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2023 年自然指数专辑

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上海交通大学 NI 论文学院贡献度——环境科学学科

2023 年 6 月 15 日，2023 自然指数年度榜单（Nature Index Annual Tables 2023）发布。

自然指数（Nature Index，NI）是《自然》出版集团 2014 年推出的一项科研评价指标，通过文章计量数（Count）和贡献份额（Share）两个指标数据，统计国家/地区、科研机构/大学等在全球顶级期刊高水平论文的产出能力、创新趋势、创新能力、优势学科和合作潜力。自然指数以 12 个月为统计时长，定期滚动更新，对被评价机构在 145 种顶级自然科学类期刊（2014 年 68 种，2018 年 82 种，2023 年增加至 145 种）上发表的研究型论文进行了统计分析，涵盖生物科学、化学、地球与环境科学、物理学、卫生科学五个学科。2023 自然指数年度榜单基于 2022 年 1 月 1 日-2022 年 12 月 31 日 NI 数据计算而成。

◤ 2023 自然指数年度榜单：全球国家/地区排名

中国在自然科学领域（物理、化学、生物科学、地球和环境科学）研究的贡献，首次超越美国位居榜首，紧随其后的国家分别为美国、德国、英国、日本等。与 2022 榜单相比，中国调整后份额增长了 21.4%，在年度榜单前十国家中增幅最大。详见表 1-1。

表 1-1 2023 自然指数全球 TOP20 国家/地区

排名	国家/地区	Share 2022	Share 2023	Count 2023	2022-2023 调整后份额增长率%
1	中国	16754.47	19373.33	23520	21.40
2	美国	19851.53	17610.49	25183	-6.90
3	德国	4845.05	4193.23	8386	-9.10
4	英国	3756.56	3258.38	7286	-8.90
5	日本	3185.01	2742.49	4565	-9.60
6	法国	2154.2	1966.55	4522	-4.20
7	韩国	1592.15	1481.21	2395	-2.30
8	加拿大	1596.96	1373.29	3136	-9.70
9	瑞士	1456.83	1290.61	3059	-7.00
10	印度	1226.76	1228.94	1849	5.20
11	澳大利亚	1297.89	1061.13	2695	-14.20
12	意大利	1177.41	1050.85	2754	-6.30
13	西班牙	1145.66	1034.87	2715	-5.20
14	荷兰	939.47	818.94	2223	-8.50
15	瑞典	688.13	640	1873	-2.40
16	以色列	673.05	587.26	1191	-8.40
17	新加坡	618.78	503.08	1202	-14.60
18	俄罗斯	553.08	435.59	1151	-17.30
19	中国台湾	418.03	393.52	908	-1.20
20	丹麦	436.95	388.43	1192	-6.70

自然科学涵盖的生物科学、化学、地球与环境科学、物理四个学科类别的国家/地区排行 TOP10 见图 1-1 至图 1-4，美国在生物科学领域均居于首位，中国在化学、地球与环境科学和物理学科领域均居于首位，特别在地球与环境科学领域，贡献份额大幅增长（74.8%），上升了三分之一。

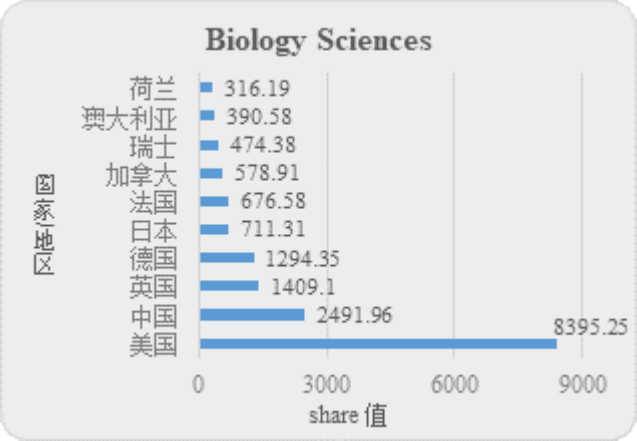

图 1-1 生物科学领域 TOP10 国家/地区

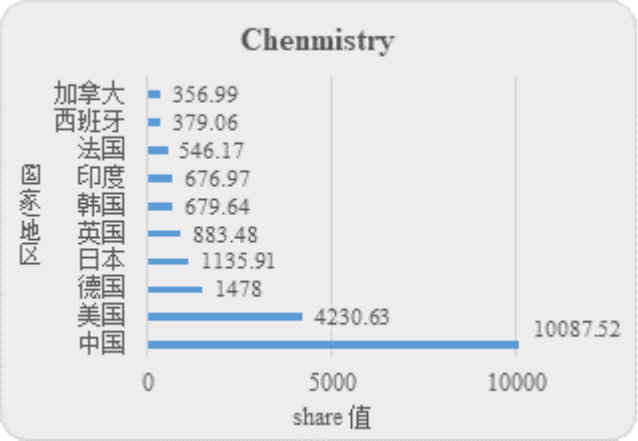

图 1-2 化学领域 TOP10 国家/地区

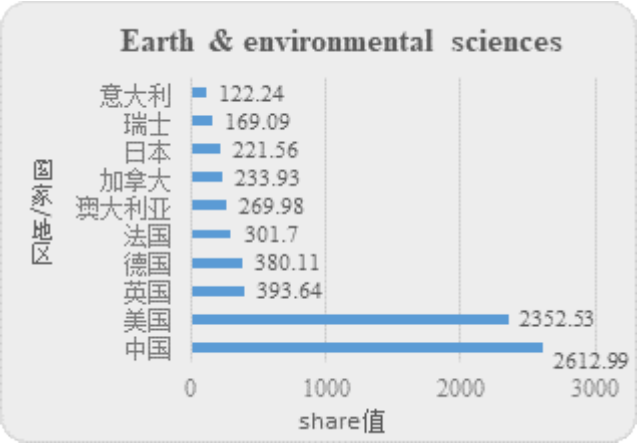

图 1-3 地球与环境科学领域 TOP10 国家/地区

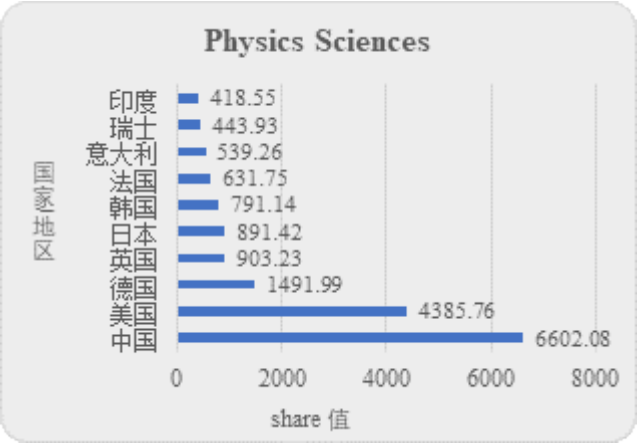

图 1-4 物理科学领域 TOP10 国家/地区

◤ 2023 自然指数年度榜单：全球研究机构/大学排名

2023 自然指数全球 TOP20 研究机构/大学中，中国占据了的半壁江山，十强中有六所来自中国：中国科学院、中国科学院大学、中国科学技术大学、南京大学、北京大学和清华大学，其他十强机构为哈佛大学、德国马普学会、法国国家科研中心和斯坦福大学。且中国的创新产出均处于上升趋势，份额增长最快的机构分别为：南京大学（第 7，25.5%）、中山大学（第 14，24.2%）、中国科技大学（第 6，19.3%）和上海交通大学（第 17，18.4%）。详见表 1-2。

表 1-2 2023 自然指数全球 TOP20 机构/大学

排名	科研机构/大学	国家/地区	Share 2023	Count 2023	2022-2023 调整后份额增长率%
1	中国科学院	中国	2053.76	6733	9.9
2	哈佛大学	美国	812.63	2404	-6.3
3	德国马普学会	德国	681.51	2459	-8.5
4	法国国家科研中心	法国	604.78	4020	-6
5	中国科学院大学	中国	585.65	2874	15.9
6	中国科技大学	中国	563.26	1609	19.3
7	南京大学	中国	554.81	1305	25.5
8	斯坦福大学	美国	549.76	1556	-4.8
9	北京大学	中国	525.33	1977	11.9
10	清华大学	中国	522.28	1550	16.1
11	德国亥姆霍兹国家研究中心	德国	491.07	2302	-8.8
12	麻省理工学院	美国	466.38	1791	-8.1
13	浙江大学	中国	451.71	1159	13.8
14	中山大学	中国	401.06	1032	24.2
15	剑桥大学	英国	396.41	1247	-0.1
16	复旦大学	中国	392.78	1101	12.4
17	上海交通大学	中国	384.72	1122	18.4
18	东京大学	日本	376.56	1093	-11.7
19	牛津大学	英国	360.47	1318	-16.7
20	瑞士苏黎世联邦理工学院	瑞士	347.41	951	-7.8

结合 2023 年自然指数年度榜和全球高校四大排行榜，选取清华大学、浙江大学、南京大学、中山大学和麻省理工学院、剑桥大学 6 所高校作为标杆单位，从排名、Count、Share、Count / Share、学科等角度，分析上海交通大学（以下简称“我校”）及对标高校近 5 年 NI 论文发展趋势。[1]

◤ 2023 自然指数年度榜单：国内对标高校排名显著提升

如图 2-1，近 5 年机构排名显示，除个别年份个别机构外，国内 5 所高校近五年排名几乎全部呈现逐年上升趋势。其中清华大学起点较高（13 位），除 2021 年相对较大幅度回落外，其余年份每年上升一个位次。南京大学排名稳步提升，2023 年国内排名居于榜首(全球第 7 位)。浙江大学、中山大学和上海交通大学近 5 年 NI 表现十分亮眼，至少提高 15 个位序，尤其是中山大学，5 年提升了 41 个位次，2023 年已超过我校排名；2019 年至 2023 年我校排名上升了 24 位，首次进入全球 Top20。与国内数据呈显著上升势头相反，麻省理工学院和剑桥大学近年则呈现小幅度下降的趋势，与 2019 年相比均下降了 6 位。

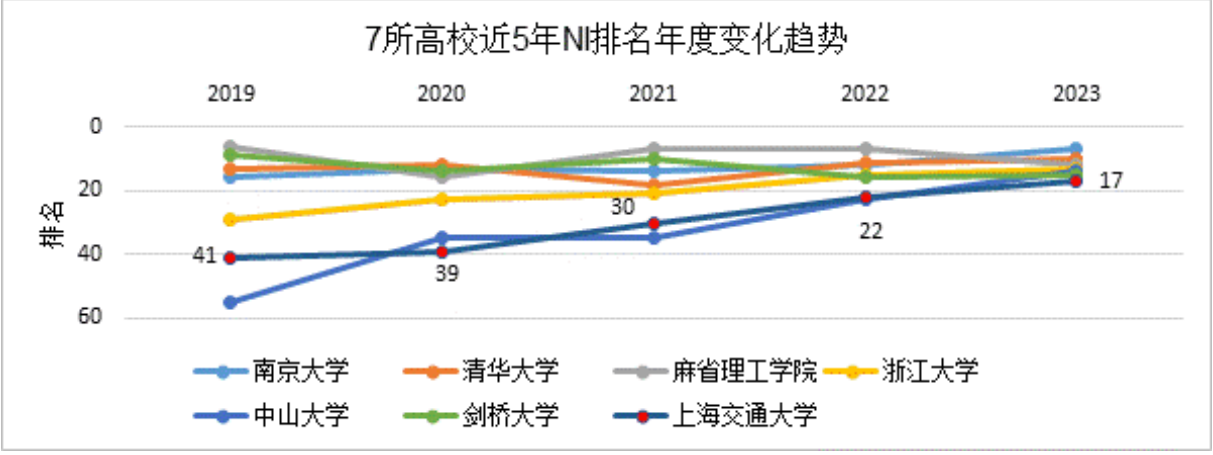

图 2-1 7 所高校近 5 年 NI 排名年度变化趋势

◤ 2023 自然指数年度榜单：国内对标高校 NI 发文数量呈强势增长势头

图 2-2 呈现了 7 所高校近 5 年 NI 发文数量年度变化趋势。国外高校 NI 发文数量呈现一定的萎缩之势，麻省理工学院年度论文数量虽始终居于对标高校榜首，但 2022 年发文数量较 2021 年减少 77 篇，降至近 5 年最低；剑桥大学 NI 发文量连续两年下滑，且下滑数量有所增加。国内高校近 3 年几乎都表现出了强势增长势头，每年以 70-200 篇的增速高速发展；与国内其他 4 所高校相比我校 NI 论文数量及年度发展趋势上看并不占有优势，2023 年仅高于中

[1] 为保持分析对象的一致性，2023 年排名及发文均选择 Nature Sciences，即原有的 82 种刊，卫生科学学科不包含在内。

山大学（90 篇），建议进一步促进基础研究，鼓励 NI 发文，谨防被反超。

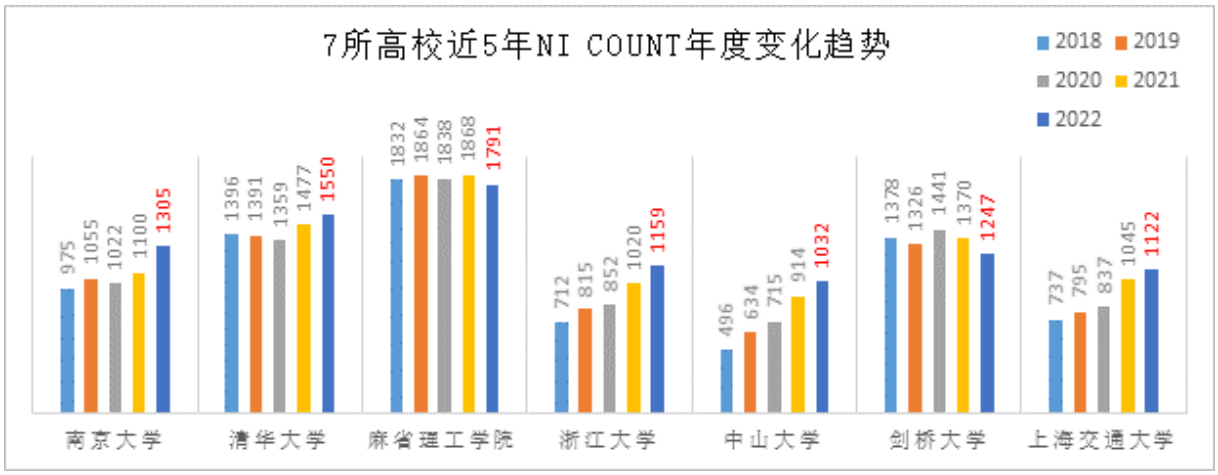

图 2-2 7 所高校近 5 年 NI Count 年度变化趋势

◤ 2023 自然指数年度榜单：对标高校 Count/Share 整体变化不大

表 2-1 展现了 7 所高校近 5 年 NI 发文的合作情况。在一定程度上，Count/Share 比值反映了研究的合作情况，比值越低，说明机构更倾向内部合作，作者贡献越大，机构的独立创新能力越强，且从 NI 排名角度讲，此值越低越有利。但 Count/Share 比值高侧面说明外部合作更多，而合作是高校实现跨越式发展的重要战略之一，因此需要辩证地看待合作模式指标 C（Count/Share）值[2]。

表 2-1 7 所高校近 5 年 Count/Share 年度变化趋势

高校	2019	2020	2021	2022	2023
南京大学	2.48	2.48	2.45	2.37	2.35
清华大学	3.50	3.25	3.45	3.13	2.97
麻省理工学院	3.20	3.32	3.50	3.50	3.84
浙江大学	2.45	2.47	2.49	2.45	2.57
中山大学	2.53	2.44	2.66	2.70	2.57
剑桥大学	3.07	3.16	3.15	3.29	3.15
上海交通大学	3.19	3.26	2.83	3.06	2.92

年度趋势上看，各高校 Count/Share 整体变化不大，只有南京大学、清华大学和中山大学似乎呈现出一点变化的趋势，其中南京大学和清华大学呈现了合作减少的趋势，麻省理工学院则呈合作加强的趋势。7 所高校中南京大学、浙江大学和中山大学 C 值显著低于其他高校，

[2] 基于合作模式指标 C=count/share 可以了解机构科研合作模式，反映出高校在某一确定评价周期内的合作情况与科研产出能力。

[2] 何斐,刘俊晓,徐学友等.基于自然指数的高校基础研究评估模型构建与应用[J].图书情报导刊,2022,7(09):67-77.

尤其是南京大学 2023 年该比值 2.35 稳居于 7 校最低值。我校 Count/Share 与清华大学相差不多，说明我校科学研究中开放合作程度较高[3]。

◤ 南京大学科研合作具有显著优势，我校国际合作研究的贡献度亟待提高

利用 NI 官网图表（图表基于 20220301-20230228 时间范围内的 NI 论文数据）对比我校与南京大学在科研合作方面的异同点。

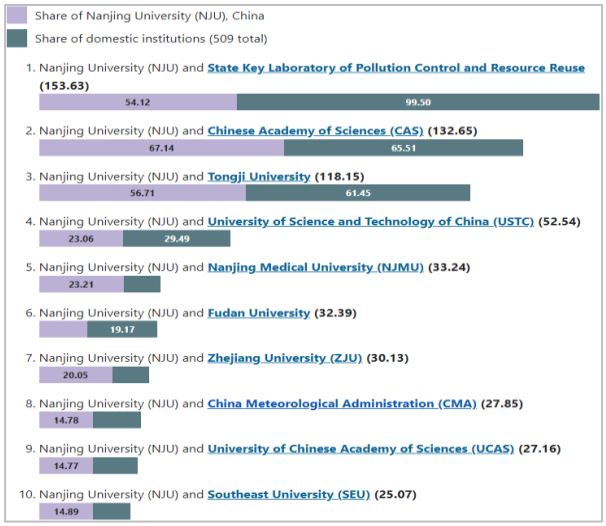

图 2-3 南京大学及其国内合作 Top10 机构 Share 分布情况

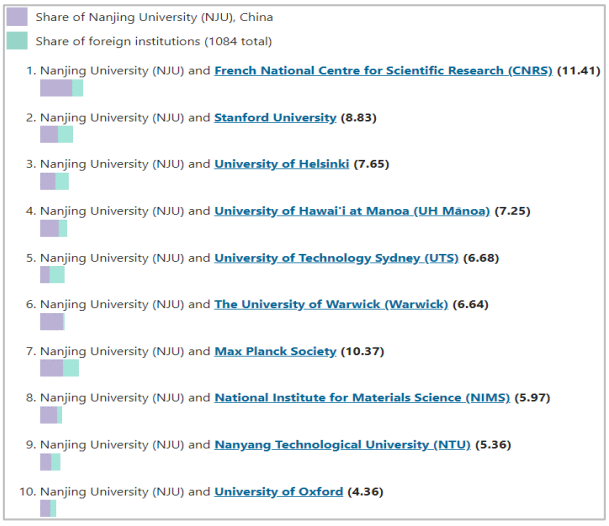

图 2-4 南京大学及其国际合作 Top10 机构 Share 分布情况

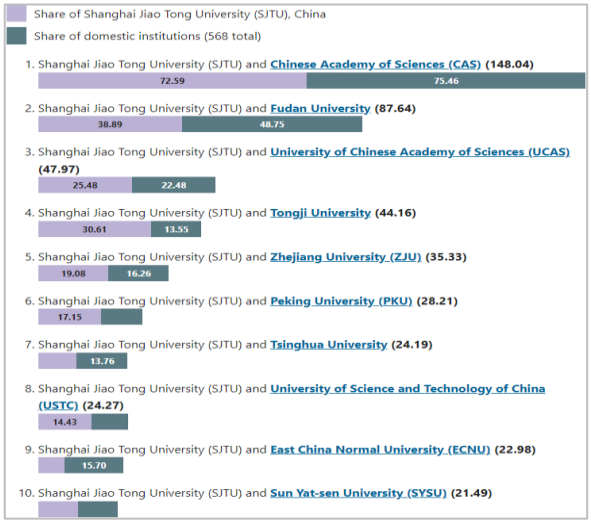

图 2-5 上海交通大学及其国内合作 Top10 机构 Share 分布情况

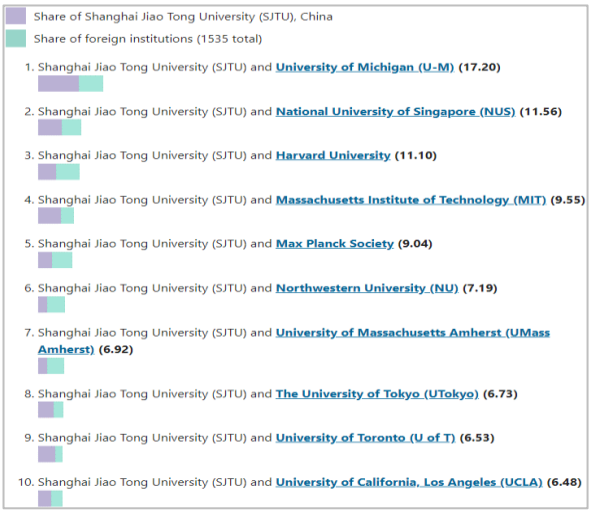

图 2-6 上海交通大学及其国际合作 Top10 机构 Share 分布情况

[3] C≦1.99，该机构独立完成度较高，其合作模式倾向于机构内部合作；若 1.99<C<5.86，该机构合作适中，其合作模式为内部合作与外部合作兼有；若 C≥5.86，该机构独立完成度较低，企合作模式倾向于外部合作。

国内合作方面，我校合作机构类型略显单一，且作者贡献度不占优势。我校合作 Share Top10 机构全部为科研机构，其中仅与中科院大学、同济大学、浙江大学、北京大学和中国科学技术大学 5 所高校合作中，作者贡献高于合作方。南京大学国内合作单位除了中科院、同济、复旦等科研机构外，也包含中国气象局和污染控制与资源化研究国家重点实验室两家重量级单位，因此在排行榜中的地球与环境学科具有显著优势。国际合作方面，合作 Share Top10 机构中，我校作者贡献度高于合作方的仅占 1/2，而南京大学此比例高达 90%。说明我校国际合作研究中的作者贡献度亟待提高。

上海交通大学入选 2023 自然指数的代表性期刊论文如下。

◤ Hydrophobic polyamide nanofilms provide rapid transport for crude oil separation

疏水性聚酰胺纳米薄膜为原油分离提供快速输送功能

作者：Li, Siyao; Dong, Ruijiao; Musteata, Valentina-Elena; et al.

归属学院：系统生物医学研究院

来源期刊：SCIENCE

内容要点：Hydrocarbon separation relies on energy-intensive distillation. Membrane technology can offer an energy-efficient alternative but requires selective differentiation of crude oil molecules with rapid liquid transport. We synthesized multiblock oligomer amines, which comprised a central amine segment with two hydrophobic oligomer blocks, and used them to fabricate hydrophobic polyamide nanofilms by interfacial polymerization from self-assembled vesicles. These polyamide nanofilms provide transport of hydrophobic liquids more than 100 times faster than that of conventional hydrophilic counterparts. In the fractionation of light crude oil, manipulation of the film thickness down to similar to 10 nanometers achieves permeance one order of magnitude higher than that of current state-of-the-art hydrophobic membranes while retaining comparable size- and class-based separation. This high permeance can markedly reduce plant footprint, which expands the potential for using membranes made of ultrathin nanofilms in crude oil fractionation.

全文链接：https://www.science.org/doi/10.1126/science.abq0598

◤ Living material assembly of bacteriogenic protocells

细菌原生细胞的活体材料组装

作者： Xu, Can; Martin, Nicolas; Li, Mei; Mann, Stephen.

归属学院：医学院

来源期刊：NATURE

内容要点：Advancing the spontaneous bottom-up construction of artificial cells with high organizational complexity and diverse functionality remains an unresolved issue at the interface between living and non-living matter(1-4). Here, to address this challenge, we developed a living

material assembly process based on the capture and on-site processing of spatially segregated bacterial colonies within individual coacervate microdroplets for the endogenous construction of membrane-bounded, molecularly crowded, and compositionally, structurally and morphologically complex synthetic cells. The bacteriogenic protocells inherit diverse biological components, exhibit multifunctional cytomimetic properties and can be endogenously remodelled to include a spatially partitioned DNA-histone nucleus-like condensate, membranized water vacuoles and a three-dimensional network of F-actin proto-cytoskeletal filaments. The ensemble is biochemically energized by ATP production derived from implanted live Escherichia coli cells to produce a cellular bionic system with amoeba-like external morphology and integrated life-like properties. Our results demonstrate a bacteriogenic strategy for the bottom-up construction of functional protoliving microdevices and provide opportunities for the fabrication of new synthetic cell modules and augmented living/synthetic cell constructs with potential applications in engineered synthetic biology and biotechnology.

全文链接：https://www.nature.com/articles/s41586-022-05223-w

◤ Instant diagnosis of gastroscopic biopsy via deep-learned single-shot femtosecond stimulated Raman histology

通过深度学习的单次飞秒刺激拉曼组织学实现胃镜活检的即时诊断

作者：Liu, Zhijie; Su, Wei; Ao, Jianpeng; et al.

归属学院：系统生物医学研究院

来源期刊：NATURE COMMUNICATIONS

内容要点：Gastroscopic biopsy provides the only effective method for gastric cancer diagnosis, but the gold standard histopathology is time-consuming and incompatible with gastroscopy. Conventional stimulated Raman scattering (SRS) microscopy has shown promise in label-free diagnosis on human tissues, yet it requires the tuning of picosecond lasers to achieve chemical specificity at the cost of time and complexity. Here, we demonstrate that single-shot femtosecond SRS (femto-SRS) reaches the maximum speed and sensitivity with preserved chemical resolution by integrating with U-Net. Fresh gastroscopic biopsy is imaged in <60 s, revealing essential

histoarchitectural hallmarks perfectly agreed with standard histopathology. Moreover, a diagnostic neural network (CNN) is constructed based on images from 279 patients that predicts gastric cancer with accuracy >96%. We further demonstrate semantic segmentation of intratumor heterogeneity and evaluation of resection margins of endoscopic submucosal dissection (ESD) tissues to simulate rapid and automated intraoperative diagnosis. Our method holds potential for synchronizing gastroscopy and histopathological diagnosis.

全文链接：https://www.nature.com/articles/s41467-022-31339-8

◤ High-Stretchability, Ultralow-Hysteresis ConductingPolymer Hydrogel Strain Sensors for Soft Machines

用于软机器的高拉伸性、超低滞后导电聚合物水凝胶应变传感器

作者：Shen, Zequn; Zhang, Zhilin; Zhang, Ningbin; et al.

归属学院：机械与动力工程学院

来源期刊：ADVANCED MATERIALS

内容要点：Highly stretchable strain sensors based on conducting polymer hydrogel are rapidly emerging as a promising candidate toward diverse wearable skins and sensing devices for soft machines. However, due to the intrinsic limitations of low stretchability and large hysteresis, existing strain sensors cannot fully exploit their potential when used in wearable or robotic systems. Here, a conducting polymer hydrogel strain sensor exhibiting both ultimate strain (300%) and negligible hysteresis (<1.5%) is presented. This is achieved through a unique microphase semiseparated network design by compositing poly(3,4-ethylenedioxythiophene):polystyrene sulfonate (PEDOT:PSS) nanofibers with poly(vinyl alcohol) (PVA) and facile fabrication by combining 3D printing and successive freeze-thawing. The overall superior performances of the strain sensor including stretchability, linearity, cyclic stability, and robustness against mechanical twisting and pressing are systematically characterized. The integration and application of such strain sensor with electronic skins are further demonstrated to measure various physiological signals, identify hand gestures, enable a soft gripper for objection recognition, and remote control of an industrial robot. This work may offer both promising conducting polymer hydrogels with enhanced sensing functionalities and

technical platforms toward stretchable electronic skins and intelligent robotic systems.

全文链接：https://onlinelibrary.wiley.com/doi/10.1002/adma.202203650

◤ Dynamics of Arterial Pulse for Wearable Continuous Blood Pressure Monitoring

用于可穿戴式连续血压监测的动脉脉搏压电动力学研究

作者：Yi, Zhiran; Liu, Zhaoxu; Li, Wenbo; et al.

归属学院：机械与动力工程学院、电子信息与电气工程学院

来源期刊：ADVANCED MATERIALS

内容要点：Piezoelectric arterial pulse wave dynamics are traditionally considered to be similar to those of typical blood pressure waves. However, achieving accurate continuous blood pressure wave monitoring based on arterial pulse waves remains challenging, because the correlation between piezoelectric pulse waves and their related blood pressure waves is unclear. To address this, the correlation between piezoelectric pulse waves and blood pressure waves is first elucidated via theoretical, simulation, and experimental analysis of these dynamics. Based on this correlation, the authors develop a wireless wearable continuous blood pressure monitoring system, with better portability than conventional systems that are based on the pulse wave velocity between multiple sensors. They explore the feasibility of achieving wearable continuous blood pressure monitoring without motion artifacts, using a single piezoelectric sensor. These findings eliminate the controversy over the arterial pulse wave piezoelectric response, and can potentially be used to develop a portable wearable continuous blood pressure monitoring device for the early prevention and daily control of hypertension.

全文链接：https://onlinelibrary.wiley.com/doi/10.1002/adma.202110291

◤ Theoretically Revealed and Experimentally Demonstrated Synergistic Electronic Interaction of CoFe Dual-Metal Sites on N-doped Carbon for Boosting Both Oxygen Reduction and Evolution Reactions

掺杂 N 的碳上 CoFe 双金属位的协同电子相互作用在促进氧还原和进化反应中的理论揭示和实验证明

作者：Zhou, Xuyan; Gao, Jiaojiao; Hu, Yixuan; et al.

归属学院：材料科学与工程学院

来源期刊：NANO LETTERS

内容要点：Heteronuclear double-atom catalysts, unlike singleatom catalysts, may change the charge density of active metal sites byintroducing another metal single atom, thereby modifying theadsorption energies of reaction intermediates and increasing thecatalytic activities. First, density functional theory calculations areused tofigure out the best combination by modeling two transition-metal atoms from Fe, Co, and Ni onto N-doped graphene. Generally,Fe and Co sites are highly active for the oxygen reduction reaction(ORR) and the oxygen evolution reaction (OER), respectively. Thecombination of Co and Fe to form CoFe-N-C not only furtherimproves the Fe's ORR and Co's OER activities but also greatlyenhances the Co site's ORR and Fe site's OER activities. Then, wesynthesize the CoFe-N-C by a two-step pyrolysis process andfindthat the CoFe-N-C exhibits exceptional ORR and OER electro-catalytic activities in alkaline media, significantly superior to Fe-N-C and Co-N-C and even commercial catalysts.

全文链接：https://pubs.acs.org/doi/10.1021/acs.nanolett.2c00658

◤ Aligned macrocycle pores in ultrathin films for accurate molecular sieving

用于精确分子筛分的超薄薄膜中排列整齐的大循环孔隙

作者：Jiang, Zhiwei; Dong, Ruijiao; Evans, Austin M.; et al.

归属学院：系统生物医学研究院

来源期刊：NATURE

内容要点：Polymer membranes are widely used in separation processes including desalination(1), organic solvent nanofiltration(2,3) and crude oil fractionation(4,5). Nevertheless, direct evidence of subnanometre pores and a feasible method of manipulating their size is still challenging because of the molecular fluctuations of poorly defined voids in polymers(6). Macrocycles with intrinsic cavities could potentially tackle this challenge. However, unfunctionalized

macrocycles with indistinguishable reactivities tend towards disordered packing in films hundreds of nanometres thick(7-9), hindering cavity interconnection and formation of through-pores. Here, we synthesized selectively functionalized macrocycles with differentiated reactivities that preferentially aligned to create well-defined pores across an ultrathin nanofilm. The ordered structure was enhanced by reducing the nanofilm thickness down to several nanometres. This orientated architecture enabled direct visualization of subnanometre macrocycle pores in the nanofilm surfaces, with the size tailored to angstrom precision by varying the macrocycle identity. Aligned macrocycle membranes provided twice the methanol permeance and higher selectivity compared to disordered counterparts. Used in high-value separations, exemplified here by enriching cannabidiol oil, they achieved one order of magnitude faster ethanol transport and threefold higher enrichment than commercial state-of-the-art membranes. This approach offers a feasible strategy for creating subnanometre channels in polymer membranes, and demonstrates their potential for accurate molecular separations.

全文链接：https://www.nature.com/articles/s41586-022-05032-1

◤ Clustering and halogen effects enabled red/near-infrared room temperature phosphorescence from aliphatic cyclic imides

聚类和卤素效应使脂肪族环状酰亚胺发出红色/近红外室温磷光

作者：Zhu, Tianwen; Yang, Tianjia; Zhang, Qiang; Yuan, Wang Zhang.

归属学院：化学化工学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Pure organic room temperature phosphorescence (RTP) materials become increasingly important but achieving red and near-infrared (NIR) RTP remains challenging. Here, the authors demonstrate that succinimide derived cyclic imides can emit RTP in the red and NIR spectral range with outstanding efficiencies of up to 9.2%.Pure organic room temperature phosphorescence (RTP) materials become increasingly important in advanced optoelectronic and bioelectronic applications. Current phosphors based on small aromatic molecules show emission characteristics generally limited to short wavelengths. It remains an enormous challenge to achieve red and near-infrared (NIR) RTP, particularly for those from nonaromatics. Here we demonstrate that succinimide

derived cyclic imides can emit RTP in the red (665, 690 nm) and NIR (745 nm) spectral range with high efficiencies of up to 9.2%. Despite their rather limited molecular conjugations, their unique emission stems from the presence of the imide unit and heavy atoms, effective molecular clustering, and the electron delocalization of halogens. We further demonstrate that the presence of heavy atoms like halogen or chalcogen atoms in these systems is important to facilitate intersystem crossing as well as to extend through-space conjugation and to enable rigidified conformations. This universal strategy paves the way to the design of nonconventional luminophores with long wavelength emission and for emerging applications.

全文链接：https://www.nature.com/articles/s41467-022-30368-7

◤ Hydrogen spillover in complex oxide multifunctional sites improves acidic hydrogen evolution electrocatalysis

复杂氧化物多功能位点中的氢溢出改善了酸性氢进化电催化性能

作者：Dai, Jie; Zhu, Yinlong; Chen, Yu; et al.

归属学院：电子信息与电气工程学院

来源期刊：NATURE COMMUNICATIONS

内容要点：While renewable H-2 production offers a promising route for clean energy production, there is an urgent need to improve catalyst performances. Here, authors design a Pt-containing complex oxide that utilizes atomic-scale hydrogen spillover to promote H-2 evolution electrocatalysis in acidic media.Improving the catalytic efficiency of platinum for the hydrogen evolution reaction is valuable for water splitting technologies. Hydrogen spillover has emerged as a new strategy in designing binary-component Pt/support electrocatalysts. However, such binary catalysts often suffer from a long reaction pathway, undesirable interfacial barrier, and complicated synthetic processes. Here we report a single-phase complex oxide La2Sr2PtO7+delta as a high-performance hydrogen evolution electrocatalyst in acidic media utilizing an atomic-scale hydrogen spillover effect between multifunctional catalytic sites. With insights from comprehensive experiments and theoretical calculations, the overall hydrogen evolution pathway proceeds along three steps: fast proton adsorption on O site, facile hydrogen migration from O site to Pt site via

thermoneutral La-Pt bridge site serving as the mediator, and favorable H-2 desorption on Pt site. Benefiting from this catalytic process, the resulting La2Sr2PtO7+delta exhibits a low overpotential of 13 mV at 10 mA cm(-2), a small Tafel slope of 22 mV dec(-1), an enhanced intrinsic activity, and a greater durability than commercial Pt black catalyst.

全文链接：https://www.nature.com/articles/s41467-022-28843-2

◤ Single-junction organic solar cells with over 19% efficiency enabled by a refined double-fibril network morphology

通过改进双纤维网络形态实现效率超过 19%的单结有机太阳能电池

作者：Zhu, Lei; Zhang, Ming; Xu, Jinqiu; et al.

归属学院：材料科学与工程学院、化学化工学院

来源期刊：NATURE MATERIALS

内容要点：In organic photovoltaics, morphological control of donor and acceptor domains on the nanoscale is the key for enabling efficient exciton diffusion and dissociation, carrier transport and suppression of recombination losses. To realize this, here, we demonstrated a double-fibril network based on a ternary donor-acceptor morphology with multi-length scales constructed by combining ancillary conjugated polymer crystallizers and a non-fullerene acceptor filament assembly. Using this approach, we achieved an average power conversion efficiency of 19.3% (certified 19.2%). The success lies in the good match between the photoelectric parameters and the morphological characteristic lengths, which utilizes the excitons and free charges efficiently. This strategy leads to an enhanced exciton diffusion length and a reduced recombination rate, hence minimizing photon-to-electron losses in the ternary devices as compared to their binary counterparts. The double-fibril network morphology strategy minimizes losses and maximizes the power output, offering the possibility of 20% power conversion efficiencies in single-junction organic photovoltaics.The morphology of donor-acceptor blends in organic photovoltaics dictates the efficiency of the exciton dissociation and charge diffusion, and thus the final device performance. Here, the authors show that filament assembly helps to maximize the output, further enabling a power conversion efficiency greater than 19%.

全文链接：https://www.nature.com/articles/s41563-022-01244-y

◤ Spectroscopy signatures of electron correlations in a trilayer graphene/hBN moire superlattice

三层石墨烯/hBN 摩尔超晶格中电子关联的光谱学特征

作者：Yang, Jixiang; Chen, Guorui; Han, Tianyi; et al.

归属学院：物理与天文学院

来源期刊：SCIENCE

内容要点：ABC-stacked trilayer graphene/hexagonal boron nitride moire superlattice (TLG/hBN) has emerged as a playground for correlated electron physics. We report spectroscopy measurements of dual-gated TLG/hBN using Fourier transform infrared photocurrent spectroscopy. We observed a strong optical transition between moire minibands that narrows continuously as a bandgap is opened by gating, indicating a reduction of the single-particle bandwidth. At half-filling of the valence flat band, a broad absorption peak emerges at similar to 18 milli-electron volts, indicating direct optical excitation across an emerging Mott gap. Similar photocurrent spectra are observed in two other correlated insulating states at quarter- and half-filling of the first conduction band. Our findings provide key parameters of the Hubbard model for the understanding of electron correlation in TLG/hBN.

全文链接：https://www.science.org/doi/10.1126/science.abg3036

◤ Tracking the sliding of grain boundaries at the atomic scale

在原子尺度上跟踪晶界滑动

作者：Wang, Lihua; Zhang, Yin; Zeng, Zhi; et al.

归属学院：材料科学与工程学院

来源期刊：SCIENCE

内容要点：Grain boundaries (GBs) play an important role in the mechanical behavior of polycrystalline materials. Despite decades of investigation, the atomic-scale dynamic processes of GB deformation remain elusive, particularly for the GBs in polycrystals, which are commonly of the

asymmetric and general type. We conducted an in situ atomic-resolution study to reveal how sliding-dominant deformation is accomplished at general tilt GBs in platinum bicrystals. We observed either direct atomic-scale sliding along the GB or sliding with atom transfer across the boundary plane. The latter sliding process was mediated by movements of disconnections that enabled the transport of GB atoms, leading to a previously unrecognized mode of coupled GB sliding and atomic plane transfer. These results enable an atomic-scale understanding of how general GBs slide in polycrystalline materials.

全文链接：https://www.science.org/doi/10.1126/science.abm2612

◤ Redox-Active Metaphosphate-Like Terminals Enable High-Capacity MXene Anodes for Ultrafast Na-Ion Storage

具有氧化还原活性的类偏磷酸盐终端可实现高容量 MXene 阳极的超快 Na-离子存储

作者：Sun, Boya; Lu, Qiongqiong; Chen, Kaixuan; et al.

归属学院：材料科学与工程学院

来源期刊：ADVANCED MATERIALS

内容要点：2D transition metal carbides and/or nitrides, so-called MXenes, are noted as ideal fast-charging cation-intercalation electrode materials, which nevertheless suffer from limited specific capacities. Herein, it is reported that constructing redox-active phosphorus-oxygen terminals can be an attractive strategy for Nb4C3 MXenes to remarkably boost their specific capacities for ultrafast Na+ storage. As revealed, redox-active terminals with a stoichiometric formula of PO2- display a metaphosphate-like configuration with each P atom sustaining three P-O bonds and one P(sic)O dangling bond. Compared with conventional O-terminals, metaphosphate-like terminals empower Nb4C3 (denoted PO2-Nb4C3) with considerably enriched carrier density (fourfold), improved conductivity (12.3-fold at 300 K), additional redox-active sites, boosted Nb redox depth, nondeclined Na+-diffusion capability, and buffered internal stress during Na+ intercalation/de-intercalation. Consequently, compared with O-terminated Nb4C3, PO2-Nb4C3 exhibits a doubled Na+-storage capacity (221.0 mAh g(-1)), well-retained fast-charging capability (4.9 min at 80% capacity retention),

significantly promoted cycle life (nondegraded capacity over 2000 cycles), and justified feasibility for assembling energy-power-balanced Na-ion capacitors. This study unveils that the molecular-level design of MXene terminals provides opportunities for developing simultaneously high-capacity and fast-charging electrodes, alleviating the energy-power tradeoff typical for energy-storage devices.

全文链接：https://onlinelibrary.wiley.com/doi/10.1002/adma.202108682

◤ Prussian Blue Nanozyme as a Pyroptosis Inhibitor Alleviates Neurodegeneration

普鲁士蓝纳米酶作为一种热渗透抑制剂可缓解神经退行性病变

作者：Ma, Xinxin; Hao, Junnian; Wu, Jianrong; et al.

归属学院：医学院

来源期刊：ADVANCED MATERIALS

内容要点：Current pharmacological interventions for Parkinson's disease (PD) remain unsatisfactory in clinical settings. Inflammasome-mediated pyroptosis represents a potential therapeutic target for the alleviation of neurodegenerative diseases. The development of inflammasome-mediated pyroptosis agonists or antagonists may transform the treatment of neurodegenerative diseases. However, the identification of specific compounds that inhibit pyroptosis remains challenging. Herein, Prussian blue nanozyme (PBzyme) is revealed as a pyroptosis inhibitor to alleviate the neurodegeneration in mouse and cell models of PD. PBzyme protects the microglia and neurons against 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP). PBzyme alleviates motor deficits, attenuates the damage of mitochondrial membrane potential, and rescues dopaminergic neurons. Furthermore, intra-cerebroventricular injection of PBzyme reduces dopaminergic degeneration and inhibits neuroinflammation in an MPTP-induced PD mouse model. Both in vitro and in vivo results demonstrate that PBzyme reduces the activation of microglial nucleotide-binding domain and leucine-rich repeat family pyrin domain containing 3 (NLRP3) inflammasomes and caspase-1 by scavenging reactive oxygen species, thereby downregulating gasdermin D (GSDMD) cleavage as well as inflammatory factor production, and eventually leading to the inhibition of microglia pyroptosis. Overall, this work highlights the neuroprotective effects of

PBzyme as a pyroptosis inhibitor and provides valuable mechanistic insights and a potential therapeutic strategy for the treatment of PD.

全文链接：https://onlinelibrary.wiley.com/doi/10.1002/adma.202106723

◤ Free-standing homochiral 2D monolayers by exfoliation of molecular crystals

通过分子晶体剥离获得独立的同手性二维单层膜

作者：Dong, Jinqiao; Liu, Lingmei; Tan, Chunxia; et al.

归属学院：材料科学与工程学院、化学化工学院

来源期刊：NATURE

内容要点：Two-dimensional materials with monolayer thickness and extreme aspect ratios are sought for their high surface areas and unusual physicochemical properties(1). Liquid exfoliation is a straightforward and scalable means of accessing such materials(2), but has been restricted to sheets maintained by strong covalent, coordination or ionic interactions(3-10). The exfoliation of molecular crystals, in which repeat units are held together by weak non-covalent bonding, could generate a greatly expanded range of two-dimensional crystalline materials with diverse surfaces and structural features. However, at first sight, these weak forces would seem incapable of supporting such intrinsically fragile morphologies. Against this expectation, we show here that crystals composed of discrete supramolecular coordination complexes can be exfoliated by sonication to give free-standing monolayers approximately 2.3 nanometres thick with aspect ratios up to approximately 2,500:1, sustained purely by apolar intermolecular interactions. These nanosheets are characterized by atomic force microscopy and high-resolution transmission electron microscopy, confirming their crystallinity. The monolayers possess complex chiral surfaces derived partly from individual supramolecular coordination complex components but also from interactions with neighbours. In this respect, they represent a distinct type of material in which molecular components are all equally exposed to their environment, as if in solution, yet with properties arising from cooperation between molecules, because of crystallinity. This unusual nature is reflected in the molecular recognition properties of the materials, which bind carbohydrates with strongly enhanced enantiodiscrimination relative to individual molecules or bulk three-dimensional crystals.

全文链接：https://www.nature.com/articles/s41586-022-04407-8

◤ Highly efficient and salt rejecting solar evaporation via a wick-free confined water layer

通过无灯芯封闭水层实现高效和拒盐太阳能蒸发

作者：Zhang, Lenan; Li, Xiangyu; Zhong, Yang; et al.

归属学院：机械与动力工程学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Recent advances in thermally localized solar evaporation hold significant promise for vapor generation, seawater desalination, wastewater treatment, and medical sterilization. However, salt accumulation is one of the key bottlenecks for reliable adoption. Here, we demonstrate highly efficient (>80% solar-to-vapor conversion efficiency) and salt rejecting (20 weight % salinity) solar evaporation by engineering the fluidic flow in a wick-free confined water layer. With mechanistic modeling and experimental characterization of salt transport, we show that natural convection can be triggered in the confined water. More notably, there exists a regime enabling simultaneous thermal localization and salt rejection, i.e., natural convection significantly accelerates salt rejection while inducing negligible additional heat loss. Furthermore, we show the broad applicability by integrating this confined water layer with a recently developed contactless solar evaporator and report an improved efficiency. This work elucidates the fundamentals of salt transport and offers a low-cost strategy for high-performance solar evaporation.Solar evaporation is promising for sustainable freshwater production but typically limited by salt accumulation. Here, by manipulating natural convection, authors develop a wick-free confined water layer that enables highly efficient and salt rejecting solar evaporation.

全文链接：https://www.nature.com/articles/s41467-022-28457-8

◤ Manipulating the oxygen reduction reaction pathway on Pt-coordinated motifs

操纵铂配位基团上的氧还原反应途径

作者：Zhao, Jiajun; Fu, Cehuang; Ye, Ke; et al.

归属学院：机械与动力工程学院、材料科学与工程学院、化学化工学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Controlling O-2 reduction pathways can help optimize catalytic activity and product selectivity. Here the authors report facile manipulation of 2e(-) /4e(-) pathways on Pt-coordinated motifs by varying the Pt site density or the coordination environment.Electrochemical oxygen reduction could proceed via either 4e(-)-pathway toward maximum chemical-to-electric energy conversion or 2e(-)-pathway toward onsite H2O2 production. Bulk Pt catalysts are known as the best monometallic materials catalyzing O-2-to-H2O conversion, however, controversies on the reduction product selectivity are noted for atomic dispersed Pt catalysts. Here, we prepare a series of carbon supported Pt single atom catalyst with varied neighboring dopants and Pt site densities to investigate the local coordination environment effect on branching oxygen reduction pathway. Manipulation of 2e(-) or 4e(-) reduction pathways is demonstrated through modification of the Pt coordination environment from Pt-C to Pt-N-C and Pt-S-C, giving rise to a controlled H2O2 selectivity from 23.3% to 81.4% and a turnover frequency ratio of H2O2/H2O from 0.30 to 2.67 at 0.4 V versus reversible hydrogen electrode. Energetic analysis suggests both 2e(-) and 4e(-) pathways share a common intermediate of *OOH, Pt-C motif favors its dissociative reduction while Pt-S and Pt-N motifs prefer its direct protonation into H2O2. By taking the Pt-N-C catalyst as a stereotype, we further demonstrate that the maximum H2O2 selectivity can be manipulated from 70 to 20% with increasing Pt site density, providing hints for regulating the stepwise oxygen reduction in different application scenarios.

全文链接：https://www.nature.com/articles/s41467-022-28346-0

◤ Single-cell multi-omics reveals dyssynchrony of the innate and adaptive immune system in progressive COVID-19

单细胞多组学揭示进展性 COVID-19 先天性和适应性免疫系统的不同步性

作者：Unterman, Avraham; Sumida, Tomokazu S.; Nouri, Nima; et al.

归属学院：生命科学技术学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Dysregulated immune responses against the SARS-CoV-2 virus are instrumental in severe COVID-19. However, the immune signatures associated with immunopathology are poorly understood. Here we use multi-omics single-cell analysis to probe the dynamic immune responses in hospitalized patients with stable or progressive course of COVID-19, explore V(D)J repertoires, and assess the cellular effects of tocilizumab. Coordinated profiling of gene expression and cell lineage protein markers shows that S100A(hi)/HLA-DRlo classical monocytes and activated LAG-3(hi) T cells are hallmarks of progressive disease and highlights the abnormal MHC-II/LAG-3 interaction on myeloid and T cells, respectively. We also find skewed T cell receptor repertories in expanded effector CD8(+) clones, unmutated IGHG(+) B cell clones, and mutated B cell clones with stable somatic hypermutation frequency over time. In conclusion, our in-depth immune profiling reveals dyssynchrony of the innate and adaptive immune interaction in progressive COVID-19.SARS-CoV-2 infection can lead to progressive pathology in patients with COVID-19, but information for this disease progression is sparse. Here the authors use multi-omics approach to profile the immune responses of patients, assessing immune repertoire and effects of tocilizumab treatments, to find a dyssynchrony between innate and adaptive immunity in progressive COVID-19.

全文链接：https://www.nature.com/articles/s41467-021-27716-4

◤ Gut microbiota promotes cholesterol gallstone formation by modulating bile acid composition and biliary cholesterol secretion

肠道微生物群通过调节胆汁酸组成和胆汁胆固醇分泌促进胆固醇胆石的形成

作者：Hu, Hai; Shao, Wentao; Liu, Qian; et al.

归属学院：电子信息与电气工程学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Cholesterol gallstone disease is a worldwide common disease. Cholesterol supersaturation in gallbladder bile is the prerequisite for its pathogenesis, while the mechanism is not completely understood. In this study, we find enrichment of gut microbiota (especially Desulfovibrionales) in patients with gallstone disease. Fecal transplantation of gut microbiota from gallstone patients to gallstone-resistant strain of mice can induce gallstone formation. Carrying

Desulfovibrionales is associated with enhanced cecal secondary bile acids production and increase of bile acid hydrophobicity facilitating intestinal cholesterol absorption. Meanwhile, the metabolic product of Desulfovibrionales, H2S increase and is shown to induce hepatic FXR and inhibit CYP7A1 expression. Mice carrying Desulfovibrionales present induction of hepatic expression of cholesterol transporters Abcg5/g8 to promote biliary secretion of cholesterol as well. Our study demonstrates the role of gut microbiota, Desulfovibrionales, as an environmental regulator contributing to gallstone formation through its influence on bile acid and cholesterol metabolism.Metabolic conditions associated with alterations of the gut microbiome, such as obesity and diabetes, predispose to gallstone disease. Here the authors demonstrate that the gut microbiome, in particular the genus Desulfovibrionale, contribute to gallstone formation in mice.

全文链接：https://www.nature.com/articles/s41467-021-27758-8

◤ Engineering immunomodulatory and osteoinductive implant surfaces via mussel adhesion-mediated ion coordination and molecular clicking

通过贻贝粘附介导的离子协调和分子点击工程化免疫调节和骨诱导植入物表面

作者：Wang, Tao; Bai, Jiaxiang; Lu, Min; et al.

归属学院：医学院

来源期刊：NATURE COMMUNICATIONS

内容要点：Immune response and new tissue formation are important aspects of tissue repair. However, only a single aspect is generally considered in previous biomedical interventions, and the synergistic effect is unclear. Here, a dual-effect coating with immobilized immunomodulatory metal ions (e.g., Zn2+) and osteoinductive growth factors (e.g., BMP-2 peptide) is designed via mussel adhesion-mediated ion coordination and molecular clicking strategy. Compared to the bare TiO2 group, Zn2+ can increase M2 macrophage recruitment by up to 92.5% in vivo and upregulate the expression of M2 cytokine IL-10 by 84.5%; while the dual-effect of Zn2+ and BMP-2 peptide can increase M2 macrophages recruitment by up to 124.7% in vivo and upregulate the expression of M2 cytokine IL-10 by 171%. These benefits eventually significantly enhance bone-implant mechanical

fixation (203.3 N) and new bone ingrowth (82.1%) compared to the bare TiO2 (98.6 N and 45.1%, respectively). Taken together, the dual-effect coating can be utilized to synergistically modulate the osteoimmune microenvironment at the bone-implant interface, enhancing bone regeneration for successful implantation.

全文链接：https://www.nature.com/articles/s41467-021-27816-1

针对上海交通大学（以下简称“我校”）入选 2023 自然指数的 1057 篇期刊论文（2022 年度发表），根据 NI 官网公布的 Count、Share 统计方法计算我校各二级单位对 NI 发文数量及 Share 积分的贡献情况，共有 35 个二级单位为此作出贡献。

◤ 上海交通大学 NI 论文学院贡献度——物理学科

2022 年我校在物理学科发表 NI 论文 488 篇，Share 总积分 165.66，分别占学校全部 NI 论文产出和 Share 总和的 46.17%和 42.98%，是我校 NI 论文产出的主要学科。

表 4-1 物理学科二级机构贡献度情况

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
物理与天文学院	38.75	193	23.39%	39.55%	4.98
医学院	29.46	91	17.78%	18.65%	3.09
材料科学与工程学院	25.27	64	15.25%	13.11%	2.53
电子信息与电气工程学院	16.09	51	9.71%	10.45%	3.17
化学化工学院	12.06	44	7.28%	9.02%	3.65
机械与动力工程学院	9.26	26	5.59%	5.33%	2.81
李政道研究所	6.81	89	4.11%	18.24%	13.07
生物医学工程学院	6.64	13	4.01%	2.66%	1.96
上海交大密西根学院	5.41	14	3.26%	2.87%	2.59
自然科学研究院	1.89	9	1.14%	1.84%	4.76
IFSA	1.84	5	1.11%	1.02%	2.72
环境科学与工程学院	1.50	5	0.91%	1.02%	3.33
船舶海洋与建筑工程学院	1.32	5	0.80%	1.02%	3.79
数学科学学院	1.22	4	0.74%	0.82%	3.28
中英国际低碳学院	1.18	3	0.71%	0.61%	2.54
航空航天学院	1.11	10	0.67%	2.05%	9.01
药学院	1.06	6	0.64%	1.23%	5.66
转化医学研究院	0.89	8	0.54%	1.64%	8.99
生命科学技术学院	0.85	5	0.51%	1.02%	5.88
分析测试中心	0.51	5	0.31%	1.02%	9.80
系统生物医学研究院	0.49	2	0.29%	0.41%	4.08
张江高等研究院	0.41	6	0.25%	1.23%	14.63
致远学院	0.37	4	0.22%	0.82%	10.81
农业与生物学院	0.33	1	0.20%	0.20%	3.03
变革性分子前沿科学中心	0.31	2	0.19%	0.41%	6.45
海洋学院	0.30	1	0.18%	0.20%	3.33
四川研究院	0.11	3	0.07%	0.61%	27.27
跨学科研究中心	0.11	1	0.07%	0.20%	9.09
安泰经济与管理学院	0.07	1	0.04%	0.20%	14.29
巴黎卓越工程师学院	0.06	4	0.03%	0.82%	66.67

如表 4-1 所示，校内共有 30 个二级机构有物理学科 NI 发文。从发文数量上看，物理与天文学院（193 篇）、医学院（91 篇）和李政道研究所（89 篇）发文量居于前三，材料科学与工程学院和电子信息与电气工程学院领域内发文超过 50 篇。从 Share 贡献上看，物理与天文学院虽然仍处于第一位，但 Share 占比仅为 23.39%，远低于发文量占比（39.55%）；这种反差在李政道研究所表现更为明显，全校物理学科发文总量 18.24%的论文，产生的 Share 值仅占全校物理学科的 4.41%，分析原因，李政道研究所和物理与天文学院很多研究基于大型研究团队，根据 Share 计算规则，作者数量越多，每位学者产生的 Share 积分越少，甚至可能为 0。医学院和材料科学与工程学院 Share 贡献占比分别为 17.78%、15.25%，位于全校第二、三位。从合作程度来看，发文量大于 10 篇的 10 个机构中，生物医学工程学院独立完成能力最强，C=1.96，其次是材料科学与工程学院和密西根学院（2.53 和 2.59）；合作程度最高的是李政道研究所（13.07），其次是航空航天学院（9.01），独立完成度低，主要以外部合作做为主。

◤ 上海交通大学 NI 论文学院贡献度——化学学科

2022 年我校在化学学科发表 NI 论文 384 篇，涉及校内 27 个二级单位，由表 4-2 可知，我校化学学科 NI 论文的 1/3 由化学化工学院贡献，发文量 128 篇，占该学科全校 NI 发文的 33.33%，Share 值 48.89，占全校该学科 NI Share 总和的 29.68%。医学院和材料科学与工程学院发文量分别为 111 篇和 63 篇，Share 得分分别为 31.10 和 24.45，占全校该学科 NI Share 总和的 18.88%和 14.84%，因此我校化学学科 Share 总和的近 1/2 来自于化学化工学院、医学院和材料科学与工程学院 3 个学院。合作模式指标来看，环境科学与工程学院、生物医学工程学院和药学院独立科研能力位居前三甲。

表 4-2 化学学科二级机构贡献度情况

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
化学化工学院	48.89	128	29.68%	33.33%	2.62
医学院	31.10	111	18.88%	28.91%	3.57
材料科学与工程学院	24.45	63	14.84%	16.41%	2.58
电子信息与电气工程学院	11.25	33	6.83%	8.59%	2.93
药学院	7.09	15	4.31%	3.91%	2.12
生物医学工程学院	6.68	12	4.06%	3.13%	1.80
生命科学技术学院	6.57	17	3.99%	4.43%	2.59
机械与动力工程学院	6.13	17	3.72%	4.43%	2.77
环境科学与工程学院	5.34	9	3.24%	2.34%	1.69

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
转化医学研究院	4.26	19	2.59%	4.95%	4.46
物理与天文学院	4.07	18	2.47%	4.69%	4.42
上海交大密西根学院	2.07	9	1.26%	2.34%	4.35
系统生物医学研究院	1.10	3	0.67%	0.78%	2.73
Bio-X 研究院	1.01	4	0.61%	1.04%	3.96
分析测试中心	0.89	3	0.54%	0.78%	3.37
张江高等研究院	0.78	4	0.48%	1.04%	5.13
自然科学研究院	0.68	4	0.41%	1.04%	5.88
IFSA	0.50	2	0.31%	0.52%	4.00
变革性分子前沿科学中心	0.41	3	0.25%	0.78%	7.32
李政道研究所	0.39	6	0.24%	1.56%	15.38
农业与生物学院	0.22	1	0.13%	0.26%	4.55
中英国际低碳学院	0.18	2	0.11%	0.52%	11.11
海洋学院	0.17	1	0.10%	0.26%	5.88
智慧能源创新学院	0.16	2	0.09%	0.52%	12.50
致远学院	0.14	1	0.09%	0.26%	7.14
船舶海洋与建筑工程学院	0.10	1	0.06%	0.26%	10.00
安泰经济与管理学院	0.07	1	0.04%	0.26%	14.29

◤ 上海交通大学 NI 论文学院贡献度——生物科学学科

2022 年生物科学学科我校发表 NI 论文 293 篇，涉及校内 23 个二级单位，如表 4-3 所示。生物科学学科，我校 NI 发文及 Share 值均呈现高度集中的特点，医学院发文 228 篇，占我校该学科 NI 发文总量的 77.82%，Share 值为 67.89，占我校该学科 Share 总积分的 73.74%；校本部机构中，生命科学技术学院在该领域发文量及 Share 贡献值最高。合作模式指标方面，只有药学院、化学化工学院和生物医学工程学院 3 个机构低于该学科全校平均值。

表 4-3 生物科学学科二级机构贡献度情况

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
医学院	67.89	228	73.74%	77.82%	3.36
生命科学技术学院	6.21	30	6.74%	10.24%	4.83
化学化工学院	3.84	10	4.18%	3.41%	2.60
Bio-X 研究院	2.85	13	3.10%	4.44%	4.56
生物医学工程学院	2.71	8	2.95%	2.73%	2.95
药学院	1.68	4	1.83%	1.37%	2.38
农业与生物学院	1.32	5	1.43%	1.71%	3.79
自然科学研究院	0.92	4	0.99%	1.37%	4.35
系统生物医学研究院	0.73	5	0.79%	1.71%	6.85
物理与天文学院	0.68	3	0.74%	1.02%	4.41

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
机械与动力工程学院	0.63	4	0.68%	1.37%	6.35
材料科学与工程学院	0.57	3	0.62%	1.02%	5.26
电子信息与电气工程学院	0.37	5	0.40%	1.71%	13.51
张江高等研究院	0.35	4	0.38%	1.37%	11.43
IFSA	0.31	1	0.33%	0.34%	3.23
致远学院	0.31	2	0.33%	0.68%	6.45
转化医学研究院	0.22	3	0.24%	1.02%	13.64
上海交大密西根学院	0.13	1	0.14%	0.34%	7.69
分析测试中心	0.08	1	0.09%	0.34%	12.50
海洋学院	0.08	1	0.09%	0.34%	12.50
数学科学学院	0.08	1	0.09%	0.34%	12.50
安泰经济与管理学院	0.07	1	0.07%	0.34%	14.29
李政道研究所	0.06	1	0.06%	0.34%	16.67

◤ 上海交通大学 NI 论文学院贡献度——环境科学学科

2022 年地球与环境科学学科我校发表 NI 论文 91 篇，涉及校内 21 个二级单位，如表 4-4 所示，从发文数量上看，环境科学与工程学院（34 篇）和海洋学院（28 篇）占据绝对优势，发文占比分别为 37.36%和 30.77%，该领域内医学院有 10 篇发文；从 Share 贡献方面看，环境科学与工程学院 Share 值为 16.68，占我校环境学科 Share 总值的 50.38%，而海洋学院虽然发文量与环境科学与工程学院仅相差 6 篇，但积累的 Share 却不足环境科学与工程学院的 1/4。

表 4-4 环境科学学科二级机构贡献度情况

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
环境科学与工程学院	16.68	34	50.38%	37.36%	2.04
海洋学院	3.96	28	11.95%	30.77%	7.07
医学院	3.19	10	9.65%	10.99%	3.13
化学化工学院	2.07	7	6.25%	7.69%	3.38
机械与动力工程学院	1.20	3	3.62%	3.30%	2.50
国际与公共事务学院	1.08	2	3.27%	2.20%	1.85
电子信息与电气工程学院	1.08	4	3.26%	4.40%	3.70
船舶海洋与建筑工程学院	0.75	2	2.27%	2.20%	2.67
物理与天文学院	0.74	3	2.23%	3.30%	4.05
生物医学工程学院	0.72	1	2.17%	1.10%	1.39
中英国际低碳学院	0.40	5	1.19%	5.49%	12.50
IFSA	0.31	1	0.93%	1.10%	3.23
上海交大密西根学院	0.26	2	0.77%	2.20%	7.69
张江高等研究院	0.25	1	0.76%	1.10%	4.00
分析测试中心	0.13	1	0.39%	1.10%	7.69

二级单位	Share (分)	Count (篇)	Share 占比	Count 占比	Count/Share
重庆研究院	0.07	1	0.22%	1.10%	14.29
安泰经济与管理学院	0.07	1	0.20%	1.10%	14.29
李政道研究所	0.06	1	0.18%	1.10%	16.67
自然科学研究院	0.05	1	0.15%	1.10%	20.00
中国城市治理研究院	0.04	1	0.13%	1.10%	25.00
生命科学技术学院	0.02	1	0.05%	1.10%	50.00

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