

万方知库
Eco-Environmental
Knowledge Web

ACTA SCIENTIAE CIRCUMSTANTIAE

环境科学学报

2022 Vol.42 No.5 第42卷 第5期

特别选题：基于“人工智能”驱动在农村生活污水系统治理专栏



Science Press
万方数据

科学出版社
Science Press



中国科学院生态环境研究中心 主办



目次

特别选题	
基于“人工智能”驱动在农村生活污水系统治理专栏序言	孟庆义,王培京,胡明,等 (1)
农村污水设施车载式剩余污泥脱水技术与设备研究	詹俊,王培京,李现瑾,等 (7)
基于层次分析-灰色评价法的北京市农村污水处理技术评估	史世强,王培京,胡明,等 (13)
基于德尔菲法和情景分析的北京市农村生活污水处理工艺优选	王培京,孟庆义,肖金玉,等 (22)
基于多约束条件下分散污水处理设施建设模式研究与实践	邱彦昭,王培京,晁春国,等 (30)
专论与综述	
臭氧污染对我国粮食安全影响及其减缓应对措施	王效科,张丹红,耿春梅,等 (37)
研究报告	
重庆市 2015—2020 年秋冬季 PM _{2.5} 污染传输路径与潜在源贡献分析	蒲茜,李振亮,曹云攀,等 (49)
皖南地区铜陵市大气颗粒物污染特征及潜在源研究	牛司平,朱旭,朱兰兰,等 (60)
南京市大气颗粒物 PM ₁ 中重金属污染的磁学诊断	肖慧,许悦,钱新,等 (74)
我国典型细颗粒物排放源单颗粒质谱特征对比研究	徐娇,张英磊,冯银厂,等 (83)
基于 XGBoost 算法的近地面臭氧浓度遥感估算	赵楠,卢毅敏 (95)
西安市加油站挥发性有机物排放及其影响的数值模拟研究	吕梦菲,吴其重,杨晓春,等 (109)
疫情背景下的福建省高速公路机动车污染物排放清单	邹泽耀,郑鑫程,徐崇敏,等 (119)
典型地铁站的污染物扩散全尺寸试验研究	王磊,赵子旺,张琨,等 (129)
NO ₂ 对二甲苯光氧化生成 SOA 及其吸光度影响	王益倩,刘仕杰,赵宇,等 (136)
产脲酶菌株 <i>Sporosarcina ureilytica</i> ML-2 诱导方解石沉淀矿化 Pb(II)、Cd(II) 和 Cr(VI) 研究	曾勇,陈泽智,杜亚玲,等 (148)
3 种填料 <i>A. ferrooxidans</i> 挂膜效果及对模拟酸性矿山废水中 Fe ²⁺ 生物矿化能力比较	王鹤茹,杨琳琳,王蕊,等 (160)
Fe ³⁺ 对 MBBR 系统脱氮途径及关键酶性能影响分析	王依婷,汪宇,高宇,等 (169)
基于生物膜序批式反应器工艺的城市污水磷酸盐富集实验研究	温林霄,潘杨,陈越,等 (178)
同步脱氮除磷复配菌剂对河流水质净化效果研究	王雨阳,李茹莹 (187)
石墨烯-二氧化钛电活性膜降解对氯间二甲苯酚研究	白昱,周律,辛怡颖,等 (195)
温度对电自养氧还原生物阴极电化学性能的影响	朱雪梅,廖承美,韩沂琰,等 (208)
泡沫铜电催化还原 Fe(II) EDTA 络合脱硝液的研究	王浩强,张光旭,刘士豪,等 (217)
Fe、N 共掺杂原子级分散 Fe-g-C ₃ N ₄ 催化剂活化过硫酸盐降解亚甲基蓝的机制	彭小明,吴健群,戴红玲,等 (225)
磁性氮掺杂碳材料活化过硫酸盐降解酸性橙 7	王诗生,赵大唯,章慧娟,等 (237)
次氯酸钠强化芬顿法处理废水中次磷酸盐同步回收磷酸铁	刘蕴晗,刘朝峰,李一兵,等 (247)
不同形态无机氮对水环境中双酚 A 光降解的影响	韩瑶,李丽君,赵荣梅,等 (254)
聚己内酯复合固体碳源的制备及其深度脱氮性能研究	杨惠兰,张丹,兰书焕,等 (263)
壳聚糖纤维对芦荟大黄素吸附及其抑藻机理研究	董泽樟,叶建州,薛舒心,等 (274)
水产养殖尾水中抗生素抗性基因的去除及磺胺类耐药细菌研究	孙宇洁,孟令轩,朱琳,等 (286)
澜沧江梯级水库对汞运输的影响	马宏海,陈求稳,刘东升,等 (296)
闽江河口区文武砂水库水体溶存 CH ₄ 浓度时空变化特征	洪妍,张逸飞,杨平,等 (304)
闽江感潮河段夏秋季涨落潮河水稳定同位素 (N/D/O-18) 组成特征解析	真翎,吴贤忠,李家兵,等 (314)
春灌背景下黄河上游清水河流域 DOM 的空间分布规律	徐斌,裴东艳,何斐,等 (325)
通过屋顶暴露方法模拟聚碳酸酯微塑料在长江水样的长期老化行为	王荐,吴运金,何跃,等 (336)
不同释放模式下网湖沉积物氮磷释放通量估算	荣楠,周道坤,郭灿斌,等 (345)
泉州湾河口湿地不同植被恢复下沉积物磷形态和酶活性特征	乐易迅,胡敏杰,赖兴凯,等 (355)
电缆细菌对沉积物-水界面磷、铁、硫分布影响的室内模拟研究	张靖天,卢敏敏,霍守亮,等 (364)
溪流营养盐滞留的水文与非水文过程分析方法	刘超,李如忠,傅扬 (374)
模型参数与边界条件对滇池水质变化的全局敏感性分析	刘李爱华,蒋青松,毛国柱,等 (384)
添加玉米秸秆对绿花菜尾菜堆肥植物毒性的影响	嘎毕拉,罗维 (395)
填埋场覆盖土微生物好氧/厌氧共代谢降解氯乙烷的特性、贡献度及微生态研究	曹昆,苏夏,邢志林,等 (405)
微塑料污染和蚯蚓活动对黄棕壤温室气体排放的影响	鄢紫薇,张秀玲,林杉,等 (416)
互花米草入侵对河口湿地土壤环境中铁氧化菌群落结构及多样性影响	曾庆淞,陈钰,郑毅,等 (425)
过硫酸盐对电动-铁/碳复合材料联合修复多氯联苯污染土壤的强化作用	宋艳,林道辉 (435)
超低排放改造推广及 NH ₃ 减排对京津冀冬季环境效益研究	焦小森,任世华,张伟,等 (444)
明亮发光杆菌培养的响应面优化及其对常见金属离子的毒性评价研究	王丹,周彦宏,白林明,等 (454)
邻苯二甲酸二乙基己酯 (DEHP) 通过调控 Wnt/β-catenin 信号通路加重肝纤维化的机制研究	赵宗彪,李向阳,王法财,等 (465)

CONTENTS

Preface: Special column on rural domestic wastewater systematic treatment driven by artificial intelligence	MENG Qinyi, WANG Peijing, HU Ming, et al (1)
Study on vehicle-mounted residual sludge dewatering technology and equipment for rural sewage facilities	ZHAN Jun, WANG Peijing, LI Xianjin, et al (7)
Evaluation of Beijing rural sewage treatment technology based on Analytic Hierarchy Process-Grey Relation Analysis	SHI Shiqiang, WANG Peijing, HU Ming, et al (13)
Optimization of rural domestic wastewater treatment technology based on Delphi method and scenario analysis in Beijing	WANG Peijing, MENG Qinyi, XIAO Jinyu, et al (22)
Research and application of the construction mode of the decentralized sewage treatment facilities based on multi constraints	QIU Yanzhao, WANG Peijing, CHAO Chunguo, et al (30)
Impact of ozone pollution on China's food security and mitigation measures	WANG Xiaoke, ZHANG Danhong, GENG Chunmei, et al (37)
Transport pathways and potential source contribution of PM _{2.5} pollution in Chongqing from 2015 to 2020	PU Xi, LI Zhenliang, CAO Yuning, et al (49)
Pollution and potential sources of atmospheric particulate matter in Tongling City of Southern Anhui Province	NIU Siping, ZHU Xu, ZHU Lanlan, et al (60)
Magnetic diagnosis of heavy metal pollution in atmospheric particulate matter (PM ₁) from Nanjing city	XIAO Hui, XU Yue, QIAN Xin, et al (74)
Single particle mass spectra of typical fine particulate matter sources in China	XU Jiao, ZHANG Yinglei, FENG Yinchang, et al (83)
Remote-sensing estimation of near-surface ozone concentration based on XGBoost	ZHAO Nan, LU Yimin (95)
Numerical simulation study on volatile organic compounds emissions and its effects from gas stations in Xi'an	LU Mengfei, WU Qizhong, YANG Xiaochun, et al (109)
Fujian Province highway motor vehicle pollutant emission inventory under the background of the COVID-19	ZOU Zeyao, ZHENG Xincheng, XU Chongmin, et al (119)
Full scale experimental study of pollutant diffusion in a typical subway station	WANG Lei, ZHAO Ziwan, ZHANG Kun, et al (129)
Effects of NO ₂ on the formation and optical absorption of SOA derived from xylene photochemical oxidation	WANG Yiqian, LIU Shijie, ZHAO Yu, et al (136)
The mineralization study of Pb(II), Cd(II) and Cr(VI) by induced calcite precipitation by urease producing strain <i>Sporosarcina ureilytica</i> ML-2	ZENG Yong, CHEN Zezhi, DU Yaling, et al (148)
Fe ²⁺ oxidation and mineralization properties of <i>A. ferrooxidans</i> biofilm immobilized on three fillers	WANG Heru, YANG Linlin, WANG Rui, et al (160)
Effect of Fe ³⁺ on the nitrogen removal pathway and related key enzymes in an MBBR system	WANG Yiting, WANG Yu, GAO Yu, et al (169)
Study on phosphate enrichment in municipal wastewater based on biofilm sequencing batch reactor process	WEN Linxiao, PAN Yang, CHEN Yue, et al (178)
Study on river water purification by the mixed culture of simultaneous nitrogen and phosphorus removal bacteria	WANG Yuyang, LI Ruying (187)
Study on Parachlormetaxylene degradation by rGO-TiO ₂ electroactive membrane	BAI Yu, ZHOU Lu, XIN Yiyang, et al (195)
Effects of different temperature on the electrochemical performance of oxygen-reducing electroautotrophic biocathode	ZHU Xuemei, LIAO Chengmei, HAN Yilian, et al (208)
Study on the electrocatalytic reduction of Fe(II)EDTA complexing denitrification solution by copper foam	WANG Haoqiang, ZHANG Guangxu, LIU Shihao, et al (217)
Degradation mechanism of methylene blue by Fe-g-C ₃ N ₄ (600) catalyst activation peroxymonosulfate	PENG Xiaoming, WU Jianqun, DAI Hongling, et al (225)
Magnetic N-doped carbonaceous materials activated persulfate for degradation of Acid Orange 7	WANG Shisheng, ZHAO Dawei, ZHANG Huijuan, et al (237)
NaClO-enhanced Fenton process for oxidation of hypophosphite and simultaneous recovery of ferric phosphate	LIU Yunhan, LIU Chaofeng, LI Yibing, et al (247)
The effect of different forms of inorganic nitrogen on photodegradation of bisphenol A in water environment	HAN Yao, LI Lijun, ZHAO Rongmei, et al (254)
Preparation of polycaprolactone composite solid carbon source and its tertiary nitrogen removal	YANG Huilan, ZHANG Dan, LAN Shuhuan, et al (263)
The adsorption mechanism of aloe-emodin on chitosan fiber and its inhabitation effect on algae growth	DONG Zezhang, YE Jianzhou, XUE Shuxin, et al (274)
Removal of antibiotic resistance genes and sulfonamides resistant bacteria in aquaculture tail water	SUN Yujie, MENG Lingxuan, ZHU Lin, et al (286)
The impact of cascade reservoirs on mercury transport in the Lancang River	MA Honghai, CHEN Qiwen, LIU Dongsheng, et al (296)
Spatiotemporal variations in dissolved CH ₄ concentration in Wenwusha Reservoir from Min River Estuary, southeast China	HONG Yan, ZHANG Yifei, YANG Ping, et al (304)
Component analysis of N/D/O-18 stable isotope during ebb and flood tides in summer and autumn in the tidal reach of the Minjiang River	ZHEN Ling, WU Xianzhong, LI Jiabing, et al (314)
Spatial distribution of DOM in the Qingshui River basin of the upstream Yellow River on spring irrigation season	XU Bin, PEI Dongyan, HE Fei, et al (325)
Long-term aging behavior of polycarbonate microplastic in the Yangtze River via a rooftop exposure protocol	WANG Jian, WU Yunjin, HE Yue, et al (336)
Estimation of nitrogen and phosphorus release fluxes from sediments of the Wanghu Lake under different release modes	RONG Nan, ZHOU Daokun, GUO Canbin, et al (345)
Changes of phosphorus speciation and enzyme activities in sediments of the Quanzhou Bay estuarine wetland under different vegetation restoration patterns	LE Yixun, HU Minjie, LAI Xingkai, et al (355)
Laboratory simulation of the effect of cable bacteria on phosphorus, iron and sulfur distribution at sediment water interface	ZHANG Jingtian, LU Yanmin, HUO Shouliang, et al (364)
Method of analysis on nutrient retention of hydrological and non-hydrological processes in a headwater stream	LIU Chao, LI Ruzhong, FU Yang (374)
Global sensitivity analysis of parameters and boundary conditions to water quality model in Lake Dianchi	LIU Liaihua, JIANG Qingsong, MAO Guozhu, et al (384)
Effects of large-scale windrow composting of different ratios of corn straw to residue of green cauliflower on phytotoxicities of Chinese cabbage seeds	GA Bila, LUO Wei (395)
Characteristics, contribution and microecology of degradation of chloroethylene by aerobic/anaerobic co-metabolism of microorganisms in landfill cover soil	CAO Kun, SU Xia, XING Zhilin, et al (405)
Effects of microplastics pollution and earthworm activity on greenhouse gas emissions from yellow brown soil	YAN Ziwei, ZHANG Xiuling, LIN Shan, et al (416)
Effects of <i>Spartina alterniflora</i> invasion on soil iron-oxidizing bacteria community structure and diversity in estuarine wetland	ZENG Qingsong, CHEN Yu, ZHENG Yi, et al (425)
The enhancement of persulfate on the electrokinetic-iron/carbon composite co-remediation of PCBs-contaminated soil	SONG Yan, LIN Daohui (435)
The promotion of ultra-low emission (ULE) transformation and NH ₃ emission reduction on the environmental benefits of Beijing-Tianjin-Hebei in winter	JIAO Xiaomiao, REN Shihua, ZHANG Wei, et al (444)
Optimization of culture conditions of <i>Photobacterium phosphoreum</i> using response surface methodology and toxicity evaluation on metal ions	WANG Dan, ZHOU Yanhong, BAI Linming, et al (454)
Study on the mechanism of di-(2-ethylhexyl) phthalate (DEHP) aggravating liver fibrosis by regulating Wnt/β-catenin signaling pathway	ZHAO Zongbiao, LI Xiangyang, WANG Facai, et al (465)

《环境科学学报》第六届编委会名单

- 主 编：曲久辉
- 副 主 编：刘文清 杨志峰 彭永臻 袁志国 俞汉青 朱 彤 毕 军
王书肖
- 学术顾问：汤鸿霄 郝吉明 陶 澍 江桂斌 傅伯杰 赵进才 贺克斌
张远航 彭平安
- 编 委：(按姓氏笔画排)
- 马 军 王书肖 王金南 王学军 王建龙 王晓昌 王爱杰
文湘华 尹大强 毕 军 曲久辉 朱 彤 朱利中 全 燮
刘 永 刘文清 刘会娟 麦碧娴 杨 敏 杨志峰 吴丰昌
何品晶 余 刚 张利田 陈同斌 欧阳志云 周启星 郑 华
郑君瑜 郑明辉 胡 春 胡勇有 俞汉青 袁志国 贾晓珊
黄 霞 崔宝山 彭永臻 潘 纲
- 编辑部主任：杨桂华
- 责 任 编 辑：卜庆杰 王 虎

环 境 科 学 学 报

(Huanjing Kexue Xuebao)

(月刊,1981 年创刊)

2022 年 5 月 第 42 卷 第 5 期

ACTA SCIENTIAE CIRCUMSTANTIAE

(Monthly,Started in 1981)

Vol.42, No.5, May 2022

主 管	中国科学院	Sponsored by	Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences,
主 办	中国科学院生态环境研究中心		State key Laboratory of Environmental Aquatic Chemistry,
协 办	环境水质学国家重点实验室		School of Environmental Sciences, Beijing Normal University
编 辑	《环境科学学报》编辑委员会	Edited by the Editorial Board of	Acta Scientiae Circumstantiae
	北京 2871 信箱 邮政编码 100085		(P.O.Box 2871, Beijing 100085, China)
	电话:(010)62941073	Editor-in-Chief	Qu Jiuhui
	E-mail:hjkxxb@ rcees.ac.cn	Published by	Science Press(16 Donghuangchenggen North Street Beijing 100717, China)
	网址:www.actasc.cn	Distributed by	Science Press Tel:010-64034563, E-mail:journal@cspg.net
主 编	曲 久 辉	International distributed by	China International Book Trading Corporation (Guoji Shudian)
出 版	科 学 出 版 社		(P.O.Box 399, Beijing 100044, China)
	北京东黄城根北街 16 号		
	(邮政编码 100717)		
印刷装订	北京宝昌彩色印刷有限公司		
发 行 处	科学出版社		
	电话:010-64017032,64017539		
国外总发行	中国国际图书贸易总公司		
	(北京 399 信箱,100044)		
出 版 日 期	每月 26 日		

中国标准刊号:ISSN 0253-2468
CN 11-1843/X

CODEN:HKXUDL

国内邮发代号:82-625

国外发行代号:M410

订购处:全国各地邮政局

定价:160.00 元

网上购买请扫以下二维码

