3.1 专业学位研究生一作论文（179 篇）

表 3-1 2019 年至今学院专业学位研究生第一作者发表科研论文汇总表

表 3-1 2019 年至今学院专业学位研究生第一作者发表科研论文汇总表

序号	论文名称	第一作者(研究生)	通讯作者	发表时间	发表刊物名称、年、卷及页码	收录类型	单位署名情况	JCR分区
1.	Molecular Design of Perylene Diimide Derivatives for Photocatalysis	李子斌	冯嘉靖 孙　兵	2025	ACS Catalysis, 2025, 15, 1829-1840	SCI	第一&通讯	Q1
2.	Recent Progress of Chemical Reactions Induced by Contact Electrification	霍鑫怡	魏　迪	2025	Molecules, 2025, 30, 584	SCI	第一	Q2
3.	Revealing the Role of Interfacial Charge Transfer in Mechanoluminescence	霍鑫怡	魏　迪	2025	Nanomaterials, 2025, 15, 656	SCI	第一	Q2
4.	Construction of a novel chemiluminescence system based on mixed-ligand metal-organic frameworks	应伊然	吴　静	2025	Journal of Luminescence, 2025, 277, 120989	SCI	第一&通讯	Q2
5.	Interlayer cation effects on optical and dielectric properties of montmorillonite in terahertz frequency band	郝立贤	郑志远	2025	Applied Clay Science, 2025, 274(000)	SCI	第一&通讯	Q1
6.	Auto-recovery property of OPB under obstacles and inclement weather	萧泓玥	高禄	2025	APL Photonics, 2025, 10(4)	SCI	第一&通讯	Q1
7.	Bionic Boston ivy adhesive foot - photothermal flexible phase change hydrogel	冯瑞婷	吴秀文	2025	Journal of Materials Chemistry A, 2025, 13(33), 27531-27545	SCI	第一&通讯	Q1
8.	Optical and dielectrical properties of opal water content determination using terahertz time-domain spectroscopy	高楚侗	郑志远	2025	Applied Spectroscopy, 2025, 79(6), 1008-1017	SCI	第一&通讯	Q2
9.	Optical-dielectric characterization and contactless thickness measurement of ceramics based on terahertz spectroscopy	高楚侗	郑志远	2025	Applied Optics, 2025, 64(19), 5302-5310	SCI	第一&通讯	Q3

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10.	Layered Double Hydroxide-Based PdCux@LDH Alloy Nanozyme for a Singlet Oxygen-Boosted Sonodynamic Therapy	莫民丽	戚洪彬 关山月	2024	ACS Applied Materials & Interfaces, 2024, 16(18): 23003-23014	SCI	第一&通讯	Q1
11.	石墨炔空心花球的制备及高选择性电催化氧还原过氧化氢	周友贵	商　虹	2024	功能材料，2024，55(03)：3017-3022	北大核心	第一&通讯	/
12.	Enhanced electromagnetic wave absorption of magnetite-spinach derived carbon composite	易　媛	赵增迎	2024	Colloids and Surfaces A: Physicochemical and Engineering Aspects 2024, 694, 134149	SCI	第一&通讯	Q2
13.	CO2 Absorption by Solvents Consisting of TMG Protic Ionic Liquids and Ethylene Glycol: The Influence of Hydrogen Bonds	路博浩	杨德重	2024	Atmosphere. 2024, 15(2):229	SCI	第一&通讯	Q3
14.	Metal–organic frameworks and their derivatives for the electrochemical CO2 reduction reaction: insights from molecular engineering	刘小明	刘煊赫	2024	Journal of Materials Chemistry A, 2024,12, 20578-20605	SCI	第一&通讯	Q1
15.	Methanol as an anti-solvent to improve the low open-circuit voltage of $CsPbBr_3$ perovskite solar cells prepared with water	程佳杰	董敬敬	2024	Dalton Transactions, 2024, 53(11), 5180-5191	SCI	第一&通讯	Q1
16.	Isobutyramide additive to improve the performance of $CsPbBr_3$ perovskite solar cells prepared by green solvent	程佳杰	董敬敬	2024	Physica Status Solidi A-Applications & Materials Science, 2024, 221(11)	SCI	第一&通讯	Q3
17.	Novel polar oxides with exceptional pyroelectric performance: doping-induced polar transition in $Ba_6Pb_{3.2}(PO_4)_6Cl_2$	张铎	孙瑞锦	2024	Journal of Materials Chemistry A, 2024, 12(46), 31932-31941	SCI	第一&通讯	Q1

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18.	Composite phase change materials coupled with radiative cooling for asphalt pavement thermal management	王少博	吴秀文	2024	Construction and Building Materials, 2024, 457	SCI	第一&通讯	Q1
19.	Optical and dielectric properties of water-bearing sandstones in the terahertz range	高楚侗	郑志远	2024	Infrared Physics and Technology, 2025, 143	SCI	第一&通讯	Q2
20.	Ghost image of rotating object with group frame neural network combining frame correction algorithm	冯善果	高　禄	2024	Optics and Laser Technology, 2024, 17, 110241	SCI	第一&通讯	Q1
21.	Nanofluidic Membrane-Assisted Organic Electrochemical Transistors for Bioinspired Gustatory Sensation Based on Selective Cation Transport.	张　悦	孙　兵	2024	Small, 2024, 20, 2403629	SCI	第一&通讯	Q1
22.	Cascading CRISPR/Cas and Nanozyme for Enhanced Organic Photoelectrochemical Transistor Detection with Triple Signal Amplification.	张　琳	孙　兵	2024	Analytical Chemistry, 2024, 96, 14283–14290.	SCI	第一&通讯	Q1
23.	Rational Fabrication of Ionic Covalent Organic Frameworks for Chemical Analysis Applications	于　静	孙　兵	2023	Biosensors, 2023, 13, 636	SCI	第一&通讯	Q1
24.	A Heterostructure Photoelectrode Based on Two-Dimensional Covalent Organic Framework Film Decorated TiO2 Nanotube Arrays for Enhanced Photoelectrochemical Hydrogen Generation	张　悦	孙　兵 商　虹	2023	Molecules, 2023, 28(2), 822	SCI	第一&通讯	Q2
25.	A new way to achieve infrared stealth by composite phase change microcapsules	何宇阳	吴秀文	2023	Journal of Energy Storage, 2023, 73, 109217	SCI	第一&通讯	Q1
26.	Cooperation or competition between piezocatalysis and photocatalysis of $Bi_4Ti_3O_{12}$ nanoflakes	刘　筱	邢　杰	2023	Journal of Alloys and Compounds, 2023, 936, 168367	SCI	第一&通讯	Q1

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27.	Template-assisted Synthesis of Large-area Ordered Perovskite Nanowires Array for High-performance Photodetector	马方园	邢　杰	2023	ACS Applied Materials & Interfaces, 2023, 15, 12024-12031	SCI	第一&通讯	Q1
28.	High-performance artificial synapse based on CVD-grown WSe_2 flakes with intrinsic defects	郭子浩	邢　杰	2023	ACS Applied Materials & Interfaces, 2023, 15, 19152-19162	SCI	第一&通讯	Q1
29.	Magnetic Field-Enhanced Performance of Superparamagnetic LiMn2O4-Based Composite Slurry Electrode for Semisolid Flow Battery	白小洁	刘　昊	2023	Small Methods, 2023, 7: 2300548	SCI	第一&通讯	Q1
30.	Enhanced Electrochemical Performance of Metallic CoS-Based Supercapacitor by Cathodic	田　也	刘　昊	2023	Nanomaterials, 2023, 13.8 : 1411	SCI	第一&通讯	Q1
31.	Research Progress of Green Solvent in $CsPbBr_3$ Perovskite Solar Cells	程佳杰	樊振军 董敬敬	2023	Nanomaterials, 2023, 13(6): 991	SCI	第一&通讯	Q1
32.	ZnPc/$CsPbBr_3$ QDs collaborative interface modification to improve the performance of $CsPbBr_3$ perovskite solar cells	邹　丽	董敬敬	2023	Solar Energy Materials and Solar Cells, 251, 112157	SCI	第一&通讯	Q1
33.	Improvement of the Stability and Optical Properties of CsPbBr3 QDs	王佳明	董敬敬	2023	Nanomaterials, 2023, 13(16): 2372.	SCI	第一&通讯	Q1
34.	The mechanism of pyroelectricity in polar material hemimorphite	武岳彤	孟德忠 赵长春	2023	Appl. Phys. Lett. 2023,122 (19), 192904	SCI	第一&通讯	Q2 榜刊
35.	Removal of nitrides and fluorides from secondary aluminum dross by catalytic hydrolysis and its mechanism	李占兵	吴秀文	2023	HELIYON, 2023, 9(1): e12893	SCI	第一&通讯	Q2

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36.	Tailored luminescence of Bi doped Ca3Ga4O9 phosphors with the substitution of strontium ions	印莉虹	王亚芳	2023	Optical Materials, 2023, 139: 113737	SCI	第一&通讯	Q2
37.	Tunable narrowband and broadband coexisting absorber enabled by a simple all－metal grating for sensing applications	王建伟	高　华	2023	Frontiers in Physics，2023，11,1234275	SCI	第一&通讯	Q2
38.	Preparation of $CsPbBr_3$ Perovskite Solar Cells Using a Green Solvent	程佳杰	董敬敬	2023	Energies, 2023, 16, 6426	SCI	第一&通讯	Q3
39.	Analysis of Phase Diagram of CaO－CoOx－ErOy and Crystal Structure of Perovskite $(Ca_3\text{-}xErx)Co_2O_{6\text{-}}z$	王浩成	樊振军	2023	Solid Solution,2023,16(13),4958	SCI	第一&通讯	Q3
40.	Absorption properties and mechanisms of metallic moth-eye structures. Optics Communications	张 泽	高华	2023	Optics Communications, 2023, 540: 129487	SCI	第一&通讯	Q3
41.	Abnormal magnetic phenomenon at low temperature in Zn doped frameworks	刘荣肇	樊振军	2023	Acta Physica Sinica,2023,72(3),030201	SCI	第一&通讯	Q4
42.	Removal of hexavalent chromium pollutant and mechanism by heat-treated natural pyrite as an efciency reactive media for permeable reactive barrier	周 彬	刘 昊	2023	J. Environ. Sci. Technol. 2023，s13762-023-05056-8	SCI	第一&通讯	Q4
43.	稀有矿物方硼石人工合成与功能特性研究进展	汪强强	孙瑞锦 赵长春	2023	矿物学报，2023,11, 17,	核心	第一&通讯	——
44.	太赫兹光谱技术在岩石矿物研究中的应用研究进展	张思齐	郑志远 黄昊翀	2023	激光与光电子学进展	核心	第一&通讯	——
45.	四吡咯基有机多孔材料的制备及在电池中性能研究进展.功能材料	李春花	商　虹	2023	功能材料,2023, 54(3), 3052-3059	核心	第一&通讯	——
46.	The Effect of Hydrogen Bonds on CO2 Capture by Functionalized Deep Eutectic Solvents Derived from	王宗华	杨德重	2023	ACS Sustainable Chemistry & Engineering,2023，11(16):	SCI	第一&通讯	Q1

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	4-Fluorophenol				6272-6279.			
47.	Linking health to geology- a new assessment and zoning model based on the frame of medical geology	李凤嫣	余　涛	2023	Environmental Geochemistry and Health. 2023.	SCI	第一&通讯	Q1
48.	有关消费者评论的不平衡文本数据的情感分析研究	文　涵	赵俊芳	2023	数学的实践与认识	核心	第一&通讯	——
49.	Sentiment Analysis of Imbalanced Comment Texts Under the Framework of BiLSTM	文　涵	赵俊芳	2023	ICAIBD 2023, 312-319	会议论文	第一&通讯	——
50.	基于字符特征的 DGA 域名检测方法研究综述	王　宇	王祖朝	2023	计算机科学,2023,50(08):251-259.	核心	第一&通讯	——
51.	A Classification Method Based on CNN-Bi-LSTM for Difficult Detecting DGA Domain Name	王　宇	王祖朝	2023	(ICEIEC). IEEE, 2023: 17-21.	会议论文	第一&通讯	——
52.	果树农药残留消解特性及数学模型研究进展	王增磊	赵俊芳	2023	江苏农业科学, 2023, 51(2):28-35.	核心	第一&通讯	——
53.	基于改进的 WOA-LSSVM 樱桃番茄内部品质检测方法研究	康明月	罗斌	2023	光谱学与光谱分析,2023,43(11):3541-3550.	核心	第一作者	——
54.	基于近红外光谱技术结合改进的 CS-BPNN 樱桃番茄 SSC 和 Vc 含量检测	康明月	孙鸿雁	2023	现代食品科技,2023,39(08):287-295.	核心	第一&通讯	——
55.	基于特征代表性的土壤环境质量监测点布局优化方法	初玉婷	李晓岚	2023	农业环境科学学报,2023,42(11):2430-2439.	核心	第一作者	——
56.	Calculation Method of Canopy Dynamic Meshing-Division Volumes for Precision Pesticide Application in Orchards Based on LiDAR	王梦梦	孙鸿雁	2023	Agronomy, 2023, 13(4), 1077.	SCI	第一&通讯	Q1

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57.	数字图像相关方法辅助的视频运动放大改进方法及其在位移测量中的应用	丁　彤	田　垄	2023	实验力学, 2023, 38(5): 625-633.	核心	第一&通讯	——
58.	Piecewise Pseudo almost Periodic Solutions of Interval General BAM Neural Networks with Mixed Time-varying Delays and Impulsive Perturbations	董延寿	赵俊芳	2023	AIMS Mathematics, 2023, 8(9): 21828-21855.	SCI	第一&通讯	Q2
59.	On Weak Metric Dimension of Digraphs	冯　敏	杨越峰	2023	Discrete Mathematics, Algorithms and Applications, 2023, 15(3): 2250088		通讯	——
60.	P-polynomial Weakly Distance-regular Digraphs	曾　青	杨越峰	2023	The Electronic Journal of Combinatorics, 2023, 30(3), P3.3.	SCI	通讯	Q3
61.	Traveling Waves for a Nonlocal Dispersal Susceptible–infected–Recovered Epidemic Model with the Mass Action Infection Mechanism	吴　鑫	马兆海	2023	Mathematical, 2023, 46(18): 18837-18860.	SCI	通讯	Q1
62.	Stability of Planar Traveling Waves for a Class of Lotka–Volterra Competition Systems with Time Delay and Nonlocal Reaction Term	薛叶青	马兆海	2023	Qualitative Theory of Dynamical Systems, 2023, 22(4): 122.	SCI	通讯	Q1
63.	Some New Results on Sum Index and Difference Index	张　媛	王海英	2023	AIMS Mathematics, 2023, 8(11): 26444-26458.	SCI	第一&通讯	Q1
64.	A facile and efficient nitrite electrochemical sensor based on N, O co-doped porous graphene film	袁晓明	吴秀文	2022	Microchemical Journal, 2022, 178, 107361	SCI	第一&通讯	Q1
65.	Novel FeNi-FeCo-C composite nanofibers: Highly efficient electrocatalysts for oxygen evolution from water splitting	马　骅	吴秀文	2022	Journal of Alloys and Compounds, 2022, 926, P166910, 0925-8388	SCI	第一&通讯	Q1

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66.	Preparation of highly efficient and stable CsPbBr3 perovskite solar cells based on an anti-solvent rinsing strategy	颜佳豪	董敬敬	2022	Solar Energy Materials and Solar Cells,2022,234,111420	SCI	第一&通讯	Q1
67.	Role of Halogen Doping on Ionic Diffusion in the Grain Boundary Structure of Cubic Na_3PS_4: Ab Initio Molecular Dynamic Study	何瑞彬	申 坤	2022	J. Phys. Chem. *C.*, 2022, *126* (25), 10593–10600	SCI	第一&通讯	Q2
68.	Distributed Edge-Enhanced Imaging With a Fractional Spiral Phase Filter Using Random Light	王花花	高 禄	2022	Frontiers in Physics, 2022,10	SCI	第一&通讯	Q2
69.	Nanofocusing performance of plasmonic probes based on gradient permittivity materials	王冬雪	高 华	2022	Journal of Optics，2022，24: 065003	SCI	第一&通讯	Q3
70.	Crystal growth and functional properties of rare mineral $Mn_3B_7O_{13}Cl$	郭杰森	孙瑞锦 赵长春	2022	JOURNAL OF CRYSTAL GROWTH, 2022, 581,126510	SCI	第一&通讯	Q3
71.	Dual interfacial modification to improve the performance of CsPbBr3 perovskite solar cells	李小燕	董敬敬	2022	Materials Science in Semiconductor Processing, 2022, 141: 106450	SCI	第一&通讯	Q2
72.	Efficient $CsPbBr_3$ Perovskite Solar Cells with Storage Stability > 340 Days	侯少川	董敬敬	2022	Energies, 2022, 15, 7740	SCI	第一&通讯	Q3
73.	Metal organic frameworks as platforms for the nanostructuring of Mn3 single molecule magnets	刘同欣	樊振军	2022	Journal of Solid State Chemistry, 2022, 305, 122697	SCI	第一&通讯	Q2
74.	Designing of Birnessite/Polyaniline Composite for Improving Cyclability as Cathode Material for Zinc Ion Batteries Based on Insights into the Reaction Mechanism	白小洁	刘 昊	2022	ChemistrySelect, 2022, 7(20): e20220096	SCI	第一&通讯	Q3

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75.	A facile and efficient nitrite electrochemical sensor based on N, O co-doped porous graphene film	袁晓明	吴秀文	2022	Microchemical Journal, 2022, 178, 107361	SCI	第一&通讯	J Q1
76.	半固态储能电池的研究进展	白小洁	刘昊	2022	无机盐工业, 2022,54(02):6-15	核心	第一&通讯	——
77.	n-GaN 上 Au/Zr 和 Au/Ti 金属电极的界面反应和金属间互扩散行为对比研究	张可欣	李庚伟	2022	材料导报, 2022, (21):1-14	EI	第一&通讯	——
78.	铝灰基聚合氯化铝处理选煤废水试验	李占兵	吴秀文	2022	洁净煤技术，2022，28（12）：143-148	核心	第一&通讯	——
79.	稀有矿物异极矿的人工合成研究进展	武岳彤	孟德忠 赵长春	2022	岩石矿物学杂志，2022，41(6):1187-1196	核心	第一&通讯	——
80.	Precise construction of lithiophilic sites by diyne-linked phthalocyanine polymer for suppressing metallic lithium dendrite	顾　宇	商　虹 孙　兵	2022	Dalton Transactions, 2022, 51(15), 5828-5833.	SCI	第一&通讯	Q1
81.	Graphene Quantum Dots Modified Upconversion Nanoparticles for Photodynamic Therapy	李玉婷	商　虹 吴　静	2022	International Journal Of Molecular Sciences.2022, 23(20).	SCI	第一&通讯	Q1
82.	CO2 capture by 1,2,3-triazole-based deep eutectic solvents: the unexpected role of hydrogen bonds	王宗华	杨德重	2022	Chemical Communications, 2022, 58(53): 7376- 7379.	SCI	第一&通讯	Q1
83.	SO2 capture by 2-pyridineethanol through the formation of a zwitterionic liquid	王宗华	杨德重	2022	Chemical Communications,2022,58(42):6212-6214	SCI	第一&通讯	Q1
84.	Leaching experiments and risk assessment to explore the migration and risk of potentially toxic elements in soil from black shale	蒋天宇	余　涛	2022	Science of The Total Environment. 2022, 844: 156922.	SCI	第一&通讯	Q1

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85.	Deep eutectic solvents composed of bio-phenol-derived superbase ionic liquids and ethylene glycol for CO2 capture	王　泽	杨德重	2022	Chemical Communications, 2022, 58(13): 2160-2163.	SCI	第一&通讯	Q1
86.	Analysis of phosphorus and sulfur effect on soil selenium bioavailability based on diffusive gradients in thin films technique and sequential extraction	叶文强	王英滨	2022	Chemosphere, 2022, 302, 134831.	SCI	第一&通讯	Q1
87.	Carbazolic conjugated organic polymers for visible-light-driven CO2 photoreduction with H2O to CO with high efficiency and selectivity	黄春霞	吴静	2022	ChemSusChem, 2022, 15(16): e202200759	SCI	第一	Q1
88.	Ultraweak chemiluminescence enhanced on the surface of lanthanide metal–organic framework nanosheets synthesized by ultrasonic wave	李矿军	吴　静 刘煊赫	2022	Applied Surface Science, 2022, 579: 0169-4332.	SCI	第一&通讯	Q1
89.	A readily synthesized bismuth oxyiodide/attapulgite for photodegradation of tetracycline under visible light irradiation	王　泽	杨德重	2022	CrystEngComm 2022, 24: 3064-3073.	SCI	第一&通讯	Q1
90.	Deep Temporal Iterative Clustering for Satellite Image Time Series Land Cover Analysis	郭闻麒	高世臣	2022	Remote Sensing, 2022, 14(15):3635.	SCI	第一&通讯	Q1
91.	Long-Term Effects of Fire Severity and Climatic Factors on Post-Forest-Fire Vegetation Recovery	郝　彬	许　栩	2022	Forests, 2022, 13(6): 883.	SCI	第一&通讯	Q1
92.	Positive solutions for a class of phi-Laplacian differential systems with multiple parameters	虞效竹	廉海荣	2022	Electronic Journal of Differential Equations	SCI	第一&通讯	Q3
93.	空气污染与疾病关系研究中广义相加模型3种分布比较	顾峥嵘	廉海荣	2022	中国公共卫生, 2022,38(09):1199-1202.	中文核心	通讯单位	——

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94.	A Study on Volatility Spillovers among International Stock Markets during the Russia-Ukraine Conflict	牟思旭	黄光东	2022	Discrete Dynamics in Nature and Society, 2022.	SCI	第一&通讯	Q3
95.	High-Performance Phototransistors Based on MnPSe3 and Its Hybrid Structures with Au Nanoparticles	韩　旭	邢　杰	2021	ACS Appl. Mater. Interfaces, 2021, 13, 2836−2844.	SCI	第一&通讯	Q1
96.	Preparation of highly efficient and stable $CsPbBr_3$ perovskite solar cells based on an anti-solvent rinsing strategy	颜佳豪	董敬敬	2021	Energy Materials and Solar Cells, 2021, 234: 111420-111428	SCI	第一&通讯	Q1
97.	Limitations of the transmitted photonic spin Hall efect through layered structure	苗　宠	高　华	2021	Scientific Reports, 2021, 11: 21083	SCI	第一&通讯	Q1
98.	Electronic structure and optical properties of SnO_2/$HC(NH2)_2PbI_3$ interfaces from first-principles calculations	张　志	田恩科	2021	Surfaces and Interfaces 2021, 23, 100913	SCI	第一&通讯	Q1
99.	Structural, electronic, and optical properties of two-dimensional hafnium monoxide nanosheets	邓新新	罗炳程 张自力	2021	Physica E Low-dimensional Systems and Nanostructures 2021, 130: 114690	SCI	第一	Q2
100.	Nanofocusing performance of plasmonic probes based on gradient permittivity materials	王冬雪	高　华	2021	Scientific Reports, 2021, 11(1): 21083	SCI	第一&通讯	Q3
101.	In situ polymerization of organic and inorganic phase change microcapsule and enhancement of infrared stealth via nano iron	柯伟东	吴秀文	2021	Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2021, 627, 127124	SCI	第一&通讯	Q2
102.	Electronic, structural and optical properties of cerium and zinc co-doped organic-inorganic halide perovskites for photovoltaic application	邓新新	罗炳程 张自力	2021	Physica B Condensed Matter, 2021, 603: 412703	SCI	第一	Q3

序号	论文名称	第一作者(研究生)	通讯作者	发表时间	发表刊物名称、年、卷及页码	收录类型	单位署名情况	JCR分区
103.	The effect of grain boundary on Na ion transport in polycrystalline solid-state electrolyte cubic Na3PS4	王一璇	李庚伟	2021	Materials Research Express, 2021,8,025508	SCI	第一&通讯	Q3
104.	Abnormal magnetic phenomenon at low temperature in Zn doped frameworks	刘荣肇	樊振军	2021	Acta Physica Sinica, 2021, 72(3): 030201	SCI	第一&通讯	Q4
105.	Improving the Efficiency and Stability of Organic-Inorganic Hybrid Perovskite Solar Cells by Absorption Layer Ion Doping	颜佳豪	董敬敬	2021	Acta Physica Sinica,2021,70,20,228-237	SCI	第一&通讯	Q4
106.	Crystal structure of tris(3-iodopyridin-1-ium)catena-poly[(hexachlorido-κ1 Cl)-(μ2-trichloridoκ2 Cl:Cl)diantimony(III)], $C_{15}H_{15}Cl_9I_3N_3Sb_2$	马宇欣	赵长春	2021	Z. Kristallogr. - N. Cryst. Struct. 2021; 236(5): 937–939	SCI	第一&通讯	JCR Q4
107.	Reconstruction of infrared digital holography based on compressed sensing[C]//Sixteenth National Conference on Laser Technology and Optoelectronics	冯　昊	张自力	2021	International Society for Optics and Photonics, 2021, 11907: 119072P	会议论文	第一&通讯	——
108.	Factors Influencing Ultrasonic Wave Propagation in Tourmaline	盖兴慧	赵长春 樊振军	2021	Journal of Physics: Conference Series, 2021,1739－8	EI	第一&通讯	——
109.	水系锌离子电池二氧化锰正极的储能特性及机理研究进展	张华旭	刘　昊	2021	精细化工, 2021, 38:21-26	EI	第一&通讯	——
110.	热光非定域螺旋相衬成像（特邀）	王花花	高　禄	2021	红外与激光工程, 2021, 50(9), 118-124	EI	第一&通讯	——
111.	二维 MXene 材料——Ti_3C_2T_x 在钠离子电池中的研究进展,	周　彬	刘　昊	2021	无机盐工业, 2021, 53: 21-26.	核心	第一&通讯	——
112.	热光关联成像系统相干时间	袁志丹	高　禄	2021	实验技术与管理 2021 38 (02): 28-81	核心	第一&通讯	——

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113.	A two-dimensional porous conjugated porphyrin polymer for uniform lithium deposition	李春花	商 虹	2021	Dalton Transactions, 2021, 50(43), 15849-15854.	SCI	第一&通讯	Q1
114.	The influence of hydrogen bond donors on the CO2 absorption mchanism by the bio-phenol-based deep eutectic solvents	王 泽	杨德重	2021	Molecules, 2021, 26(23):7167	SCI	第一&通讯	Q2
115.	Chemiluminescence enhanced by cerium-doped LaF3 nanoparticles through electron-hole annihilation	王嫣然	吴 静	2021	Journal of Luminescence, 2021, 239, 118407.	SCI	第一&通讯	Q2
116.	One-step hydrothermal synthesis of bimetallic oxides (NiO@Mn3O4) supported on rGO: A highly efficient electrode material for supercapacitors	何晞岩	成媛媛 戚洪彬	2021	Electrochimica Acta, 2021, 388, 138609	SCI	第一&通讯	Q1
117.	Ni foam-supported tin oxide nanowall array: An integrated supercapacitor anode	田 也	彭志坚	2021	Molecules, Aug 2021, 26(15): 4517.	SCI	第一&通讯	Q2
118.	Nanomaterials meet microfluidics: improved analytical methods and high-throughput synthetic approaches	陈天友	吴 静	2021	TrAC-Trends in Analytical Chemistry, 2021, 142, 116309.	SCI	第一&通讯	Q1
119.	Microfluidic methods for cell separation and subsequent analysis	陈天友	吴 静	2021	Chinese Chemical Letters, 2021, in press	SCI	第一&通讯	Q1
120.	Chemiluminescence enhanced by cerium-doped LaF3 nanoparticles through electron-hole annihilation	王嫣然	吴 静	2021	Journal of Luminescence, 2021, 239, 118407.	SCI	第一&通讯	Q2
121.	Ultraweak chemiluminescence enhanced on the surface of lanthanide metal-organic framework nanosheets synthesized by ultrasonic wave	黄春霞	吴 静 刘煊赫	2021	Applied Surface Science, 2021, in press	SCI	第一&通讯	Q1
122.	Co-Zn-MOFs Derived N-Doped Carbon Nanotubes with Crystalline Co Nanoparticles Embedded as	张文迪	刘煊赫	2021	Nanomaterials,2021,11(2), 261.	SCI	第一&通讯	Q1

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	Effective Oxygen Electrocatalysts							
123.	环境中氟的来源及健康风险评估研究进展	李凤嫣	余涛	2021	岩矿测试，2021，40（6），793-807	核心	第一&通讯	——
124.	基于DGT技术对土壤硒生物有效性及其影响因素的分析	蒋天宇	余涛	2021	现代地质, 2021, 35(3): 637-646.	核心	第一&通讯	——
125.	矿物材料去除水中抗生素的研究进展	李矿军	张秀丽	2021	工业水处理. 2021. 4(42): 30-38	核心	第一&通讯	——
126.	新型碳材料在锂电池中的性能研究进展	顾宇	商虹	2021	化工新型材料，2021，49，56	核心	第一&通讯	——
127.	微流控系统在生化分析领域的新应用	陈天友	吴　静	2021	分析试验室，2021，40（6）：621-637	核心	第一&通讯	——
128.	基于DGT技术对土壤硒生物有效性及其影响因素的分析	蒋天宇	余　涛	2021	现代地质, 2021, 35(3): 637-646.	核心	第一&通讯	——
129.	A New Algorithm and Its Application in Detecting Community of the Bipartite Complex Network	雷中怡	王海英	2021	Complexity, 2021, 2021: 1-10.	SCI	第一&通讯	Q2
130.	Variety Classification of Coated Maize Seeds Based on Raman Hyperspectral Imaging	刘青云	黄文倩	2021	Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 2022, 270: 120772.	SCI	第一作者	Q1
131.	Shear Wave Velocity Prediction of Carbonate Reservoirs Based on CatBoost	仲诚诚	耿凤杰	2021	ICAIBD, 2021, 622-626.	会议论文	第一&通讯	——
132.	Weighted Cross-Product Constraint Transformation to Optimize Spatial Structure of Data	王思晴	李明霞	2021	ICAIBD, 2021, 27-31.	会议论文	第一&通讯	——

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133.	Feature Extraction of Hyperspectral Image Structure Based on Spatial-Spectral Fusion	张舒涛	赵俊芳	2021	ICAIBD, 2021, 469-473.	会议论文	第一&通讯	——
134.	Remarkable improved photoelectric performance of SnS2 field-effect transistor with Au plasmonic nanostructures	韩 旭	邢 杰	2020	Nanotechnology, 2020, 31, 21	SCI	第一&通讯	Q2
135.	Comparisons of thermoluminescence signals between crystal and powder samples Radiation	印莉虹	王亚芳	2020	Radiation Measurements 2020 135：106380	SCI	第一&通讯	Q2
136.	Non-local edge enhanced imaging with incoherent thermal light	宋汉全	高 禄	2020	Applied Physics Letters, 2020,116(17): 174001	SCI	第一&通讯	Q2 榜刊
137.	Enhanced near-infrared persistent luminescence in $MgGa_2O_4$: Cr^{3+} through codoping	赵 莹	王亚芳	2020	J. Lumin., 2020, 220: 117035	SCI	第一&通讯	Q2
138.	Crystal structure of bis (octahydrocyclopenta[c] pyrrolium) pentachlorobismuthate(III),$(C_7NH_{14})_2BiCl_5$	马宇欣	赵长春	2020	Z. Kristallogr. NCS 2020; 235(6): 1461–1462	SCI	第一&通讯	Q4
139.	Enhanced near-ultraviolet and visible light absorption of organic-inorganic halide perovskites by co-doping with cesium and barium: insight from first-principles calculations	姚 远	田恩科	2020	Journal of Solid State Chemistry, 2020, 289: 121477.	SCI	第一&通讯	Q2
140.	The crystal structure of bis(2-hydroxypyrimidinium) pentachloridobismuthate	郝木难	赵长春	2020	New Crystal Structures, 235(4):885-886	SCI	第一&通讯	Q4
141.	Sensitive characterizations of natural dolomite by terahertz time-domain spectroscopy	郝思博	黄昊翀 郑志远	2020	Optics Communications, 2020, 456,124524	SCI	第一&通讯	Q3
142.	A well encapsulating stearic acid composite phase change material sealed by calcium carbonate	张金林	吴秀文	2020	Phase Transitions, 2020, 93(1): 100–115	SCI	第一&通讯	Q3

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143.	低功耗、高灵敏的 Bi_2O_2Se 光电导探测器	李丹阳	李庚伟	2020	Acta Physica Sinica, 2020, 69(24): 320-328	SCI	第一&通讯	Q4
144.	二维MXene材料—Ti3C2Tx在钠离子电池中的研究进展	周 彬	刘 昊	2020	无机盐工业,2021,53(08):21-26.DOI:10.19964/j.issn.1006-4990.2020-0450	核心	第一&通讯	——
145.	方解石三维热释光特性研究	印莉虹	王亚芳	2020	矿物学报,2021,41(3): 301-311	核心	第一&通讯	——
146.	Microwave dielectric properties of novel (1−x)MgTiO3–xCa0.5Sr0.5TiO3 ceramics[J]. Journal of Materials Science: Materials in Electronics	陈楚郢	彭志坚	2020	Journal of Materials Science: Materials in Electronics, 2020, 31(16): 13696-13703.	SCI	第一&通讯	Q2
147.	Effects of adding B2O3 on microwave dielectric properties of 0.9625MgTiO3-0.0375(Ca0.5Sr0.5)TiO3 composite ceramics	陈楚郢	彭志坚	2020	International Journal of Applied Ceramic Technology, 2020, 17(6): 2545-2552.	SCI	第一&通讯	Q2
148.	Novel self-supported MoS2/FeS2 nanocomposite as an excellent electrocatalyst for hydrogen evolution	陈 燕	彭志坚	2020	Solid State Sciences, 2020, 101：106156	SCI	第一&通讯	Q1
149.	Metal W connected Z-scheme C fibers@WO3-x core-shell composites with highly efficient solar-driven photocatalystic activity	陈 燕	彭志坚	2020	Ceramics International, 2020, 46(11): 18562-18572	SCI	第一&通讯	Q1
150.	Oxygen vacancies enhanced pseudocapacitive charge storage performance of WO3-x crystals	马 骅	彭志坚	2020	Materials International, 2020, 2, 0210-0218	SCI	第一&通讯	Q2
151.	Carbon cloth supported Co1-xNixWO4 nanostructures for high-performance electrochemical capacitor electrodes.	马 骅	彭志坚	2020	Journal of Alloys and Compounds, 2020, 845: 155654	SCI	第一&通讯	Q1

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152.	Deep Eutectic Solvents Consisting of 1-Ethyl-3-methylimidazolium Chloride and Biobased 2-Pyrrolidone for Reversible SO2 Capture	吕　萌	杨德重	2020	ChemistrySelect, 2020,5(24), 7142-7147	SCI	第一&通讯	Q3
153.	Ultra-weak Chemiluminescence Enhanced by Cerium-doped LaF3 Nanoparticles: A Potential Nitrite Analysis Method	王宇飞	吴　静	2020	Frontiers in Chemistry, 2020, 8, 639.	SCI	第一&通讯	Q2
154.	Electrochemically switchable electrochemiluminescent sensor constructed based on inorganic perovskite quantum dots synthesized with microwave irradiation	王宇飞	吴　静	2020	J. Electroanal. Chem., 2020, 867, 114181.	SCI	第一&通讯	Q1
155.	One-step ultrasonic synthesis of Co/Ni-catecholates for improved performance in oxygen reduction reaction	刘小明	刘煊赫	2020	Ultrasonics Sonochemistry, 2020, 67, 105179.	SCI	第一&通讯	Q1
156.	Thermoluminescence spectra of rare earth doped magnesium orthosilicate	赵　莹	王亚芳	2019	J. Alloy. Compd., 2019, 797: 1338-1347	SCI	第一&通讯	Q1
157.	The influence of germanium ions on the infrared long persistent phosphor Zn1+xAl2-2xGexO$_4$: Cr	席　蕾	王亚芳	2019	J. Alloy. Compd., 2019, 153094	SCI	第一&通讯	Q1
158.	Study on a new type of pyroelectric materials with structure of tourmaline.	陈凯仁	赵长春 申　坤	2019	Ceramics International ,2019, 45(8): 10684-10690	SCI	第一&通讯	Q1
159.	Insights into the water status in hydrous minerals using terahertz time-domain spectroscopy	马媛媛	黄昊翀 郑志远	2019	Scientific Reports, 2019, 9, 9265	SCI	第一&通讯	Q2
160.	CsBr interface modification to improve the performance of perovskite solar cells prepared in ambient air.	陈思璇	董敬敬	2019	Solar Energy Materials and Solar Cells, 2019, 201, 1101-1110	SCI	第一&通讯	Q1

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161.	Annealing effects on the electrical and photoelectric performance of SnS_2 field-effect transistor	许　宏	邢　杰	2019	Applied Surface Science, 2019, 484, 39-44	SCI	第一&通讯	Q1
162.	$SnSe_2$ field-effect transistor with high on/off ratio and polarity-switchable photoconductivity	许　宏	邢　杰	2019	Nanoscale Research Letters, 2019, 14,17	SCI	第一&通讯	Q1
163.	A Novel Inorganic Thermal Insulation Material Utilizing Perlite Tailings.	高　欢	刘昊	2019	Energy and Buildings , 2019, 190, 25-33	SCI	第一&通讯	Q1
164.	Investigation of copper sulfate pentahydrate dehydration by terahertz time-domain spectroscopy	马媛媛	黄昊翀 张自力	2019	Chinese Physics B, 2019, 6, 110-113	SCI	第一&通讯	Q3
165.	Zero Refractive Index Properties of Two-Dimensional Photonic Crystals with Dirac Conrs	魏果果	高　华	2019	Chinese Physics Letters, 2019, 36，034203	SCI	第一&通讯	Q3
166.	Enhanced photocatalytic activity of β-Ga2O3 nanowires by Au nanoparticles decoration	卢景浩	邢　杰	2019	Journal of Materials Science, 2019, 54，6530-6541	SCI	第一&通讯	Q2
167.	Characterizations of the Calamine tablets by terahertz time-domain spectroscopy	郝思博	黄昊翀 郑志远	2019	Optik, 2019, 187, 278-284	SCI	第一&通讯	Q2
168.	Terahertz lens fabricated by natural dolomite	郝思博	郑志远 张自力	2019	Chinese Physics Letters, 2019,36,124205	SCI	第一&通讯	Q2
169.	Improved thermoluminescence response of terbium doped magnesium orthosilicate by co-doping with sodium ions	晋海涛	王亚芳	2019	Optical Materials, 2019,98：109448:01-06	SCI	第一&通讯	Q2
170.	More superior pyroelectric performance of synthesized dravite by high-pressure solidstate method	单　优	赵长春	2019	AIP Advances, 2019, 9, 035304:1-7	SCI	第一&通讯	Q3
171.	Improved Performance of Planar Perovskite Solar Cells via Ethanol-Vapor Annealing Treatment	吴　坚	董敬敬	2019	OAM-RC, 2019, 13, 202-205	SCI	第一&通讯	Q4

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172.	n 型 GaN 过渡族难熔金属欧姆电极对比	何天立	李庚伟	2019	Acta Physica Sinica, 2019, 68(20): 206101	SCI	第一&通讯	Q4
173.	零折射率材料平板的透射特性研究	魏果果	高 华	2019	大学物理, 2019, (05):15-19	核心	第一&通讯	——
174.	High-performance inductive couplers based on novel Ce3+ and Co2+ ions co-doped Ni-Zn ferrites	杨 跑	戚洪彬	2019	Ceramics International, 2019, 45(11): 13685-13691.	SCI	第一&通讯	Q1
175.	Microstructure, magnetism and high-frequency performance of polycrystalline Ni0.5Zn0.5Sm0.025HoxFe1.975-xO4 ferrites	杨 跑	戚洪彬 彭志坚	2019	Journal of the American Ceramic Society, 2019, 102: 7469–7479.	SCI	第一&通讯	Q1
176.	Synthesis, microstruture and electromagnetic performance of NixZn1-xFe2O4 ferrites with different Ni/Zn ratios prepared by a novel molten salt method	杨 跑	彭志坚	2019	IOP Conference Series: Materials Science and Engineering, 2019, 678: 012141.	SCI	第一&通讯	Q1
177.	Design and fabrication of polyaniline/Bi2MoO6 nanocomposites for enhanced visible-light-driven photocatalysis	冯甜甜	孙 兵	2019	New J. Chem., 2019, 43, 9606-9613	SCI	第一&通讯	Q2
178.	The preparation of Fe doped triclinic-hexagonal phase heterojunction WO3 film and its enhanced photocatalytic reduction of Cr (VI)	冯明超	彭志坚	2019	MATERIALS RESEARCH BULLETIN，2019，109: 168-174	SCI	第一&通讯	Q2
179.	Improvement on the electrocapacitive properties of NiO with carbon	杨雅文	刘煊赫	2019	Chem. Lett.，2019, 48, 90-93.	SCI	第一&通讯	Q4

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Molecular Design of Perylene Diimide Derivatives for Photocatalysis

Zibin Li,[‖] Feng Liu,[‖] Yanrong Lu, Jiatong Hu, Jiajing Feng,[*] Hong Shang, Bing Sun,[*] and Wei Jiang[*]

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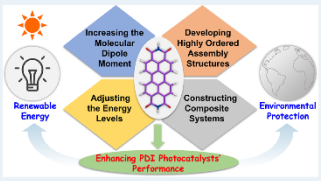
ABSTRACT: Perylene diimides (PDIs) and their derivatives represent a kind of most promising photocatalytic materials due to their strong visible light absorption, ease of functionalization, excellent thermal/photostability, as well as tunable electronic structures and energy levels. However, several challenges persist in the development of PDI photocatalysts, including low electron−hole separation efficiency, slow charge transfer, and rapid carrier recombination. In this perspective, we focus on enhancing the performance of PDI photocatalysts through a molecular design. We provide a comprehensive overview of various improvement strategies: (1) precise modulation of molecular dipole moments by altering the polarity of side chains to strengthen the built-in electric field, (2) utilization of steric hindrance and noncovalent interactions of side chains to construct nanoscale, highly ordered supramolecular nanostructures, (3) modification of the perylene core to adjust molecular energy levels and increase the number of active sites, (4) integration of PDI with various semiconductors or metals to form composite systems that enhance the interfacial built-in electric field or create extensive delocalized charge channels, and (5) selection of suitable linker groups to build polymer photocatalysts with large dipole moments. These strategies can facilitate the separation and migration of photogenerated carriers in PDI photocatalysts, eventually boosting their photocatalytic efficiency. The relationship between molecular structure and photocatalytic performance, particularly in the context of photocatalytic degradation and water splitting, is examined in detail. Finally, the future prospects and challenges of PDI photocatalysts are thoroughly discussed.



KEYWORDS: perylene diimides, molecular design, ordered supramolecular nanostructures, heterojunction, photocatalysis

1. INTRODUCTION

As the global economy undergoes rapid expansion, the energy demand is escalating incessantly. At the same time, the extensive utilization of nonrenewable fossil fuels and the environmental pollution stemming from the production of industrial products pose significant threats to human health. It is imperative to address the two pressing global issues of energy scarcity and environmental pollution. Semiconductor photocatalysis technology represents a cutting-edge approach that employs semiconductor materials as the medium and harnesses solar energy as the energy source, aiming to achieve the renewable energy sources, such as hydrogen and methanol, or the reduction of pollutants. Owing to its advantages of environmental sustainability, high efficiency, and cost-effectiveness, semiconductor photocatalysis technology has emerged as one of the most viable solutions to address energy and environmental problems.[1,2]

Semiconductor photocatalytic processes generally encompass photon absorption, separation of photogenerated charge carriers, migration of carriers to the catalysts' surface, and the subsequent redox reactions at active sites on the surface.[3] To elevate the photocatalytic performance of semiconductors, research should delve into avenues such as (i) harnessing molecular design or forming composite systems enables achieving full-spectrum absorption from ultraviolet to visible and the near-infrared region, thereby broadening the absorption spectrum, enhancing solar utilization efficiency, and improving overall energy performance;[4] (ii) augmenting the internal electric field of molecules or exploiting interfacial potential differences in composites can overcome high exciton binding energies, fostering the separation of photogenerated charge carriers;[5] (iii) crafting highly ordered structures or establishing extensive delocalized pathways facilitates carriers migration to the materials' surface, while the production of ultrathin nanomaterials shortens migration distances and the construction of heterojunctions minimizes carriers recombination, consequently enhancing carriers migration efficiency;[6] (iv) molecular structure modifications, composite construction, or metal doping can augment surface active sites,

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Nanofluidic Membrane-Assisted Organic Electrochemical Transistors for Bioinspired Gustatory Sensation Based on Selective Cation Transport

Yue Zhang, Yutian Ma, Lili Wang, Chunyan Li, Lijuan Wu, Chengcheng Zhong, Bing Sun,* Yupeng Chen,* and Lei Jiang*

Natural organisms have evolved precise sensing systems relying on unique ion channels, which can efficiently perceive various physical/chemical stimuli based on ionic signal transmission in biological fluid environments. However, it is still a huge challenge to achieve extensive applications of the artificial counterparts as an efficient wet sensing platform due to the fluidity of the working medium. Herein, nanofluidic membranes with selective cation transport properties and solid-state organic electrochemical transistors (OECTs) with amplified signals are integrated together to mimic human gustatory sensation, achieving ionic gustatory reagent recognition and a portable configuration. Cu-HHTP nanofluidic membranes with selective cation transport through their uniform micropores are constructed first, followed by assembly with OECTs to form the designed nanofluidic membrane-assisted OECTs (nanofluidic OECTs). As a result, they can distinguish typically ionic gustatory reagents, and even ionic liquids (ILs), demonstrating enhanced gustatory perception performance under a wide concentration range (10^{-7}–10^{-1} M) compared with those of conventional OECTs. The linear correlations between the response and the reagent concentration further indicate the promising potential for practical application as a next-generation sensing platform. It is suggested that nanofluidic membranes mediated intramembrane cation transport based on the steric hindrance effect, resulting in distinguishable and improved response to multiple ions.

1. Introduction

Biological ion channels play a significant role in their vital activities, involving not only basic uptake of ionic mineral elements but also high-level conversion of biological energy and rapid transmission of nerve signals.[1–5] Taking advantage of these specific ion channels responsive to various physical (temperature, pressure, and light) and chemical (molecules and ions) stimuli, biological organisms have developed precise sensing systems,[6–11] which work based on ionic signal transmission in biological fluid environments. The corresponding artificial counterparts are gradually attracting the attention of researchers to conquer issues such as high-energy consumption and adverse humidity interference of conventional sensing platforms.[12,13] Silica/poly(ethylene terephthalate) hybrid nanochannels,[14] MXene/cellulose nanofiber nanofluidic membranes, conical asymmetric nanochannels grafted with ferroporphyrin,[15] MXene/Cu-HHTP and WS_2/Cu-HHTP heterogeneous nanochannels[16,17] with selective ion transport were successfully

Y. Zhang, B. Sun
School of Science
China University of Geosciences
Beijing 100083, China
E-mail: sunbing@cugb.edu.cn

Y. Zhang, C. Li, L. Wu, C. Zhong, Y. Chen
CAS Key Laboratory for Biomedical Effects of Nanomaterials and Nanosafety
CAS Center for Excellence in Nanoscience
National Center for Nanoscience and Technology
Beijing 100190, China
E-mail: chenyupeng@nanoctr.cn

Y. Ma
Division of Pharmacoengineering and Molecular Pharmaceutics
Eshelman School of Pharmacy
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599, USA

L. Wang, L. Jiang
University of Science and Technology of China
Hefei 230026, China
E-mail: wanglily@ustc.edu.cn

L. Wang, L. Jiang
Suzhou Institute for Advanced Research
University of Science and Technology of China
Suzhou, Jiangsu 215123, China

Y. Chen
University of Chinese Academy of Sciences
Beijing 100049, China

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Article

Cascading CRISPR/Cas and Nanozyme for Enhanced Organic Photoelectrochemical Transistor Detection with Triple Signal Amplification

Lin Zhang, Lu Hou, Hui-Hui Cai, Bing Sun,* De-Man Han,* and Feng-Zao Chen*

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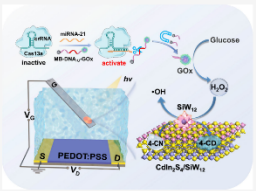
ABSTRACT: Innovative signal amplification and transduction play pivotal roles in bioanalysis. Herein, cascading CRISPR/Cas and the nanozyme are integrated with electronic amplification in an organic photoelectrochemical transistor (OPECT) to enable triple signal amplification, which is exemplified by the miRNA-triggered CRISPR/Cas13a system and polyoxometalate nanozyme for OPECT detection of miRNA-21. The CRISPR/Cas13a-enabled release of glucose oxidase could synergize with peroxidase-like SiW_{12} to induce catalytic precipitation on the photogate, inhibiting the interfacial mass transfer and thus the significant suppression of the channel current. The as-developed OPECT sensor demonstrates good sensitivity and selectivity for miRNA-21 detection, with a linear range from 1 fM to 10 nM and an ultralow detection limit of 0.53 fM. This study features the integration of bio- and nanoenzyme cascade and electronic triple signal amplification for OPECT detection.



INTRODUCTION

Developing bioassays with high sensitivity and accuracy by using signal amplification has long been pursued within the metrology community. To achieve this goal, extensive efforts have been dedicated to exploring diverse biological pathways, such as enzymatic catalysis and nucleic acid-based amplification technologies.[1−3] Photoelectrochemical (PEC) sensing is one of the state-of-the-art bioanalytical methods with excellent characteristics in terms of remote control and reduced background due to the different energy forms of input and out signals.[4−12] Despite its good analytical performance, achieving a higher sensitivity remains a key focus in PEC analysis. Organic electrochemical transistors (OECTs),[13−15] which utilize electrolyte ion implantation to modulate channel conductivity, have emerged as a cutting-edge technique in biosensing. Their inherent signal amplification, ease of operation, and biocompatibility make them highly suitable for multifunctional and diverse applications. However, the requirement for an additional gate voltage (V_G) in the OECT process poses challenges, as it is detrimental to vulnerable biomolecules and increases power consumption. Recently, organic photoelectrochemical transistor (OPECT) bioanalysis has been established through the integration of OECT and photoelectrochemical (PEC) bioanalysis.[16−18] In this technique, the regulated generation of photovoltage (V_P) was observed to modify the potential distribution across solid−liquid interfaces, consequently alternating the doping state of the polymeric channel and thus the device characteristics.[19−23] Due to the distinctive advantages of OECT and PEC bioanalysis, the nascent OPECT technology is promising for the development of innovative biosensors.[24−29]

Clustered regularly interspaced short palindromic repeats (CRISPR)/Cas system, a group of widespread adaptive immune systems, have garnered increasing interest in recent years.[30,31] Cas13a, as one of the key members of the Cas family, can be programmed with CRISPR RNAs (crRNAs) to nonspecifically *trans*-cleave nearby RNAs in the presence of its target RNA.[32] Such *trans*-cleavage activity, initiated by a single target nucleic acid, can cleave numerous nonspecific nucleic acid strands at physiological temperatures, resulting in substantial signal amplification. In the field of biosensing, compared to previous nucleic acid-based amplification strategies, the CRISPR/Cas system significantly simplifies operational procedures and enhances analytical performance, as demonstrated in many CRISPR/Cas-assisted biosensors.[33−35]

Nanozymes, a class of nanomaterials with enzyme-like characteristics, demonstrate unique advantages in terms of enhanced stability, tunable catalytic activity, facile surface modification, and inherent biocompatibility, enabling the development of advanced biosensing with improved perform-

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Analysis of phosphorus and sulfur effect on soil selenium bioavailability based on diffusive gradients in thin films technique and sequential extraction

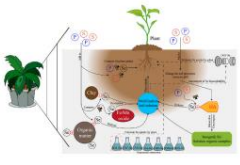
Tianyu Jiang [a], Tao Yu [a,c,*], Hongbin Qi [a], Fengyan Li [a], Zhongfang Yang [b]

[a] School of Science, China University of Geosciences, Beijing, 100083, China
[b] School of Earth Science and Resources, China University of Geosciences, Beijing, 100083, China
[c] Key Laboratory of Ecogeochemistry, Ministry of Natural Resources, Beijing, 100037, China

HIGHLIGHTS

- The application of S and P increased the Se content of pak choi.
- Se uptake of pak choi with the S and P were consistent with SOL-Se in the soil.
- The S and P application enhanced SOL-Se to affect the bioavailability of soil Se.
- HA-Se was one of the main sources of C_{DGT}-Se with exogenous S and P application.

GRAPHICAL ABSTRACT



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ABSTRACT

Human intake of selenium (Se) mainly occurs through the food chain, and is largely dependent on the bioavailability of soil Se. Sulfur (S) and phosphorus (P) also as essential nutrients for plants, their antagonistic with Se effects on Se bioavailability should be considered. We conducted pot experiments to investigate the interaction effect on the bioavailability of Se in the soil using a sequential extraction method and diffusive gradients in thin films (DGT). The results showed that the root and shoot Se of pak choi increased at most 340%–360% with S and P application, while the Se uptake by pak choi was slightly inhibited when S and P application was 100 mg kg^{-1}. With high S and P application, pak choi Se had a high bioaccumulation factor (BAF) and low translocation factor (TF), and soil Soluble-Se (SOL-Se) increased 178%–299%, which due to the competitive adsorption of S, P with Se and changes in soil pH that lead to the transformation of soil Se fractions. In addition, the available Se concentration in soil measured by the DGT (C_{DGT}-Se) increased by 866% with exogenous S and P application, and its source was HA-Se. However, C_{DGT}-Se failed to show a good linear relationship with the Se content of pak choi. The application of DGT to assess the bioavailability of Se in soils where Se is present in the steady state needs to be further explored. We discuss the effect of S and P application on the bioavailability of soil Se and provide evidence for agricultural production and rational fertilizer use on Se-rich land.

Abbreviations: Se, selenium; S, sulfur; P, phosphorus; DGT, diffusive gradients in thin films; BAF, bioaccumulation factor; TF, translocation factor; C_{DGT}-Se, The available Se concentration in soil measured by the DGT; SOL-Se, Soluble-Se; EXC-Se, Exchangeable-Se; CAR-Se, Carbonate-bound Se; HA-Se, Humic acid bound-Se; FMO-Se, Iron/manganese oxide-bound Se; SOM-Se, Strong Organic matter bound Se; RES-Se, Residual Se.

* Corresponding author. School of Science, China University of Geosciences, Beijing, 100083, PR China.
E-mail address: yutao@cugb.edu.cn (T. Yu).

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Article

Deep Temporal Iterative Clustering for Satellite Image Time Series Land Cover Analysis

Wenqi Guo [1,2], Weixiong Zhang [2], Zheng Zhang [2], Ping Tang [2] and Shichen Gao [1,*]

[1] School of Science, China University of Geosciences (Beijing), Beijing 100083, China; 2119210056@email.cugb.edu.cn
[2] Aerospace Information Research Institute (AIR), Chinese Academy of Sciences (CAS), Beijing 100094, China; zhangweixiong@aircas.ac.cn (W.Z.); zhangzheng@aircas.ac.cn (Z.Z.); tangping@aircas.ac.cn (P.T.)
* Correspondence: gsc2039@cugb.edu.cn

Abstract: The extensive amount of Satellite Image Time Series (SITS) data brings new opportunities and challenges for land cover analysis. Many supervised machine learning methods have been applied in SITS, but the labeled SITS samples are time- and effort-consuming to acquire. It is necessary to analyze SITS data with an unsupervised learning method. In this paper, we propose a new unsupervised learning method named Deep Temporal Iterative Clustering (DTIC) to deal with SITS data. The proposed method jointly learns a neural network's parameters and the resulting features' cluster assignments, which uses a standard clustering algorithm, K-means, to iteratively cluster the features produced by the feature extraction network and then uses the subsequent assignments as supervision to update the network's weights. We apply DTIC to the unsupervised training of neural networks on both SITS datasets. Experimental results demonstrate that DTIC outperforms the state-of-the-art K-means clustering algorithm, which proves that the proposed approach successfully provides a novel idea for unsupervised training of SITS data.

Keywords: satellite image time series; unsupervised training; neural network; cluster assignments

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1. Introduction

In recent years, the remote sensing field has seen rapid development [1,2], resulting in a flood of overhead high-resolution imagery from different remote sensing platforms [3–6]. Nowadays, modern earth observation programs generate massive amounts of satellite image time series (SITS) data that can be used to record geographical areas over time [7]. Although this huge volume of SITS data offers abundant new sources, it far exceeds the human capacity for analysis and requires highly automated techniques. Unlike a single-scene photograph, SITS preserves the evolution of land cover types, which is sometimes critical to making land cover types more identifiable [8,9]. How to effectively investigate SITS information is still an open issue in the remote sensing field.

Deep learning is extensively used in a broad range of domains and gains popularity in SITS land cover analysis [10–12]. It produces excellent results but is extremely reliant on the amount of available data, and more precisely labeled data. Remote sensing produces a large volume of data that is typically devoid of annotations. This situation is exacerbated by time series of satellite images. On the one hand, the land cover type of SITS data may change with time, especially for long time series [13], making the class label difficult to determine in some situations. On the other hand, SITS data now provide a better temporal resolution [14], allowing labeled training samples to simply keep up with the high frequency of data capture. Therefore, multiple clustering approaches are used in the SITS data to overcome the difficulties mentioned above.

There have been are numerous clustering techniques used to perform unsupervised classification on SITS data for different tasks [15–17]. Different clustering methods differ mainly in clustering features and similarity measures [18–20]. For example, the widely

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Long-Term Effects of Fire Severity and Climatic Factors on Post-Forest-Fire Vegetation Recovery

Bin Hao [1], Xu Xu [1,*], Fei Wu [1] and Lei Tan [2]

[1] School of Science, China University of Geosciences, Beijing 100083, China; bin09@cugb.edu.cn (B.H.); wufei@cugb.edu.cn (F.W.)
[2] Beijing Municipal Engineering Research Institute, Beijing 100037, China; tanlei@bjtu.edu.cn
* Correspondence: xuxu@cugb.edu.cn; Tel.: +86-152-1096-2335

Abstract: As a major disturbance to forest ecosystems, wildfires pose a serious threat to the ecological environment. Monitoring post-fire vegetation recovery is critical to quantifying the effects of wildfire on ecosystems and conducting forest resource management. Most previous studies have analyzed short-term (less than five years) post-fire recovery and limited the driving factors to temperature and precipitation. The lack of long-term and multi-faceted observational analyses has limited our understanding of the long-term effects of fire on vegetation recovery. This study utilized multi-source remote sensing data for a long time series analysis of post-fire vegetation recovery in China based on Google Earth Engine (GEE) cloud computing platform. Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI), Normalized Burn Ratio (NBR), and Normalized Difference Moisture Index (NDMI) were selected to quantify the low, moderate, and high severity of burned areas. Ridge Regression Model (RRM) was used to analyze the relationship between 15 driving factors and the vegetation regeneration process. The results show that it took at least 7–10 years for the vegetation index to recover to the pre-fire level after a forest fire. The recovery rate of high severity combustion areas was the fastest within the first two years. From the results of Ridge Regression, it came out that the overall fitting degree of the model with NDVI as the dependent variable was superior than that with EVI. The four variables of temperature, precipitation, soil temperature, and soil moisture were able to explain the change in more detail in vegetation indices. Our study enriches the research cases of global forest fires and vegetation recovery, provides a scientific basis for the sustainable development of forest ecosystems in China, and provides insight into environmental issues and resource management.

Keywords: forest fire; vegetation recovery; burn severity; ridge regression analysis; climatic factors

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1. Introduction

Fire is a natural disturbance that occurs every few years in many forest ecosystems [1]. The distributions and characteristics of forest fuels are changing due to global warming, which impacts the occurrence of forest fires [2–5]. Fire affects atmospheric chemistry, forest ecosystem succession, carbon cycling, forests degradation, and land-use change [6–10]. Forest fires have occurred frequently in recent years, such as the California forest fires in the United States in October 2003 [11,12], the Australian forest fires in February 2001 and March 2002 [13–15], and the forest fires that occurred in the northeastern forest areas of China in 1987, 1992, and 1996 [16–19], etc., which have seriously affected the social, economic, and ecological benefits of forest areas [20–23]. On the other hand, fire also increases the diversity of ecosystem species and promotes natural regeneration [19]. Forests are renewable resources with a long growth cycle [24]. After severe fires, forests are often replaced by sparse woodland or scrub. If repeatedly burned, forests may become barren grassland or even bare ground [25,26].

The theory of vegetation recovery trends after forest fires is one of the hot spots in studies of forest fires. As early as the 1930s, Russian scholars began to study the effects

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Calculation Method of Canopy Dynamic Meshing Division Volumes for Precision Pesticide Application in Orchards Based on LiDAR

Mengmeng Wang [1,2,†], Hanjie Dou [1,3,*], Hongyan Sun [2], Changyuan Zhai [1,3,*], Yanlong Zhang [1,3] and Feixiang Yuan [1,3]

[1] Intelligent Equipment Research Center, Beijing Academy of Agriculture and Forestry Sciences, Beijing 100097, China; w17865579729@163.com (M.W.)
[2] School of Science, China University of Geosciences, Beijing 100083, China; sun_hy@cugb.edu.cn
[3] Information Technology Research Center, Beijing Academy of Agriculture and Forestry Sciences, Beijing 100097, China
* Correspondence: douhj@nercita.org.cn (H.D.); zhaicy@nercita.org.cn (C.Z.); Tel.: +86-10-5150-3886 (C.Z.)
† These authors contributed equally to this work.

Abstract: The canopy volume of fruit trees is an important input for the precise and varying application of pesticides in orchards. The fixed mesh division method is mostly used to calculate canopy volumes with variable target-oriented spraying. To reduce the influence of the working speed on the detection accuracy under a fixed mesh width division, the cuboid accumulation of divided areas (CADAs), which is a light detection and ranging (LiDAR) online detection method for a fruit tree canopy volume based on dynamic mesh division, is proposed in this paper. In the method, the area is divided according to the number of unilateral nozzles of the sprayer in the canopy height direction of the fruit tree, and the mesh width is dynamically adjusted according to the change in the working speed in the moving direction of the sprayer. To verify the accuracy and applicability of the method, the simulation canopy and peach tree canopy detection experiments were carried out. The test results show that the CADA method can be used to calculate the contour and volume of the canopy. However, detection errors easily occur at the edge of the canopy, resulting in a detection error of 8.33% for the simulated canopy volume. The CADA method has a good detection accuracy under different moving speeds and fruit tree canopy sizes. At a speed of 1 m/s, the detection accuracy of the canopy volume reaches 99.18%. Compared with the existing canopy volume calculation methods based on the alpha-shape algorithm and canopy meshing-profile characterization (CMPC), the detection accuracy of the CADA method is 2.73% and 7.22% better, respectively. This method can not only reduce the influence of the moving speed on the detection accuracy of the canopy volume, but also improve the detection accuracy. Thus, this method can provide theoretical support for the research and development of target-oriented variable spraying control systems for orchards.

Keywords: canopy volume; dynamic meshing; LiDAR; orchard; variable spray

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1. Introduction

The prevention and control of orchard diseases mainly rely on chemical pesticides. The traditional spraying method is continuous spraying; however, this method creates pesticide waste and environmental pollution caused by excessive spraying [1]. An accurate target-oriented variable application technology for orchards is an effective way to solve the above problems. It detects the orchard target characteristic information (position, volume, leaf area density, etc.) online through a sensor system, calculates target drug demand, and regulates the variability of drug supply to achieve the on-demand application of pesticides according to target-oriented variables [2]. The detection of target feature information of fruit trees is a prerequisite for achieving precise and variable spraying. Target feature