as breeding industry and consumption of pharmaceuticals and personal care products (PPCPs) has resulted in their continuous intruding in surface water, groundwater, and sediments (Yao, Wang et al. 2017). Various antibiotics have been detected in both developed and developing countries (Sui, Cao et al. 2015, Kivits, Broers et al. 2018). Their occurrence, fate, toxicity, and degradation have aroused much concern over the world. As a wildly used board-spectrum antibiotic, chloramphenicol (CAP) has been frequently detected in the environment that can be hardly removed in nature (Lian and Wang 2018). Therefore, it is significant to develop an effective technic for efficient degradation of CAP.

In this study, we present an investigation on the degradation of CAP using persulfate activated by nano zero-valent iron (nZVI) and micro-nano bubbles (MNBs) via batch experiments. The results indicate that nZVI coupled with MNBs activated persulfate present the much higher efficient on degradation of CAP than that of individual nZVI, MNBs, and persulfate treatment. More than 95% CAP was degraded using nZVI-MNBs activated persulfate in 10 min at a 10 ppm initial concentration. Only 30%, 5%, and 5% CAP were removed by individual MNBs, nZVI, and persulfate treatment within 60 mins at a 10 ppm initial concentration, respectively. Additionally, it is found that the higher dosage of nZVI in the nZVI-MNBs-persulfate system brought about the better degradation of CAP. Interestingly, the CAP can be efficiently removed in this combined system under acid and basic environment, compared with that under the neutral environment. The mechanism of removal of CAP can be attributed to the enhanced advanced oxidation procedures (AOPs) provided by the combined sulfate radical and hydroxyl radical. A conclusion is drawn that this nZVI-MNBs-persulfate system can provide a feasible approach for efficient degradation of CAP. This study can facilitate the application of nZVI, MNBs, and persulfate involved AOPs in removal of antibiotic in surface water and groundwater.

Keywords: chloramphenicol, degradation, nano zero-valent iron, micro-nanao bubble, persulfate

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Modelling and evaluation of the interactions between the groundwater and the surface water for Maozhou River basin

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Abstract:

Maozhou River is a heavily polluted urban river in Shenzhen, China. The restoration of the water environment has been received large quantities of invests and engineering projects. However, little effort has been devoted to understanding the interactions between the groundwater and the surface water , which is quite important and a challenge for the comprehensive pollution control of a river basin. In this study, a novel SWAT-LUD model is developed to model and evaluate the water interactions for the Maozhou river based on hydrogeological investigation and a joint monitoring for the surface water and groundwater level fluctuations. The SWAT-LUD model is updated based on the Soil and Water Tool (SWAT) mode, a semi-distributed hydrological model that has been successfully applied around world. A new type of sub-basin, named sub-basin-LU (SL), was integrated in the SWAT-LUD model. New modules for calculating the surface water-groundwater exchange is developed by incorporating the Darcy's Law. Additionally, the leakage module is added to the new model considering the rising impermeable area of the city under the rapid expansion of urbanization in the basin. The SWAT-LUD model has been validated by the river runoff and water level data and the groundwater level data obtained by the joint monitoring system. Results indicate that the main exchange behavior within the hyporheic zone is that the groundwater discharge to the river. Both the surface water and the groundwater are recharged primarily by the precipitation. The exchange intense is sub-basin dependent between the surface water and the groundwater. A detailed amount of exchanged water is evaluated for year 2017, which indicate that approximately 1.5×108 m3 of groundwater discharged into the surface water (river), accounting for 95% of the total recharge volume of surface water. And there are around 5.0×106 m3 of surface water leakage recharged into the groundwater during flood time, accounts for 80% of the total surface water recharge. This study provides an integrated SWAT-LUD model for quantitatively evaluating the interactions between the surface water and the groundwater of a basin based on field work, which is most useful to the joint control of the surface water-groundwater pollution for a river basin.

Keywords: Surface water and groundwater, Interactions, SWAT-LUD model, Water quantity, Evalution

Removal of BPA Using Ferrate and Its Potential Geoenvironmental Risk

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Abstract:

Ferrate (FeVIO42-) is one of the strongest water-stable oxidizing species that has been used in remediation of contaminated soil and groundwater (Homolková et al., 2016; Mura et al., 2017). It has high oxidative and capability of changing the physicochemical properties of soil, which might subsequently lead to the changes of soil strength. This scenario should be carefully considered in view of the long serviceability, and reliability of a building. However, little study shed light on the effect of removal of organic contaminants by ferrate on the soil's geotechnical properties.

This study investigated the effect of removal of bisphenol A (BPA) using ferrate treatment on the geotechnical properties of kaolin soil. The slurry and air-drying method was used to prepare soil samples (Li et al., 2015), with ferrate treatment at doses of 1% and 10 % (at acid, neutral, and basic condition, respectively). The physicochemical properties (mineral composition, particle size etc.) and geotechnical properties (Atterberg limits, permeameter test, and quick shear test etc.) of soil before/after ferrate treatment were evaluated.

The results indicated that the removal efficiency of BPA increased with the increasing dose of ferrate. The particle size distribution, average particle size, and specific surface of soil area remains unchanged after BPA contamination and ferrate treatment. The BPA contamination led to a decrease of hydraulic conductivity from 4.6×10-5 cm/s to 1.9×10-5 cm/s. As a comparison, the ferrate treatment resulted in a significant decrease of hydraulic conductivity to 0.77×10-5 cm/s (1% ferrate treated), 0.56×10-5 cm/s (10% ferrate-A), 0.036×10-5 cm/s (10% ferrate-N), and 0.032×10-5 cm/s (10% ferrate-A), respectively. On the other hand, the introduction of BPA led to a slight decrease in cohesion from 43 kPa to 36 kPa, and

significant drop in internal friction angle from 32.8° to 11.9°. Then, the cohesion decreased slightly down to 31 kPa as the ferrate dose of 1%, while the internal friction angle increased sharply up to 38.5°. Unexpectedly, both cohesion and internal friction angle of soil dropped tremendously when the ferrate dose increased to 10%. The influence of pH value of original soil on the changes of shear strength by ferrate treatment is negligible. This situation allows the increase in the potential geoenvironmental risk. It can be even more serious in the vicinity of injection wells, considering the concentration level of ferrate may be higher than 10%. A conclusion is drawn that remediation of contaminated soil and groundwater can increase the geotechnical risk in the short-term. More investigation should be carried out to reveal the effect of remediation on the soil strength.

Keywords: ferrate; remediation; hydraulic conductivity; shear strength; geotechnical risk

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Assessment of fertilizer application on nitrate concentration in groundwater in Chengdu Plain using HYDRUS-1D and MODFLOW

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Abstract: Groundwater in Chengdu Plain is the major source of drinking water and industrial consumption, which however is threaten by the high proportion of agricultural land-use and intensive fertilizer application. Despite that agricultural activity is recognized as the major cause of groundwater NO3-1 contaminations in the region, its prediction and control is still challenging, largely due to the difficulty to quantify loading, leaching, travel, transformation, and fates of agricultural N in soils and water. The aim of this study is to estimate nitrate leaching from unsaturated zone and simulate nitrate fate in the saturated zone in response to different agricultural practices. A HYDRUS-1D model was adopted to explore water content and nitrate distribution in the profile of unsaturated zone above the groundwater table, using combinations of planting information, soil properties, irrigation scheme and fertilizer application. The resulting estimates of water flux and nitrate leaching through the bottom of unsaturated zone were used as input data in the application of the groundwater flow model Visual MODFLOW and mass transport model MT3DMS via a concentration recharge boundary. The modeling framework was then capable of predicting different fertilizer application scenarios for the next 20 years. Four fertilizer application scenarios were developed based on a series of local policies and the effect of different scenarios were compared in predictive simulations of groundwater nitrate concentrations using MT3DMS and quantitative analysis of nitrate-contaminated areas, the spatial and temporal distribution of nitrate load using ArcGIS. The results show that average nitrate leaching through the bottom of unsaturated zone is 36.4 kg ha-1 and thus the export coefficient of 0.14 was estimated given the average fertilizer application rate of 262 kg ha-1 for the study area. The nitrate leaching rate occurs mainly between May and September, which accounts for 64.08 % of total annual leaching. Business as usual (Scenario 1) showed that the nitrate in the groundwater continued to accumulate, and the maximum concentration increased from 14 mg L-1 to 18 mg L-1 after ten years. 2 % increase in fertilizer application rate (Scenario 2) aggravated nitrate contaminations in groundwater with the maximum nitrate concentration exceeding 20 mg L-1 in 2027. With 2 % and 5 % reduction in fertilizer application rate (Scenario 3 and 4), the maximum nitrate concentration was predicted below 12 mg L-1 in 2027. This study provided information to local government and policy makers to optimize agricultural management strategies to reduce nitrate contaminations in groundwater. Appropriate agricultural management, e.g. fertilizer application rate and timing, irrigation rate and timing, has significant effects on improvement of the quality of aquifer water in Chengdu Plain.

Assessment of the bioaccessibility of molybdenum in the soils from mining area after in-situ immobilization

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Abstract: Molybdenum (Mo) is an essential trace element for almost all living organisms with a narrow range between nutritional deficiency and potential toxicity. Excessive Mo in soils will have serious effect on eco-environment, the security of drinking water even human health. In this study, the conventional additives (biosoilid and water treatment residues (WTRs)), engineered material carbon supported nano-and microscale zero valent iron (CS-nZVI) and ironminerals (ferrihydrite and magnetite) were used as amendments. The bioaccessibility/bioavailability of Mo in the soils from mining area (Mo, 15.50~227.00 mg/kg) was assessed and compared by the diffusive gradients in thin films technique (DGT) and plant bioassay after in situ immobilization. The results of DGTc showed that ferrihydrite and two WTRs could significantly decrease Mo bioaccessibility significantly with respect to untreated treatment (ferrihydrite 42~69%, WTR2 36~50% and WTR1 32~41%, respectively). Magnetite could also decreased Mo bioaccessibility significantly (27~38% with respect to untreated soil) except in the soil with highest Mo concentration. The CS-nZVI could decrease Mo bioaccessibility evenly (27~35%) in the soils with different Mo concentration. However, the biosold could not decreased the Mo bioaccessibility with DGTc increased 24% in highly contaminated soil, 15% in medium contaminated soil and 278% in the lightly contaminated soil, respectively. The bioassay showed that the WTR1, magnetite and biosolid could decrease Mo accumulation in the aboveground parts of alfalfa and ryegrass while CS-nZVI increased Mo accumulation in them.

Keywords: Molybdenum, In situ immobilization, Bioaccessibility, Diffusive gradients in thin films technique, Plant accumulation

Effects of Soil Ion Change on Soil Salinity in Greenhouse with Different Planting Years

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Abstract: The greenhouse cultivation technology is developing rapidly in China because of the benefits of small investment scale and high economic efficiency. However, with the prolongation of greenhouse cultivation period, secondary salinization of greenhouse soils reduced soil fertility and productivity, which hindered the growth of greenhouse crops to a great extent. In this study, we analyzed 132 soil samples from different regions of China, revealing the accumulation and variation characteristics of soil salinity in different regions and the relationship between soil salt accumulation and nutrient loss in greenhouse. Based on the investigation and sampling of soil salinization in typical greenhouse areas, we found that greenhouse soil nutrient enrichment was mainly due to excessive fertilization. In the greenhouse, the correlation between electrical conductivity and total salt was significant, the correlation coefficient which called "r" was 0.888, the conversion coefficient was ranged from 1.93 to 2.27. The main factors which influence the conductivity value are the Cl^-,$SO_4^{2-}$and so on, so the influence of $Cl^-$and SO_4^{2-}in soil salinization is relatively large. The decrease in pH value is accompanied by an increase in salt content, and the carrier may be the fertilizer application. It is important measure to reduce harmful ions of greenhouse soil by reducing the amount of chemical fertilizer application, increasing the use of organic fertilizer properly, and removing greenhouse covers during the rainy season timely.

Keywords: Greenhouse soil, Soil salinity, Fertilization, Soil ions.

Isolation and identification of ethanol-resistant microorganisms and preliminary study on the effection of ultraviolet mutation

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Abstract: In this study, we used enrichment mediums with gradient ethanol concentration of 3%, 6%, 9%, 12% separately to enrich ethanol tolerant bacteria from sewage and vinasse. A strain named KC06 was isolated with higher ethanol tolerance ability. This strain is a Gram-positive bacterium and identified as Bacillus subtilis by 16S rDNA PCR method. The strain KC06 was treated by ultraviolet mutation with irradiation at a distance of 25cm under 25W ultraviolet lamp. Bacillus subtilis has been studied about its drug resistance, high temperature resistance and ethanol resistance. It can form spores and biofilms to enhance the tolerance ability. In this study, we screened and isolated microorganisms with resistance to ethanol, which laid a foundation for further study of microorganisms that are resistant to ethanol.

Key words: ethanol tolerance; Bacillus subtilis; 16S rDNA identification; UV mutation

Optimizing the Removal of nitrate from groundwater via graphite oxide supported NZVI: synthesis, kinetics and mechanism of reduction

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Abstract： Although the removal of nitrate-nitrogen (NO3--N) from groundwater based on nanoscale zerovalent iron (nZVI) is a promising method, passivation of nZVI severely inhibits its performance. To overcome such issue, we synthesized reduced graphite oxide (rGO) supported nZVI (nZVI-rGO) by a in-situ liquid-phase reduction method. The characterization analysis showed that the resultant nZVI-rGO consists of three elements of C, O and Fe, and Fe(0) was immobilized on the surface of graphene. Efficient denitrification in simulation groundwater was achieved by nZVI-rGO compared with nZVI and reduced iron powder. Moreover, the efficient removal of NO3--N (50 mg·L-1 initially) by nZVI-rGO sustained over a broad pH range (3~9) due to synergy between rGO and nZVI. Detailed solution chemical analysis indicated ammonia was major aqueous product of the denitrification reaction, and approximately 15% of the NO3--N was transformed to N2. The presence of chloride posed negligible influence on the removal of NO3--N, while prominent inhibitory effect induced by bicarbonate and phosphate. The process of removing NO3--N by nZVI-rGO fit good with different reaction kinetics. Mineralogical and surface analysis of the reacted nZVI-rGO revealed that Fe(0) were oxidized and Fe3O4 were the dominant final state, which demonstrated solid-liquid separation was favorable after reduction. Based on our study, nZVI-rGO might become a promising filler in the permeable reactive barrier process for groundwater disposal.

Key words: Groundwater, Nitrate, nZVI, Graphene, Denitrification

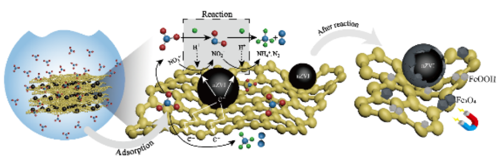

Fig.1 Schematic illustration of the nZVI-rGO application process.

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Selection of carbon materials and modification methods on the immobilization of heavy metals in contaminated soils

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Abstract: Carbon materials have shown excellent sorption characteristic on the immobilization of heavy metals in contaminated soils. To improve the immobilization efficiency, metallurgical coke, biomass char and semi-coke are being modified by steam, microwave and acid. Taguchi experimental design will be used to determine the influence of carbon material type, modified time and process temperature etc. on the immobilization of heavy metals in contaminated soils. Three carbon materials before and after modification were characterized by SEM, BET, XRD and FTIR. From the Fig. 1, it could be seen that the carbon materials modified by acid showed apparent rough surface.

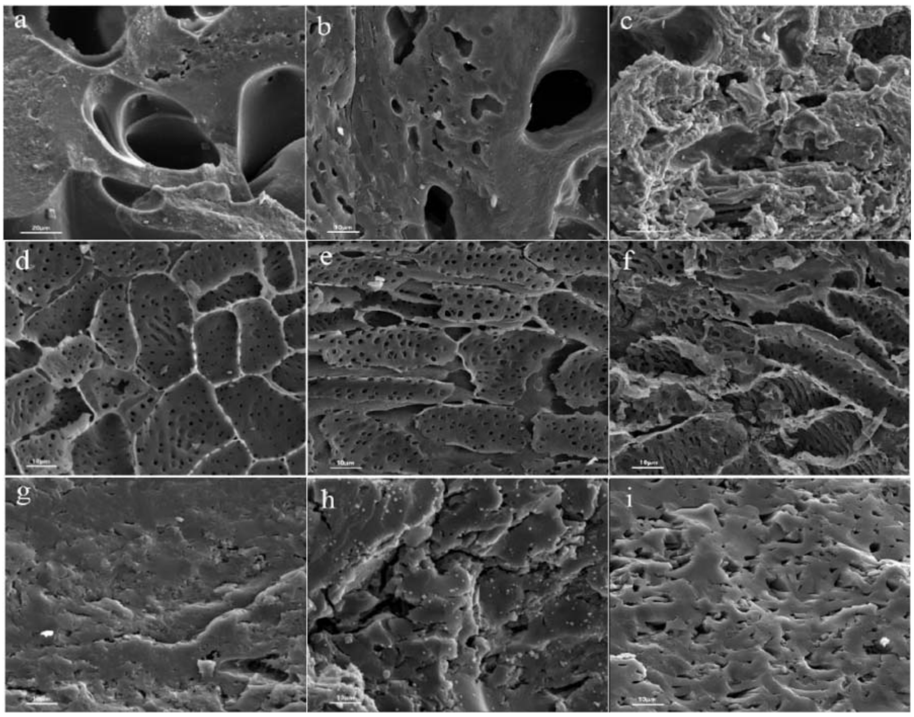

Fig. 1 Surface morphology of carbon materials before and after modification

Keywords: Carbon materials; Heavy metals; Contaminated soils; Modification methods

Uranium Sorption onto Sediment: Characteristics of Kinetics and Thermodynamics

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ABSTRACT: Sediment is the sink and source of heavy metals, which has an important influence on the migration of heavy metals. It can adsorb heavy metals and prevent the migration of radionuclide. Factors such as pH, ionic strength, Eh, uranium concentration and duration of contact affect the uranium adsorption of onto sediment. Eh is an important factor affecting the adsorption of uranium by sediment, but there are few studies about this. In this paper, the effects of flooding duration and REDOX conditions on the adsorption of uranium on sediment were studied by using static experiment method, and the changes of uranium species caused by Eh as well as the kinetic and adsorption thermodynamic characteristics of uranium adsorption by sediment were discussed.

As shown in table 1, the pseudo-second-order model could best depict experimental data, suggesting that the sorption rate is mainly controlled by chemical sorption. Simulation results from the geochemical simulation software (PHREEQC) show that, with the increase of flooding time, the Eh value of sediment gradually decreases, and the concentration of U (VI) remains unchanged, but the concentration of U (IV) and U (V) gradually increases. The thermodynamic parameters showed that entropy and enthalpy under the trial conditions were positive and that values of ΔGΘ were negative. Thermodynamics illustrated that the sorption process was endothermic and spontaneous[1].t is expected that the results of this study will help to understand the adsorption mechanism and migration of uranium on sediments under different REDOX conditions and provide more references for the remediation of radioactive pollution.

Table 1 The results of the kinetics of U (VI) adsorption on sediment

Eh	pseudo-first-order model			pseudo-second-order model		
	K_1（$g \bullet mg^{-1} \bullet h^{-1}$）	$Q_e(mg \bullet g^{-1})$	R^2	K_2（$g \bullet (mg^{-1} \bullet h^{-1}$）	$Q_e(mg \bullet g^{-1})$	R^2
Oxidation	0.76	0.67	0.89	0.91	0.94	0.99
reduction	4.71	0.54	0.91	1.338	0.87	0.99

Keywords: Uranium; Sediment; Eh; Kinetic; Thermodynamics

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高产农田区重金属 Cd 的空间分异及风险评价

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摘要：土壤是人类在地球上能够存活的重要基础条件之一，也是许多污染物被废弃后的容纳场所，更是重金属通过食物链积累直至被人体吸收的主要源头。重金属污染具有不可逆转性、积累性及长期性等特点[1]，不仅会对土壤及地下水造成直接影响，还可通过食物链危害人体健康[2]，当土壤或地表水受到了严重的重金属污染时，随着时间的推移，重金属污染物通过入渗、淋滤及地表水的补给等方式进入到地下水环境中，从而导致地下水水质朝着恶化的方向发展[3]，而地下水一旦受到污染，与土壤污染相比治理难度显著增加，且治理费用高昂，治理时间长久[4]。本研究选取五通桥重点农田区进行了详细实地勘察后，采取平均布点及重点区域加密布点结合，采集土样 14 份、浅层地下水样 19 份，土样经盐酸-硝酸-氢氟酸-高氯酸消解后，用石墨炉原子分光光度法测定重金属 Cd 含量，同时测定 pH 及含水率。浅层地下水样现场采集后加入硝酸，使其 PH≤2，室内经消解后用石墨炉原子分光光度法测定重金属。结果分析：土壤的 pH 值 6.1～7.5 之间，含水率 31.14～46.20%之间。从图 1 与图 2 的 Cd 含量分布图中我们可以得出，研究区南部的土壤与地下水中 Cd 含量较高，达到了 0.7715mg/kg 与 0.0027mg/L。区内土壤与浅层地下水中重金属的分布规律是相似的，即在研究区西南侧即靠近 007 乡道及 G93 成渝环线高速的一侧重金属镉的浓度含量较高，在研究区西

北部的重金属镉的浓度含量较低，在研究区东北部远离乡道与高速公路的地方重金属镉的浓度含量最低,土壤与浅层地下水中镉含量超标的因素可能是相同的。土壤与地下水样相关性分析显示，相关性系数为 0.167，显著性 P 为 0.789，说明地下水重金属含量存在其它外来的污染，浅层地下水中 Cd 含量超标可能与研究区南部的沫溪河有关，研究区内地下水可能会接受河水的补给，而沫溪河沿岸多工厂与养殖场，会对河水造成一定的污染。井单因素和综合评价表明，土壤和浅层地下水样主要为中度污染，存在一定环境风险。

关键词：农田、重金属、浅层地下水、空间分异、风险评估

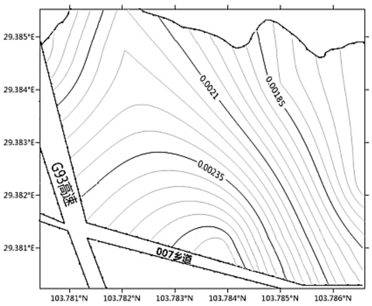

图 1　土壤重金属 Cd 分布图

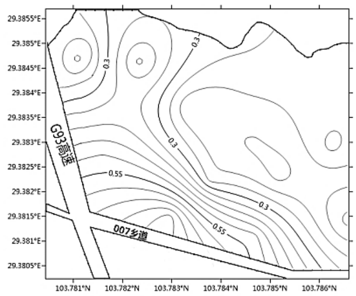

图 2　浅层地下水重金属 Cd 分布图

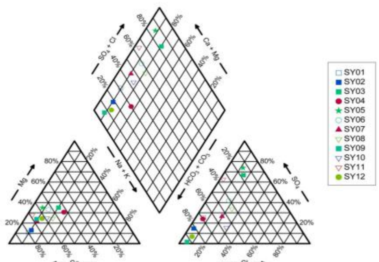

图 3 研究区水化学类型 Piper 三线图

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黄土高原西部及周边区域森林土壤水分物理性质及持水性能研究

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摘要：在黄土高原西部及周边地区选取环境条件相近并均有黄土分布的试验样区，采用野外采样与室内分析相结合的方法，对各样区不同深度土壤的容重、持水量和孔隙度进行比较分析得出：研究区内 4 个采样区三种林分类型的土壤容重、土壤总孔隙度、土壤非毛管孔隙、土壤饱和持水量与土壤毛管持水量的变化趋势较为明显，并大致一致；土壤饱和持水量与土壤毛管持水量的变化与土壤容重的变化相同，即随土层的加深而加大；土壤饱和持水量与土壤毛管持水量变化趋势基本一致，特征显著、拐点明显；土壤总孔隙度与非毛管孔隙的变化则与土壤容重相反，即随土层的加深而减小；土壤毛管孔隙度与土壤非毛管持水量变化规律性较差。以各实验样区土壤总孔隙度、土壤毛管孔隙、土壤饱和持水量与土壤毛管持水量平均值的排序来确认土壤持水性能为：贺兰山油松林>陇东黄土高原刺槐林>子午岭油松林>六盘山华北落叶松。

关键词：陇东黄土高原；土壤持水性能；土壤容重；土壤孔隙度；土壤饱和持水量

Comparison of soil water holding capacity of different areas in

Western and surrounding loess plateau

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Abstract: This paper selects four experimental samples from the western part of the Loess Plateau and its surrounding areas. The Soil bulk density, Water holding capacity of soil and the Soil porosity were calculated and compared by the method of field sampling and laboratory analysis, and the following conclusions were obtained: The change is about the same and the trend is obvious of the Soil bulk density, the Total soil porosity, the Soil saturated water content and the Soil capillary water content; the change is the same with respect to the Soil saturated water content and the Soil capillary water content with the Soil bulk density. It is explain that the Soil bulk density the Soil saturated water content and the Soil capillary water content were increased with the increase of soil depth; The inflection point is the same and the change feature is significant of the Soil saturated water content and the Soil capillary water content; The Total soil porosity, the Soil non-capillary porosity is the opposite of Soil bulk density. It is explain that the Total soil porosity and the Soil non-capillary porosity were reduced with the increase of soil depth；The Soil capillary porosity and the Soil non-capillary water content changed in regularity in the four sampling areas of three types of forest. According to the average of the Total porosity, the Capillary porosity, the Soil saturated water content and the Soil capillary water content .The order of Water-holding capacity of the four experimental samples is: Pinus tabulaeformis in Suiyu> Robinia pseudoacacia forest> Pinus tabulaeformis in Ziwuling> Larix principis rupprechtii forest.

Key words: Longdong loess plateau; Water holding capacity of soil.; Soil bulk density; Soil porosity; The saturated water content of soil

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基于 ArcGIS 的土壤重金属污染评价系统开发和应用

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摘 要：面对土壤重金属污染引发的一系列生态环境问题,农产品安全、居民健康和社会问题等日益突出，逐步引起了政府的高度重视，相继出台了土壤重金属防治规划、政策法规及行业标准等一系列文件，并在全国范围内开展了土壤重金属调查、评价及治理修复工作。为解决传统的土壤重金属污染评价研究中对数据处理、分析与制图过程中操作步骤繁琐、耗时长和专业性强等弊端，亟待开发一套土壤重金属污染评价系统，以达到快速、直观、有效的措施对土壤重金属污染现状与修复效果进行分析和展示。本次研究运用 C#语言、SQL 语言、MS Access 和 ArcGIS Engine 等技术，通过建立空间数据库、属性数据库、评价方法与评价标准模型数据库，并根据土壤重金属污染评价研究的需求，设计了图形操作、图层控制、数据查询、数据管理、数据分析、结果显示以及数据输出等功能模块来实现土壤重金属污染评价。为验证土壤重金属污染评价系统可行性和适用性，应用该系统对四川省某农用地土壤重金属污染空间分布特征、污染程度和生态风险进行了分析，其评价结果与单独基于 ArcGIS 软件评价结果相一致，表明该系统能够有效地将土壤重金属污染评价过程模块化、简易化和去专业化，为农产品产地污染评价和有效管理提供快速、有效的决策作用，也为进一步污染预警、污染治理研究提供帮助和支持，具有重大的现实意义与应用价值。

关键字：土壤；重金属；污染评价；GIS

Development and application of soil heavy metal pollution evaluation system based on ArcGIS

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Abstract: In the face of a series of ecological and environmental problems caused by heavy metal pollution in soil, the safety of agricultural products, the health of residents and social problems have become increasingly prominent, to which has been attached importance by the government.

The government has issued control plan, policies, regulations and industrial standards of soil heavy metal, and carried out investigation, evaluation, treatment and rehabilitation nationwide of soil heavy metal. In order to solve the disadvantages of traditional methods in evaluation research of soil heavy metal pollution, such as tedious operation steps, time consuming and high professional standards in data processing, analysis and mapping process. It is urgent to develop an evaluation system for soil heavy metal pollution, so as to provide rapid, intuitive and effective measures to analyze and display the current situation and recovery of soil heavy metal pollution. This study using the c # language and SQL language, MS Access and ArcGIS Engine Technology, through the establishment of spatial database, attribute database, model database of methods and standards of evaluation, and according to the demand of assessment of the soil heavy metal pollution, design some function modules to achieve the evaluation of soil heavy metal pollution, such as the graphics operations, layers control, data query, data management, data analysis and data output. The system is applied to analyze the spatial distribution characteristics, pollution level and ecological risk of heavy metal pollution in a agricultural land in Sichuan province in order to verify its feasibility and applicability. The evaluation results were consistent with those based on ArcGIS software alone and it shows that this system is able to effectively modularize, simplify and de-specialize the evaluation process of soil heavy metal pollution. It provides quicker and effective decision-making function for pollution assessment and effective management of farm produce area and then, help and support for further pollution warning and pollution control research, which is of great practical significance and application value.

Keywords: Soil; Heavy metal; Pollution Assessment; GIS

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基于风险矩阵的土壤环境风险等级确定方法探讨

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摘　要：当前，我国已进入突发环境事件多发期和矛盾凸显期，环境问题已成为威胁人体健康、公共安全和社会稳定的重要因素之一。2018 年 2 月 5 日国家发布的《企业突发环境事件风险分级方法》对企业大气和水的突发环境事件风险进行了分级，但未对土壤的突发环境事件风险分级方法进行任何描述。本文统计了四川省内的突发环境事件，分析了事件发生的原因及其在土壤方面造成的经济损失、污染范围、持续时间、恢复难易等数据，得出以了风险物质量比值 Q、生产工艺过程 M 和环境风险受体敏感程度 E 为判断依据的风险矩阵判断法。该方法按得分将风险物质量比值分为 3 个等级，生产工艺过程分为 4 个等级，并根据不同距离存在的环境敏感体将环境风险受体敏感程度分为 3 个水等级。在确定以上三个等级后该方法可以将企业的土壤风险等级确定为一般、较大和重大 3 个风险等级中的一种，完善了环境风险分级存在的不足。

关键字：风险等级；土壤；风险矩阵

Discussion on the Method of Determining Soil Environmental Risk Level Based on Risk Matrix

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Abstract: At present, China has entered a period of frequent environmental incidents and a period of contradictions, and environmental problems have become one of the important factors threatening human health, public safety and social stability. On February 5, 2018, the State issued the “Business Risk Assessment Method for Environmental Emergencies” to classify the risks of sudden environmental events in the atmosphere and water of enterprises. However, there is no description of the soil environmental risk classification method for sudden environmental events. This paper analyzes the sudden environmental events in Sichuan Province, and analyzes the causes of the events and the economic losses, pollution extent, duration, and recovery difficulties caused by the soil. The risk matrix judgment method based on the risk substance ratio Q, the production process M and the environmental risk receptor sensitivity E is obtained. The method divides the risk material quality ratio into three grades according to the score, and the production process is divided into four grades, and the environmental risk receptor sensitivity level is divided into three water grades according to the environmental sensitive bodies existing at different distances. After determining the above three levels, the method can determine the soil risk level of the enterprise as one of the general, large and major risk levels, and improve the deficiency of the environmental risk classification.

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基于数值模拟方法的饮用地下水源保护技术体系研究

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摘要：由于人口膨胀，城市化和工业发展等因素导致饮用水源安全等环境危机。本次研究基于地下水数值模型构建饮用地下水源保护技术体系，并应用于涪江一级阶地某饮用地下水源的安全管理。区内地下水作为主要水源通过 2 口开采井抽取并用于各种用途，抽水量分别为 10000m3/d 和 5000m3/d。通过对 11 组地下水样品中 22 项因子的检测结果进行分析表明，区内 NH3-N 和 CODMn 的较高浓度主要是由点污染源所导致。基于相关性分析，选择与大部分检测因子具有高度相关性的 NH3-N 和 CODMn 作为模型校准和预测的指标因子。22 个水头观测值被用于流场模型校准并表明，由于地下水开采已形成最大降深为 12m 的降位漏斗，同时作为初始下游方向的南侧，开采井的粒子捕获区延伸 1100m，因而导致潜在污染源的明显增加。为分析饮用水源安全整治措施的必要性和有效性，考虑两种情景并预测 20 年来地下水开采井中 NH3-N 和 CODMn 的浓度变化趋势。情景Ⅰ：若维持现状，16 年后 NH3-N 将超过 0.5mg/L 的饮用水水质标准。情景Ⅱ：关停现有工业污水处理厂并于开采井粒子捕获区外进行替代建设及实施严格的防渗措施；该预测结果表明，在模型运行 3 年后，开采井中 NH3-N 和 CODMn 达到峰值，浓度分别为 0.26mg/L 和 1.33mg/L。本研究针对饮用地下水源保护提供了理论依据并用于其安全管理实践。

关键词：饮用地下水源；冲积含水层；开采井；污染源；地下水模型；整治措施

Research on drinking groundwater source protection technology system based on numerical model in the river terrace, Mian Yang, China

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Abstract: Population pressure, urbanization and industrial developments, among other factors, have resulted in severe environmental crises such as drinking water source safety. A drinking groundwater source protection technology system based on groundwater model was constructed and applied to the safe management of drinking groundwater source in the first terrace of Fujiang River. In the study area, groundwater as the main source is used for various purposes through 2 exploitation wells, whose capacity is 10000m3/d and 5000 m3/d, respectively. Through the detection by 22 factors for 11 groundwater samples shows that higher concentration of CODMn and NH3-N mainly caused by point pollution sources. Base on correlation analyze that CODMn and NH3-N are selected as indicator factors for model calibration and prediction which have a high correlation with most water quality factors. 22 hydraulic head observation values were used for flow model calibration. The flow model indicates that a drop funnel to form with a maximum depth of 12m and the particle capture zone in the initial downstream direction of the south side extends to 1100m due to groundwater exploitation which causing obviously increased potential sources of pollution. In order to analyze the necessity and effectiveness of remediation measures for the safety of drinking water sources, two scenarios were taken into consideration to predict the concentration of NH3-N and CODMn in groundwater exploitation wells over a period of 20 years. ScenarioⅠ: If the current conditions are maintained lead to that the NH3-N will exceed the drinking water quality standard of 0.5 mg/L after 16 years. ScenarioⅡ: Industrial sewage treatment plants are installed outside the particle capture zone of exploitation wells and strict anti-seepage measures are implemented; this prediction results indicate that the peak concentration of NH3-N and CODMn in the exploitation wells is 0.26 mg/L and 1.33 mg/L after 3 years of model operation. This study provides a theoretical basis for drinking groundwater source protection that can be applied to safety management practices.

Keywords：Drinking groundwater; Quaternary alluvial aquifer; Exploitation wells; Source of pollution; Groundwater modeling; Remediation.

磷石膏堆场环保堆存探究

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摘　要：磷石膏是指在磷酸生产中用硫酸处理磷矿时产生的固体废渣，其主要成分为硫酸钙，其杂质主要有氟化物、游离磷酸、五氧化二磷、磷酸盐等，并存在砷、铜、锌、铁、锰、铅、镉、汞及放射性元素，因此磷石膏对环境风险较大，如不注意堆存就会造成巨大的环境污染。保证磷石膏库的稳定性，确保其不崩塌，下滑，控制其粉尘污染和污水外排，使技改措施稳定进行对确保环境安全有重大意义。本文以四川某处磷石膏堆场为例，借助 Slide 软件处理简化 Bishop 法的稳定系数计算，研究了磷石膏堆场的整体稳定性；通过查询地区降雨量和明渠流水公式确定了截排水的横截面最优选取；通过尾矿起动摩阻风速经验公式确定了防尘盖土网的材质和目数；通过实验按照《危险废物贮存污染控制标准》，确定了粘土+石灰+防渗膜的底部防渗最佳组合。在得到以上成果并采取对应措施后，该磷石膏堆场在实际生产中达到了较好的环境防治效果。

关键字：磷石膏堆场；稳定性；防渗；粉尘

Study on environmental storage of phosphogypsum yard

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Abstract: Phosphogypsum refers to the solid residue produced when phosphate ore is treated with sulfuric acid in phosphoric acid production. Its main composition is calcium sulfate, and its impurities mainly include fluoride, free phosphoric acid, phosphorus pentoxide, phosphate, etc., and there are arsenic, copper, zinc, iron, manganese, lead, cadmium, mercury and radioactive elements. Therefore, phosphorus gypsum is of great risk to the environment. If we do not pay attention to the storage, it will cause huge environmental pollution. To ensure the stability of the phosphogypsum library, to ensure that it does not collapse, decline, control its dust pollution and sewage efflux, so that the technical reform measures are stable to ensure environmental safety. Taking the phosphogypsum yard in some place in Sichuan as an example, the stability of the Bishop method is calculated by using the Slide software to study the overall stability of the phosphogypsum yard. The optimal selection of the cross-section of the intercepted drainage is determined by querying the regional rainfall and the open channel flow formula. The material and mesh number of the dust-proof cover soil network are determined by the empirical formula of the tailings starting frictional wind speed. According to the "Hazardous Waste Storage Pollution Control Standard", the optimal combination of bottom anti-seepage of clay + lime + anti-seepage film was determined. After obtaining the above results and taking corresponding measures, the phosphogypsum yard achieved good environmental control effects in actual production.

Keywords: Phosphogypsum yard; Stability; Anti-seepage; Dust

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某铬渣场地可渗透反应墙施工前期设计研究

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摘要：可渗透反应墙（PRB）是一种高效治理地下水污染的修复技术[1]。本文以六价铬污染地下水场地为例，系统总结了某铬渣场地六价铬污染地下水 PRB 修复技术设计阶段的研究内容，内容包括场地调查与诊断、可处理性测试与数值模拟[2,3]。通过场地调查与诊断查明了研究区含水层结构及渗透系数、地下水流向、六价铬在土壤及地下水中的分布规律以及水文地球化学特征；在初步筛选治理六价铬污染地下水的反应材料基础上，利用可处理性试验确定了最佳反应材料及其配比，探讨了颗粒粒径及地下水流速对去除效果的影响[4]，分析了六价铬去除的反应机理[5]；通过数值模拟确定了墙体最佳开挖位置。设计阶段各研究内容的开展为 PRB 修复技术工程顺利实施提供重要数据支撑。

关键词：可渗透反应墙，六价铬，可处理性试验，数值模拟

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耐镉芽孢杆菌对 Cd2+的吸附机理ii

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摘要：从攀枝花矿区淤泥里筛选到一批耐钒菌株，通过逐级提高 Cd2+进行驯化获得一株高耐镉菌株 PFYN01，该菌株 PFYN01 属于芽孢杆菌（Bacillus sp）。最大耐 Cd2+浓度为 3 900mg/L。本实验研究了初始 Cd2+浓度、pH、及菌量对菌株吸附 Cd2+的影响，利用扫描电镜（SEM）和傅叶里红外光谱（FTIR）结合研究分析菌株吸附机理。结果表明：菌株 PFYN01 在初始 Cd2+质量浓度为 75mg/L、加入菌量为 1.0g/L、pH=5，对 Cd2+的吸附率达到 34.98%；吸附符合 Langumir 模型，最大吸附量为 1.974mg/g；对比分析 Cd2+吸附前后的细胞微观结构及形态变化，证明了细胞组成成分参与了 Cd2+与 PFYN01 的相互作用，参与官能团有羟基（O-H）、酰胺基（N-H）、烃基（C-H）、羧基（C=O）、羰基（COOH）。

关键字：镉污染、耐镉细菌、驯化、生物吸附、吸附机理

Mechanism of Cd(II) biosorption by Cadmium-tolerant Bacillus sp.

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Abstract: A high-cadmium-tolerant strain, PFYN01, was obtained from the mud samples in the Panzhihua Mining Area by accelerating Cd2+ concentration stepwise. The strain was identified as Bacillus sp. by 16srDNA PCR. The maximum concentration of Cd2+ was 3 900 mg/L. In this experiment, the effects of initial concentration of Cd2+, pH, and bacterial amount on the adsorption of Cd2+ by the strain were studied. The biosorption mechanism of the strain was investigated by scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy. When PFYN01 had an initial concentration of Cd2+ of 75 mg/L, a bacterial mass of 1.0 g/L and pH=5, the adsorption rate of Cd2+ reached 34.98%. The adsorption rate of Cd2+ was in accordance with the Langumir model and the maximum adsorption capacity was 1.974 mg/g. Comparative analysis of cell morphology before and after biosorption of Cd2+ confirmed that the cell components hydroxyl (O-H), amide (N-H), hydrocarbyl (C-H), carboxyl (C=O), and carbonyl (COOH) participate in the interaction between Cd2+ and PFYN01. PFYN01 is a bacterium with strong biosorption capacity for Cd2+. The influencing factors on the biosorption of Cd2+ and the biosorption mechanism study will provide guidance for the remediation of heavy metals contaminated microorganisms.

Key words: cadmium pollution; cadmium-tolerant bacteria; domestication; biosorption; biosorption mechanism

南疆和田地区人工柽柳大芸生态修复模式及效益分析

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摘要：南疆和田地区是典型的干旱区，自然因素决定了区内自然生态环境中的生物量低、系统结构简单、稳定性差、易遭受破坏并且难以恢复。为了改善生态环境和生产条件，和田地区充分利用国家加快发展民族地区经济、大力改善生态环境的有利时机，以天然林保护为基础，人工生态林建设为突破口，逐步摸索出一条治理沙漠、保护生态环境、发展经济的新模式，并取得了较大的效益。本文在深刻认识生态修复重要性的基础上，以生态修复理论与方法为指导，充分利用实地调查获得的数据，采取研究与实证相结合、定量与定性相结合的研究方法，对和田地区人工柽柳大芸生态修复工程进行了研究，并得出如下结论：

（1）生态效益方面。人工柽柳林的种植能够增加土壤中粘粒、粉粒的含量，提高土壤的肥力，降低白昼气温日较差和相对湿度日较差，并有效的减弱风速，同时还使得当地生物多样性有所增加。

（2）经济效益方面。人工柽柳大芸生态修复项目的实施，使农民可利用的土地增多，农村经济重心向绿色产业转移，不仅对国民生产总值的增加起到了一定促进作用，还带动了第三产业的发展，使产业结构在向多元化的合理方向调整，农民得到的实惠越来越多。

（3）社会效益方面。人工柽柳大芸生态修复项目的实施，解决了生态林建设不能产生直接经济效益的难题，开辟了和田地区区域经济增长的新途径，缓解了人口就业难的问题；同时，还改善了农民生活质量、提高了

当地人口素质、密切了社会群众关系，使社会秩序和社会风气向良好的方向发展，人民总体满意度得到大幅度提升。

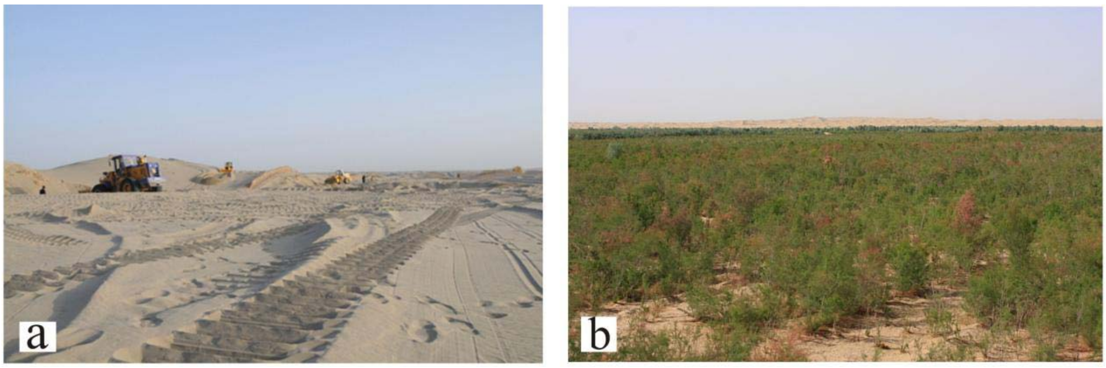

Fig.Artificial Tamarix plantation in Hotan prefecture

关键词：生态修复；人工柽柳大芸；和田地区；新疆

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Mechanisms of biochar reducing the bioavailability of PAHs for crops under two tillage patterns of continuous upland cropping and paddy-upland rotation

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Abstract: Purposes This study aimed to compare and elucidate the effects and mechanisms of paddy-upland rotation and continuous dry farming on the environmental risk of PAHs in crops/ soil.

Results Appropriate amount of corn straw- or bamboo-derived biochar pyrolyzed at 300°C and 700°C (CB300 or BB700), could reduce human exposure and health risks of PAHs in carrot roots. Based on the findings of two seasons of cultivation, the residues and bioavailability of PAHs in rhizosphere soils were lower under the pattern of continuous dry farming than those under the rotation pattern, respectively by 7% and 13%. Interestingly, the amendment of the 2% CB300, 0.5% BB700 or 2% BB700 could reduce the above significant differences to be insignificant. Over the long term, PAHs were more readily to sustainably dissipate under the rotation pattern, especially after the amendment of 2% CB300 which improved the soil nutrients, increased the diversity and richness of bacteria and fungi, and the relative abundance of the microbes and functional genes related to PAH degradation.

Conclusion In summary, combining paddy-upland cultivation and the biochars with abundant nutrients could be a very promising strategy for reducing environmental risks of PAHs on aged contaminated farmland soils.

四川省会东县某铜冶炼厂及周边土壤重金属污染空间分布特征及污染程度评价

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摘要：有色金属矿产资源采选冶炼活动所造成的土壤重金属污染已成为严重的环境问题。本文以四川省会东县某铜冶炼厂及周边农田土壤为研究对象，为掌握该铜冶炼厂污染源特征及其对周边农田土壤重金属污染的影响范围及程度，采用随机布点法分别在矿石破碎-堆浸-弃渣区、萃取-电积车间区、浸出液集液池-防洪池区与周边农田种植区采集土样和固废样品 25 个、冶炼厂区内废水样 4 个、厂区外围地表水样 4 个和地下水样 3 个，并对土样、固废样和水样中的 pH 值及 Cu、Cd、Pb、Cr、Ni、Zn、As 和 Hg 含量进行测试分析，采用地学统计分析、综合污染指数法与 ArcGIS 相结合的方法对研究区内重金属空间分布特征与污染程度进行了分析。研究结果表明：该铜冶炼厂及周边农田土壤重金属污染主要为 Cu 元素，其次是 Hg、Cd、Cr 和 Ni 元素；项目区 HDT05 采样点以上至冶炼厂区范围内土壤中重金属污染程度为重度污染，污染物以重金属 Cu 超标为主，其次为 Hg、Cd、Cr 和 Ni，但 Hg、Cd、Cr 和 Ni 的污染范围都较小；HDT20 采样点至 HDT22 采样点之间区段及 HDT24 采样点周围区块为重金属污染超标区，主要是重金属 Cu 超标，HDT20 采样点至 HDT22 采样点之间区段其污染程度为轻度-重度污染为主，而 HDT24 采样点周围区块主要为轻度污染；该铜冶炼厂及周边农田土壤重金属污染程度分区特征与 Cu 元素空间分布特征较一致，这

说明研究区土壤中浓度值较高的 Cu 元素对该区域内的土壤环境质量的影响及污染程度起主导作用。

关键字：土壤重金属；空间分布；污染评价；铜冶炼

Spatial distribution characteristic and pollution degree assessment of heavy metal pollution in a copper smelter and surrounding soil of Huidong County, Sichuan Province

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Abstract: Heavy metal pollution caused by nonferrous metals mineral resources mining and smelting activities has become a serious environmental problem. This paper takes a copper smelter and surrounding soil in Huidong County, Sichuan Province as the research object, in order to master the characteristics of the pollution source of the copper smelter and the influence scope and degree of its impact on heavy metal pollution in surrounding farmland soils. The experiment collectes soil samples in the ore crushing - heap leaching - waste slag area, extraction - electrowinning workshop, leachate collection tank - flood control area and 25 solid waste samples, 4 waste water samples in the smelter, 4 surface water samples outside the plant and 3 groundwater samples by random sampling method. And test and analysis of pH value and Cu, Cd, Pb, Cr, Ni, Zn, As and Hg contents in soil samples, solid waste samples and water samples. The spatial distribution characteristics and pollution degree of heavy metals in the study area were analyzed by geostatistical analysis, comprehensive pollution index method and ArcGIS. The results show that the heavy metal pollution in the copper smelting plant and surrounding farmland is mainly Cu element, followed by Hg, Cd, Cr and Ni elements; The heavy metal pollution level in the soil from the sampling point before the HDT05 sampling point in the project area is heavy pollution. The pollutants are mainly heavy metal Cu, followed by Hg, Cd, Cr and Ni, but the pollution range of Hg, Cd, Cr and Ni is Smaller; The segment between the HDT20 sampling point and the HDT22 sampling point and the HDT24 sampling point are heavy metal pollution exceeding the standard area, mainly the heavy metal Cu exceeds the standard, and

the pollution degree between the HDT20 sampling point and the HDT22 sampling point is mild-heavy pollution. And the area around the HDT24 sampling point are mainly slight pollution; The zoning feature of heavy metal pollution in the copper smelting plant and surrounding farmland are consistent with the spatial distribution characteristics of Cu. This indicates that the Cu element with higher concentration in the soil of the study area plays a leading role in the soil environmental quality and pollution degree in the area.
Keywords: Soil heavy metal; Spatial distribution; Pollution assessment; Copper smelting

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太湖流域典型农业园区种养废弃物面源污染治理技术集成与绩效研究

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摘要：对太湖流域典型农业园种养废弃物资源化利用技术进行集成创新和工程示范研究。研究结果表明，由种养废弃物收集处理技术单元、种养废弃物田间处理就地还田技术单元、一次性施肥控氮技术单元和尾水净化生态调控技术单元等四个基本单元集成构建的种养废弃物区域性高附加值处理利用技术体系，可以有效处理利用种养废弃物；区域内年消耗畜禽养殖废弃物 30000t，稻麦秸秆 3000t，养殖肥水 22000t，农田单位面积减少化学肥料使用量 25%，COD 削减量 1800 t/a，BOD 削减量 1200 t/a，TN 削减量 271.10t/a，TP 削减量 803.72 t/a。

Figure 1 Integrated technology of treatment and utilization of cultivation waste in typical agricultural park of Taihu River Basin

关键词：镇域尺度；种养废弃物；资源化；技术集成；绩效评价

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铁镁铝氧化物包覆石英砂的吸附除双酚 A、S 研究

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摘要：双酚 A、双酚 S 是典型的内分泌干扰物，随着其生产使用致使在土壤-地下水环境污染日益严重。双酚 A、双酚 S 在环境中频繁检出并且迁移性较强易扩散，并且根据研究表明即使在很低的浓度条件下，仍有较大的毒性，对人类健康具有很大的威胁。因此，对双酚 A、双酚 S 的去除研究很有必要。本文采用氧化还原/共沉淀法将石英砂分别负载铁氧化物、镁氧化物、铝氧化物，并对制备的改性石英砂特征分析，进行双酚 A、双酚 S 的等温吸附实验和柱穿透实验测试去除效果。探究了铁镁铝氧化物对双酚 A、双酚 S 在去除效果以及对其运移影响。通过实验结果显示，镁氧化物对双酚 S 吸附去除效果显著，而其他氧化物对双酚 A、双酚 S 去除效果较弱。铁氧化物对双酚 A、双酚 S 去除效果都较差。穿透实验结果同样显示，镁氧化物对双酚 A 运移明显抑制，滞留效果很显著。

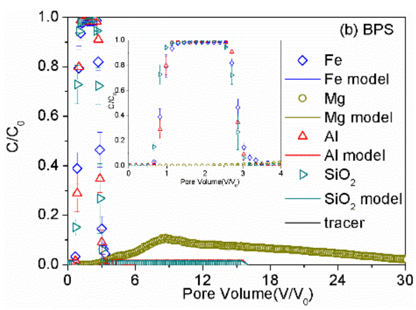

Fig. The breakthrough curves of BPS in the sand or coated with oxide of Fe/Mg/Al column

关键词：双酚 A;双酚 S；镁氧化物；吸附；穿透实验

土壤粒径分布对电动修复镉污染土壤的效果研究

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摘要：电动力学土壤修复技术（EKR）是通过向土壤中施加低能电场，从而使污染物在电迁移、电渗和电泳等电动作用下实现污染物的转运和污染场地的原位修复[1]。土壤颗粒的粒径组成作为土壤的重要理化性质，不仅是决定土壤质地的重要因素，还会影响土壤的表面电荷、缓冲性质和孔隙结构从而影响土壤颗粒表面的 zeta 电位、电渗流大小和有效的污染物转运路径[2, 3]。本文将校园土壤筛分为 0.5-1 mm，0.5-0.3 mm，0.3-0.1mm 和＜0.1 mm 4 个不同的粒径组成。以 0.05 mol L-1 的 NaNO3 为电解质调节液，石墨板为电极，在 0.67V cm-1 的电场梯度下对初始浓度为 250mg Kg-1 的镉污染土壤进行未强化的电动修复研究，主要从 EKR 过程中的电动力学特征、污染物去除效果和形态转化 3 个层面展开研究。结果表明颗粒组成为＜0.3mm 的小粒径土壤在电动修复过程中呈现出较大的电流密度和累积电渗流；小粒径的污染土壤在电动修复 7 d 后阳极附近 Cd 的总残留浓度显著低于大粒径（＞0.3mm）组成的土壤，阴极附近 Cd 的总残留浓度反之；对 7 d 后土壤中 Cd 的形态进行 BCR 形态分析，结果显示弱酸提取态为 EKR 过程中主要的 Cd 转运形态，且弱酸提取态 Cd 在小粒径土壤的阳极附近仅占 19%，而在大粒径土壤的阳极附近高达 78%。

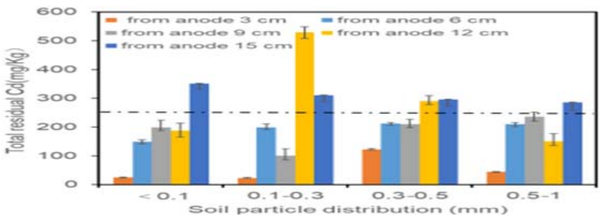

Fig. Total residual amount of Cd after EKR treatment with different soil particle size fraction

关键词：电动修复，镉污染，粒径分布，形态分布

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