



学汇百川 德济四海

科研绘图经验分享

姓名：刘翔宇

导师：潘新祥教授 徐敏义教授

2022年4月1日



「01」 论文图片绘制

「02」 汇报PPT绘制

「03」 总结与心得



如何选择合适的字体

1.选用sans serif (无衬线) 字体

- 首选：Arial , Helvetica , 微软雅黑
- Adobe : Myriad
- Apple : San Francisco

2.字号要小

- 5pt — 7pt

3.尽量不添加颜色

4.尽量不加斜体

5.数量-单位/运算符之间加空格

- $10\mu W \rightarrow 10 \mu W$

AaBbCc Sans-serif font
AaBbCc Serif font
AaBbCc Serif font (red serifs)

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Final submission

This guide provides information on preparing production-quality figures and text files. The instructions apply only if your manuscript has been accepted in principle for publication and an editor has asked you to upload production-quality material.

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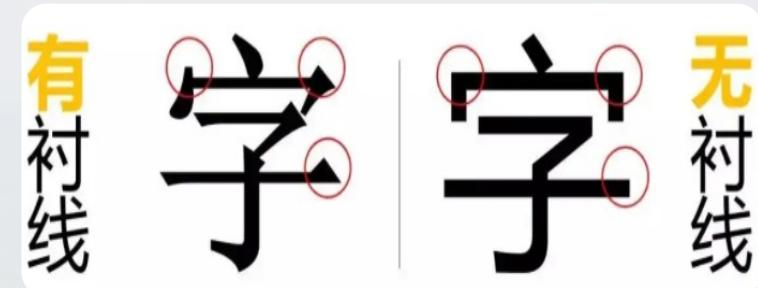
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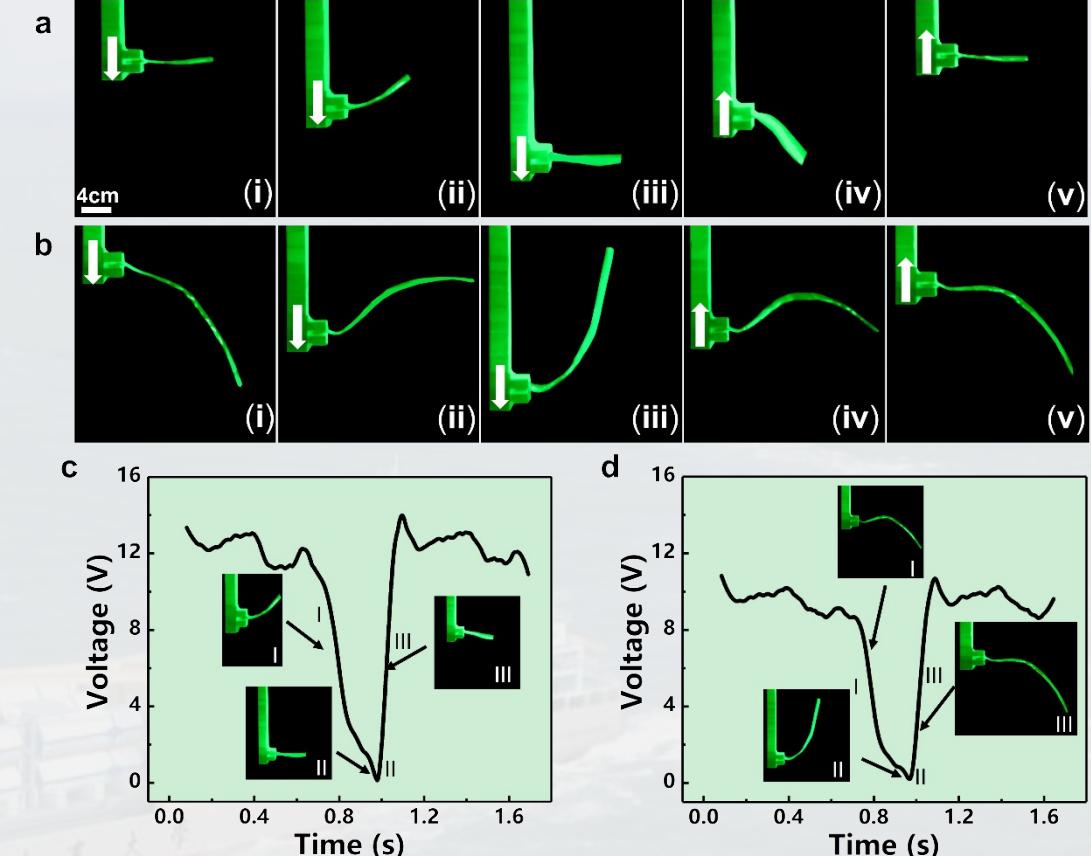
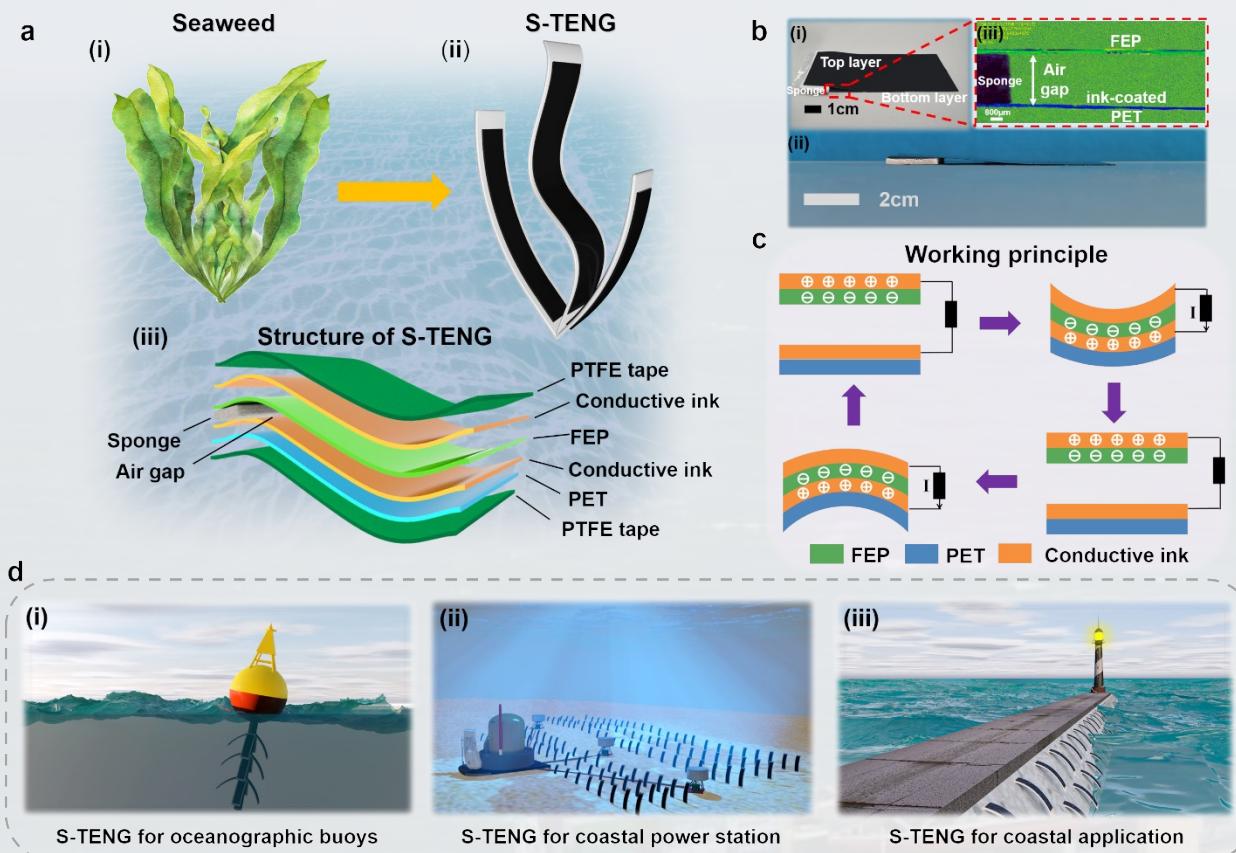
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- Cgmodel.com
- Cg99.com

2.软件渲染上色

- Cinema 4D
- 3dmax/Maya
- Keyshot

3.成图后处理

- PS/AI/AE
- 导出Tif/Tiff格式



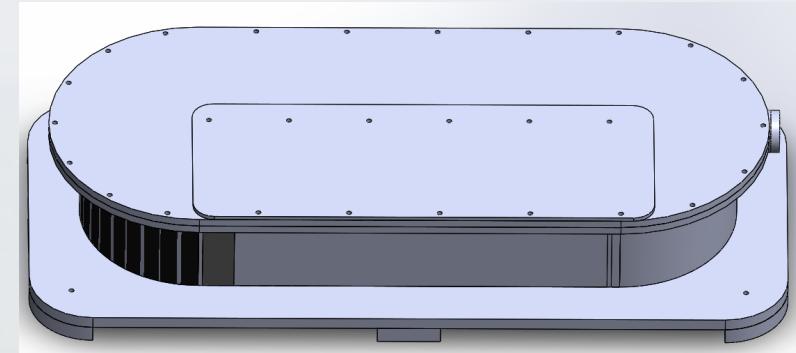
模型元素：ROV、贝壳、珊瑚、礁石



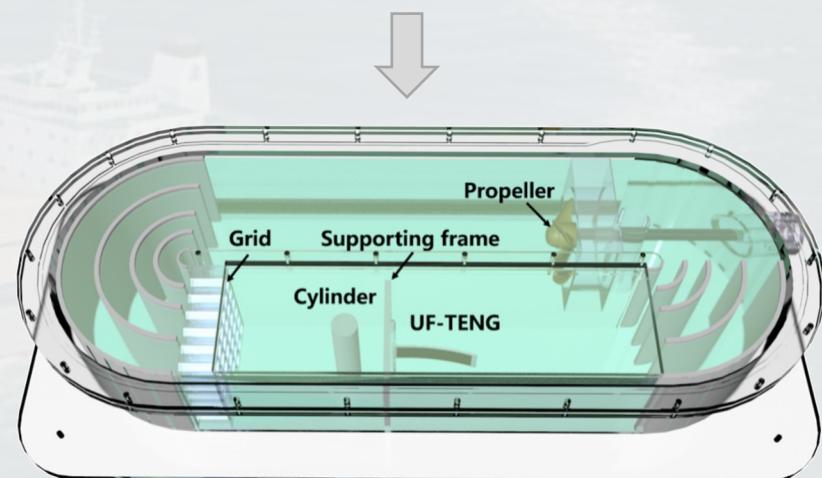
C4D中海底场景、灯光元素的建立



渲染、PS后处理（调亮度、饱和度）



模型元素：循环水槽



材质的选择、渲染、后处理

保持美观 浅显易懂



C4D工作窗口

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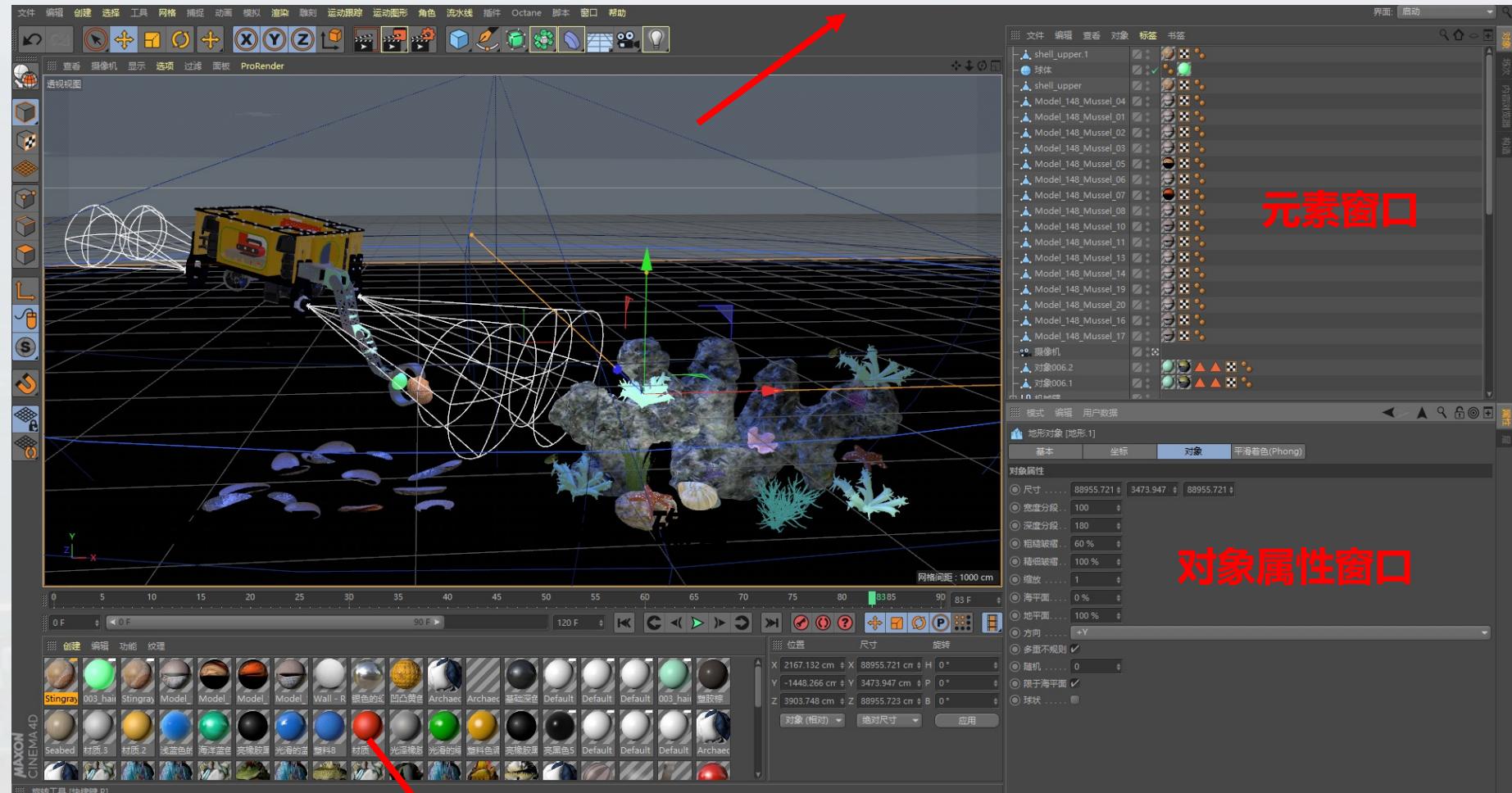
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- 自调材质包

3.插件选择

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- 粒子插件

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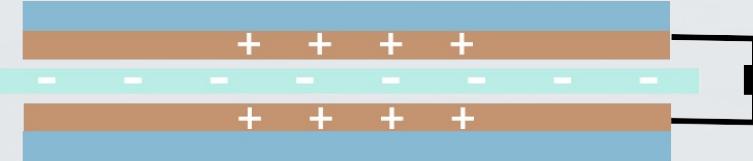
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工作窗口/预渲染窗口

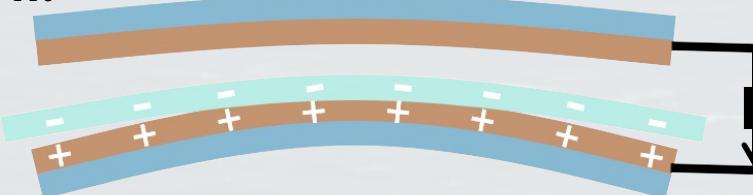


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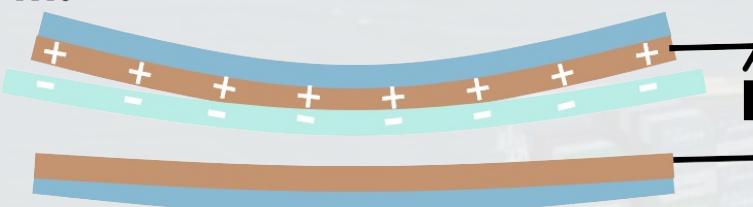
d. i.



ii.



iii.



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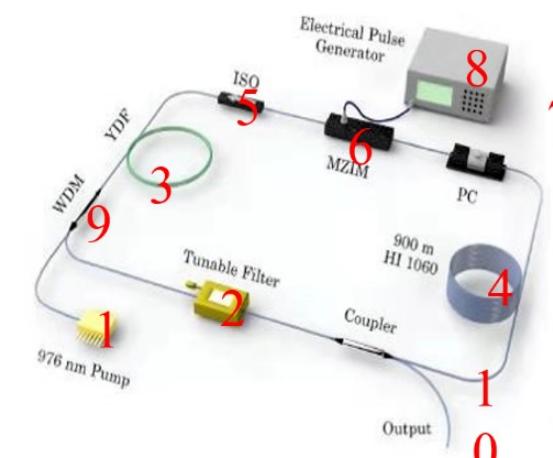
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科研人的知识加油站！



【PPT特辑·C60分子结构绘制】

原创 零尘世 零尘世 2020-06-11 11:27

收录于话题

#PPT科研绘图-补位专辑

12个 >

C60是一种结构高度对称的分子，由32个面组成，12个正五边形、20个正六边形，这就意味着PPT画出其3D结构可以大概率实现。笔者以前考虑过全3D无死角的画法，但考虑到后期计算量（人脑&PPT）巨大，最后不得不放弃。

简要思路：正六边形+球的基本单元、正五边形+球的基本单元，利用补位手法迅速绘制与这些基本单元对称的结构。两个基本单元的属性要求：尺寸大小一样、旋转中心一样、是运用补位原理构建的组合。

考虑到教程长度，以下内容中基本操作（如设置棱台、距底边高度、调出选择窗口、水平翻转等）均不再详细列出，只给出具体参数。PPT里用到的部分插件，本号后台回复“PPT插件”可以获得相关信息。

正文如下：

①绘制正六边形+球体的基本单元

利用英豪插件“添加正多边形”功能绘制一个正六边形，右键属性锁定纵横比，宽度修改为4cm，无填充，线条浅灰色、宽度10磅。

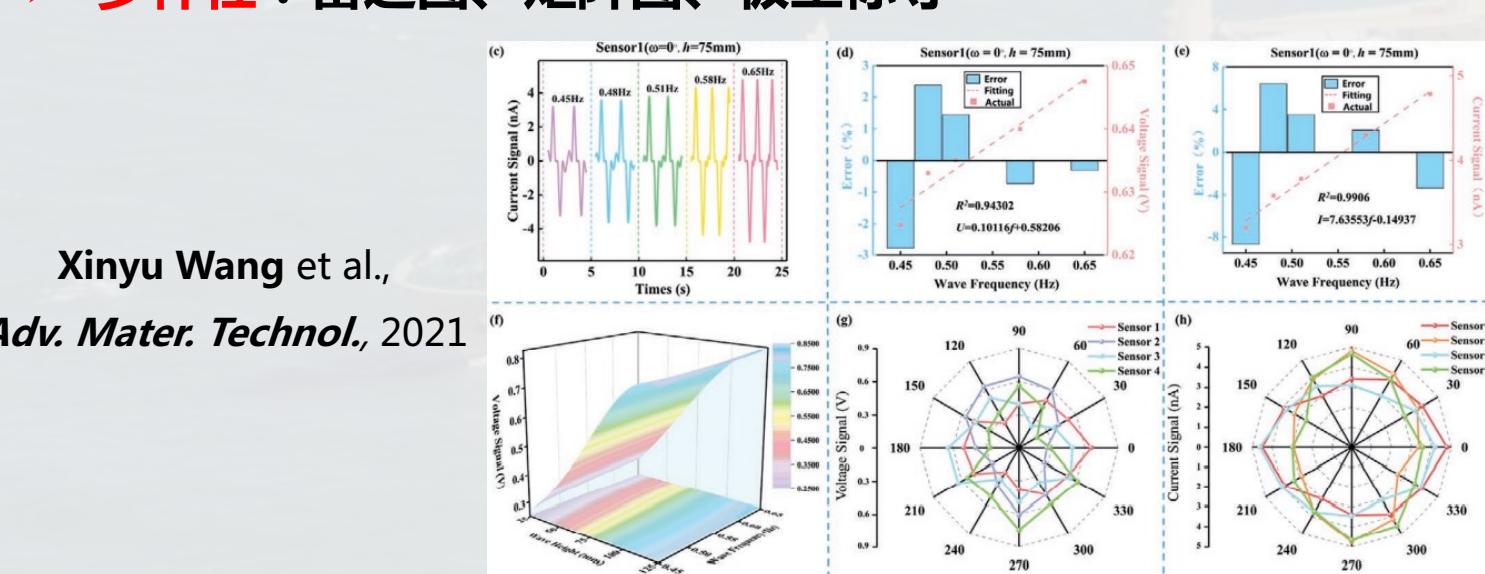


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自学平台：B站、公众号等

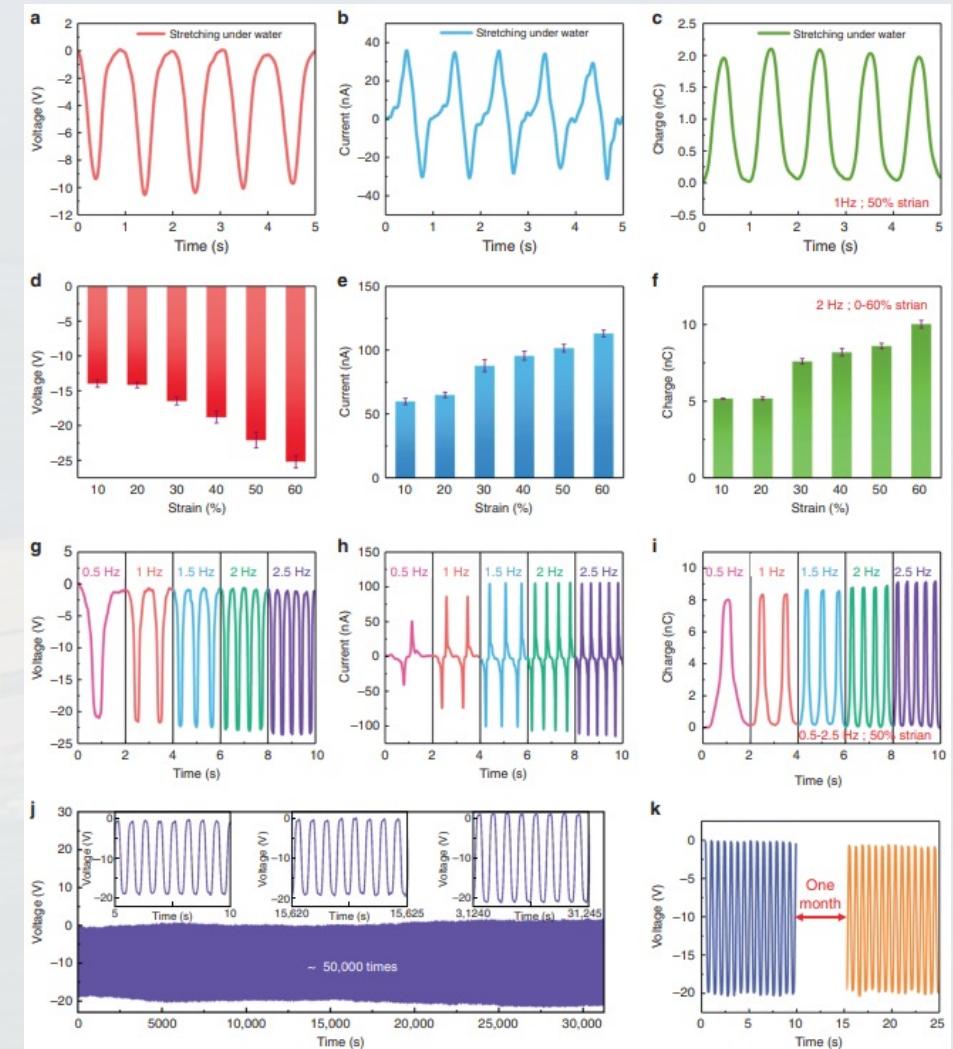


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- **多样性**：雷达图、矩阵图、极坐标等



Xinyu Wang et al.,
Adv. Mater. Technol., 2021



Zhou Li et al., Nature communication, 2019



论文toc图的制作

ACS NANO

www.acsnano.org

Artificial Intelligence of Things (AIoT) Enabled Floor Monitoring System for Smart Home Applications

Qiongfeng Shi, Zixuan Zhang, Yanqin Yang, Xuechuan Shan, Budiman Salam, and Chengkuo Lee*

Cite This: <https://doi.org/10.1021/acsnano.1c07579>

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Supporting Information

ABSTRACT: To enable smart homes and relative applications, the floor monitoring system with embedded triboelectric sensors has been proven as an effective paradigm to capture the ample sensory information from our daily activities, without the camera-associated privacy concerns. Yet the inherent limitations of triboelectric sensors such as high susceptibility to humidity and long-term stability remain a great challenge to develop a reliable floor monitoring system. Here we develop a robust and smart floor monitoring system through the synergistic integration of highly reliable triboelectric coding mats and deep-learning-assisted data analytics. Two quaternary coding electrodes are configured, and their outputs are normalized with respect to a reference electrode, leading to highly stable detection that is not affected by the ambient parameters and operation manners. Besides, due to the universal electrode pattern design, all the floor mats can be screen-printed with only one mask, rendering higher facileness and cost-effectiveness. Then a distinctive coding can be implemented to each floor mat through external wiring, which permits the parallel-array connection to minimize the output terminals and system complexity. Further integrating with deep-learning-assisted data analytics, a smart floor monitoring system is realized for various smart home monitoring and interactions, including position/trajetory tracking, identity recognition, and automatic controls. Hence, the developed low-cost, large-area, reliable, and smart floor monitoring system shows a promising advancement of floor sensing technology in smart home applications.

KEYWORDS: floor monitoring, artificial intelligence, deep learning, triboelectric nanogenerator, smart home, coding



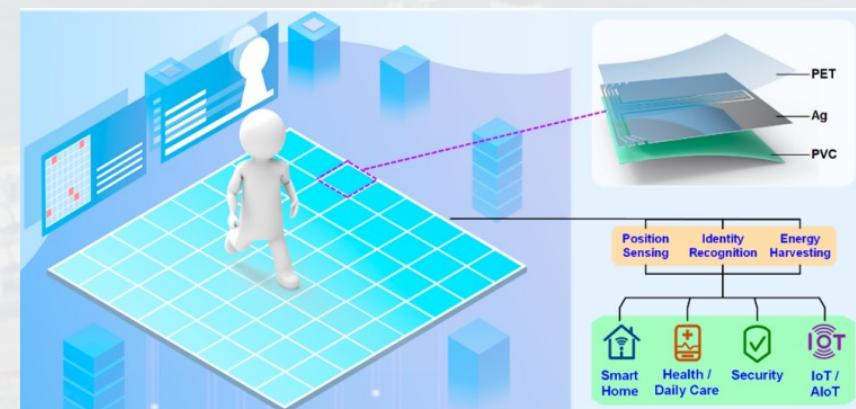
Chengkuo Lee et al., *ACS nano*, 2021

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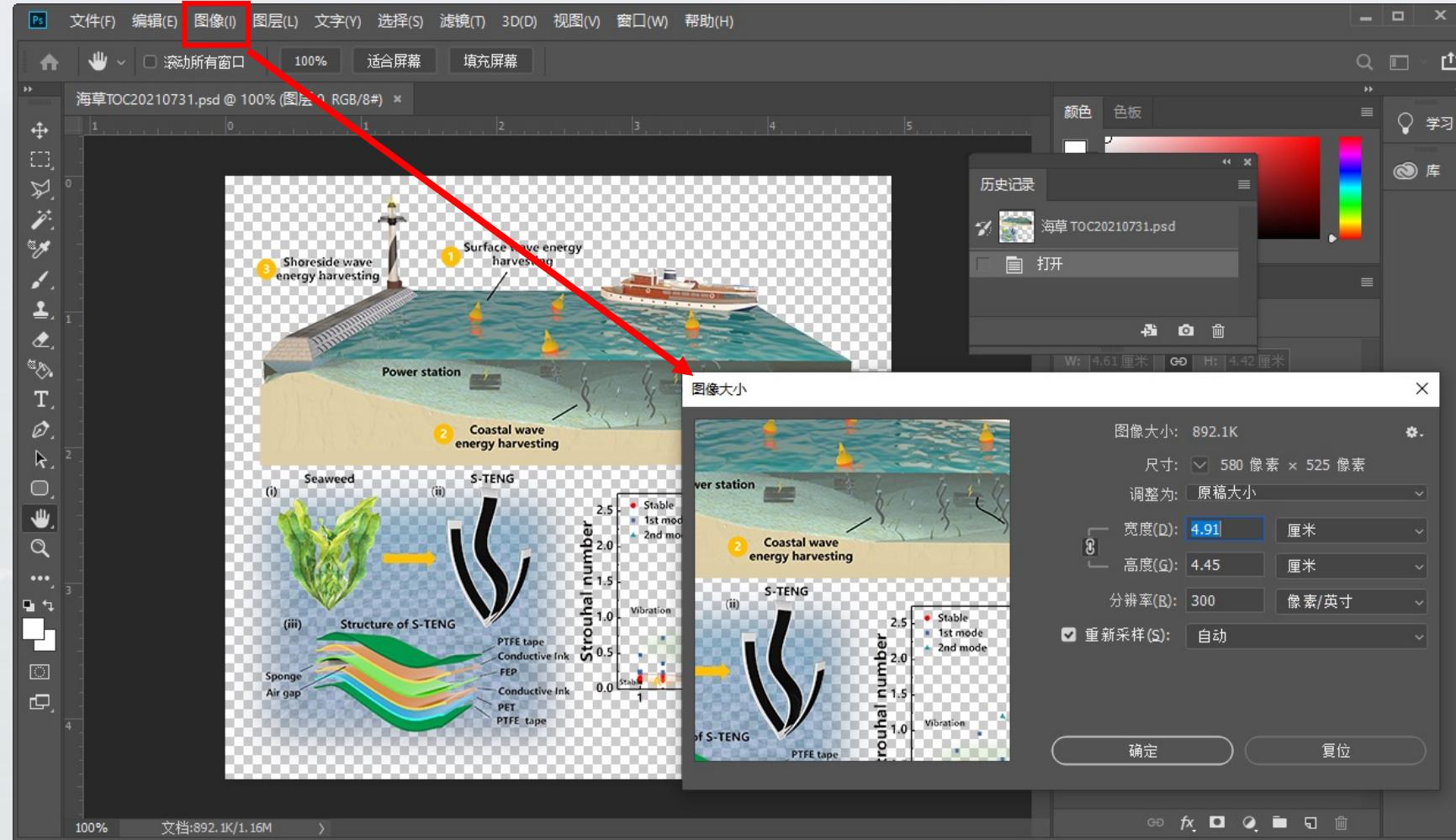
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论文toc图的制作—PS工作窗口



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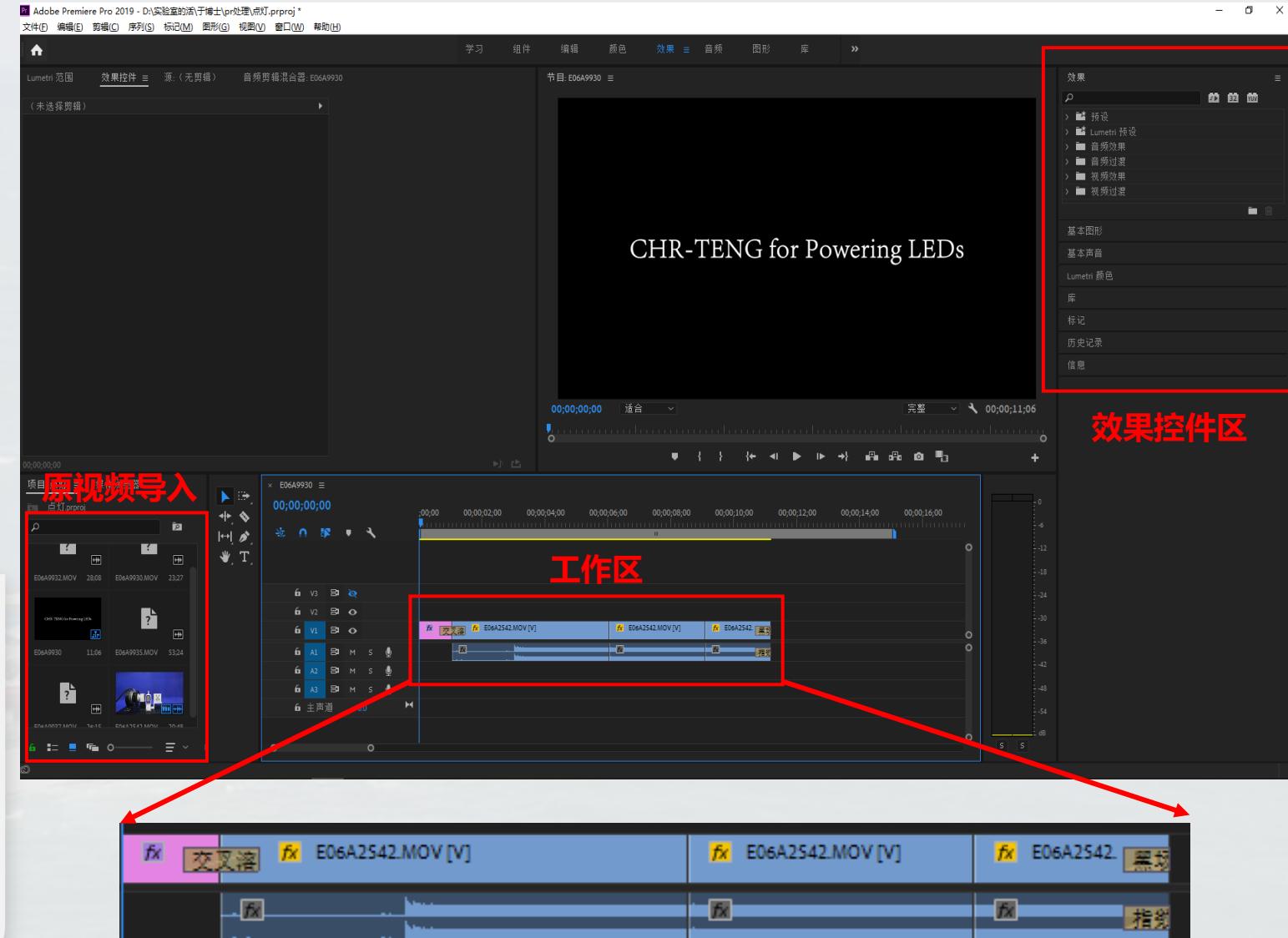
论文demo的制作—Pr工作窗口

CHR-TENG for Powering a Theremometer

Haichao Yuan et al., *Nanomaterials*, 2021

Tips

1. 原视频录制过程中保持无环境杂音
2. 保持录制设备的固定/稳定运镜
3. 导出**中等比特率**，文件大小20M以内
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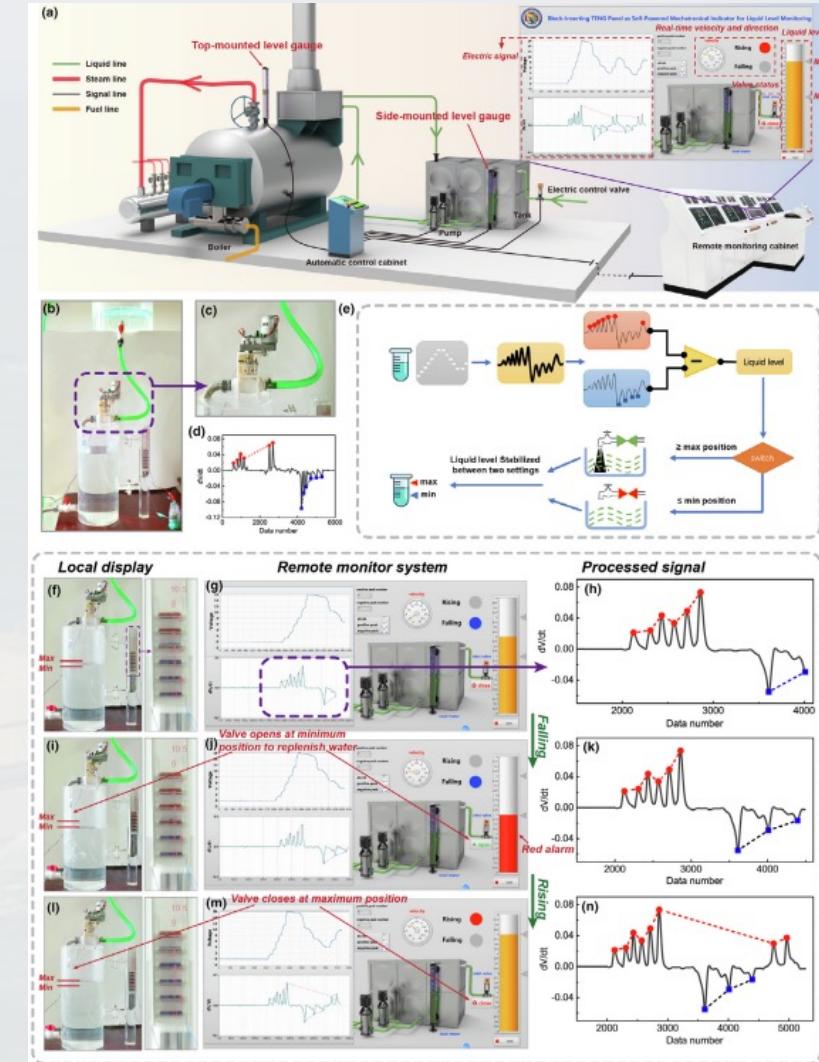
论文大图的绘制

1 | 科研论文配图的演变

2 | 科研论文配图的建议

3 | 常用色彩搭配网址

4 | 大图的构思与排版



Minyi Xu* et al., *Materials Today*, 2021



科研论文配图的建议

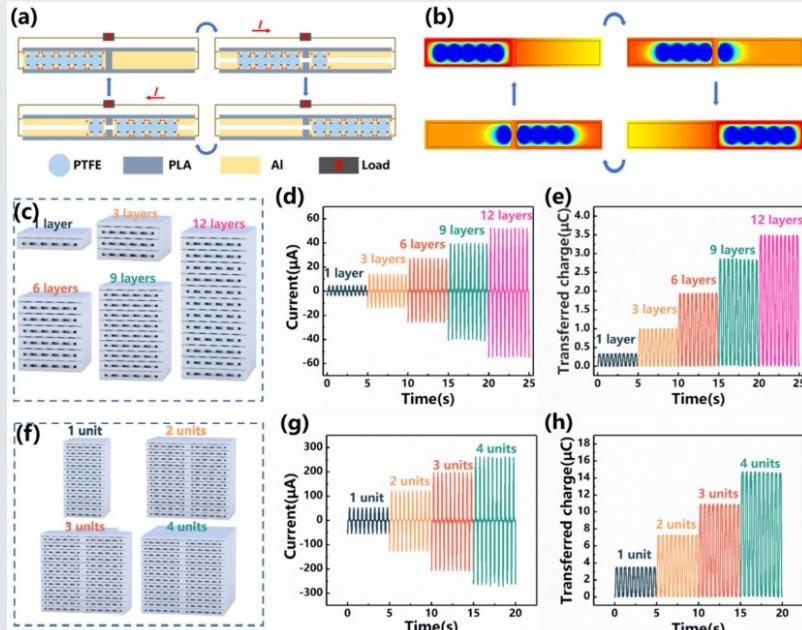
论文——用数据说话，用图片表达，用逻辑自洽

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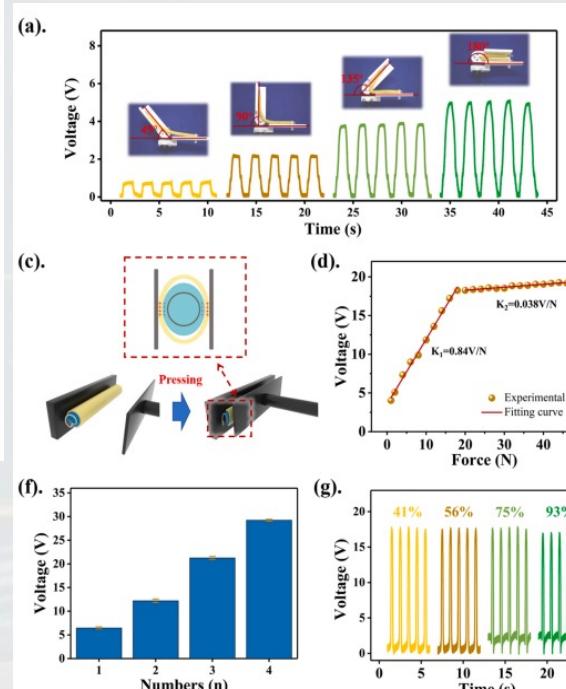
Tips

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2. 尽量选**柔和**的颜色，避免过明、过暗、过亮冷色调。
- 3. 一篇论文的配图，选取一个**主色调**（1/3到一半）、
使用**近似色**作为辅助色。其他颜色为**互补色、组合色**。

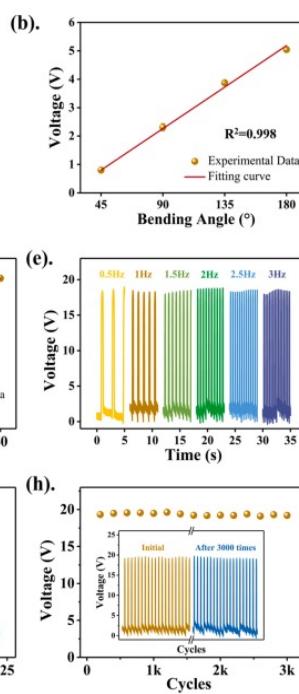
配色要以突出关键数据、展示逻辑关系为首要原则，同时尽可能采取示意图数据图相组合的形式



Hao Wang et al., *Nanomaterials*, 2022



Cong Zhao et al., *Nano energy*, 2022



Yan Wang et al., *Nano research*, 2021

一篇论文的配图，选取一个主色调（1/3到一半）、使用近似色作为辅助色。其他颜色为互补色、组合色

Research

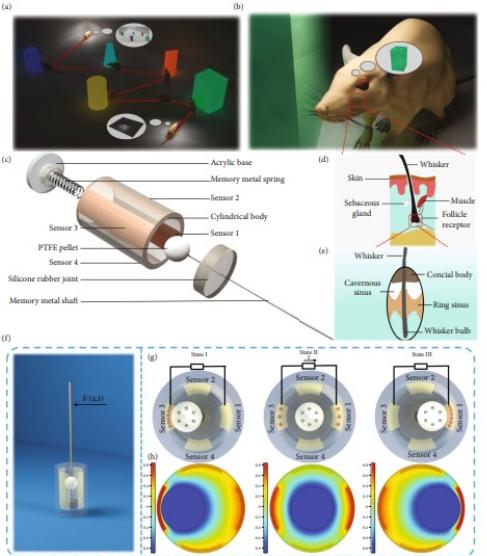


FIGURE 1: Structure and working mechanism of a TWS. (a) A mouse in darkness explores the environment with its whiskers. (b) Measuring both the orientations and distances from obstacles. (c) Location of tactile receptors beneath the surface of the skin. (d) The structure and innervation of a rat whisker follicle. (e) Basic structure of the bionic follicle sensor. (f) Frontal view of the working components. (g) Schematic charge distribution as the PTFE pellet moves. (h) Simulation results showing the potential distribution between the PTFE pellet and Cu film.

and then reaches a plateau. This is because increasing the displacement w_x can decrease the distance between the PTFE pellet and Cu electrode and increase their contact forces. From [22], increasing mechanical compression between the PTFE pellet and Cu electrode causes an increased output voltage. However, due to material limita-

tions and the size of the TWS, the output voltage saturates the sensor. Moreover, a leave-one-out cross-validation (LOOCV) strategy was used to test the model, and the detection accuracy and generalization performance of these models are shown in Figure 2(c). This confirms that the quadratic model has a high correlation coefficient of

3

4

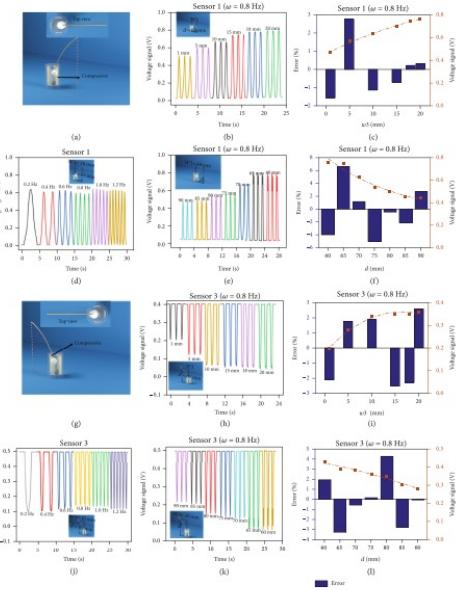


FIGURE 2: Experimental results. (a) The 3DMax model of the whisker sensor and its deflection along the 1 direction. (b) Response due to bending by $w_x = 1 \text{ mm} - 20 \text{ mm}$ in the 1 direction. (c) LOOCV validation for evaluating accuracy and generalization performance of 1 regarding w_x . (d) Response from 0.2 Hz to 1.2 Hz in the 1 direction. (e) Response to bending $d = 60 \text{ mm} - 90 \text{ mm}$ along the 3 direction. (f) LOOCV validation for evaluating accuracy and generalization performance of 1 regarding d . (g) 3DMax model of a whisker and deformation along the 3 direction from its relaxed state. (h) Response due to bending by $w_y = 1 \text{ mm} - 20 \text{ mm}$ along the 3 direction. (i) LOOCV validation for evaluating accuracy and generalization performance of 3 regarding w_y . (j) Response performance at height $d = 60 \text{ mm} - 90 \text{ mm}$ in the 3 direction. (k) LOOCV validation for evaluating accuracy and generalization performance of 3 regarding d .

Research

6

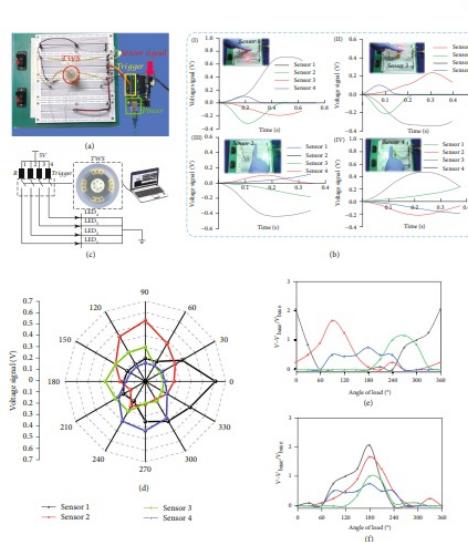


FIGURE 3: Experimental results. (a) Experimental electronic setup. (b) Demonstration of TWS as a sensitive load switch control and its corresponding output voltage signal. (c) Electronic module used for potential application demonstrations, such as controlling LED lights. (d) Directional patterns of the TWS. (e) Rotation from 0° to 360° and ΔV for each angle with the same load applied. (f) The results of (e) were replotted with θ defined.

processor was used for data processing, which provides 472 GfLOPS (billion floating-point operations per second) with only 5W of power consumption. Information gathered by the JetBot is sent to a computer via wireless communication through a WiFi module. In addition, to better track the trajectory between position updates, the Jetbot utilizes dead reckoning from encoder information located on the drive motors.

In the prescribed workspace, a preplanned path is traversed by a cascade controller, where feedforward and feed-

back controls are used to ensure high accuracy, in which JetBot is fully autonomous as it drives along the preplanned path. It is worth noting that the robot adopts a stepping motion with maximum step length of 1 cm. The robot has enough time to respond to the TWS, while a robot with higher speed could cross the workspace boundary in the limited experimental space. Figure 4(g) shows the process used to implement reactive obstacle avoidance. As soon as a landmark is recognised by the TWS, the feedback controller

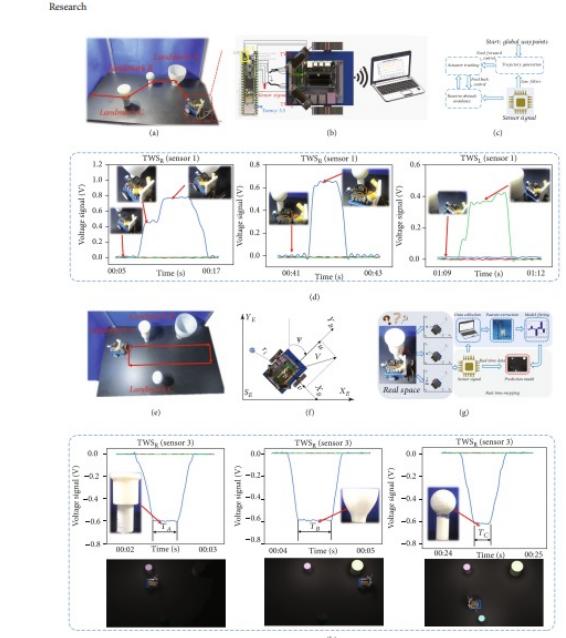


FIGURE 4: Experimental results. (a) Photographs of the actual workspace for reactive obstacle avoidance. (b) Electronic module used for potential application demonstrations, such as reactive obstacle avoidance and local mapping. (c) Overview of the closed-loop control system for reactive obstacle avoidance. (d) Voltage signal measured at landmarks A, B, and C. (e) Photographs of the actual workspace used for local mapping. (f) Reference frames BODY reference frame and ND reference frame. (g) Local mapping process, where sensory information is applied for model fitting and real-time model prediction. (h) Voltage signal measured at landmarks A, B, and C.

一篇论文的配图，选取一个主色调（1/3到一半）、使用近似色作为辅助色。其他颜色为互补色、组合色

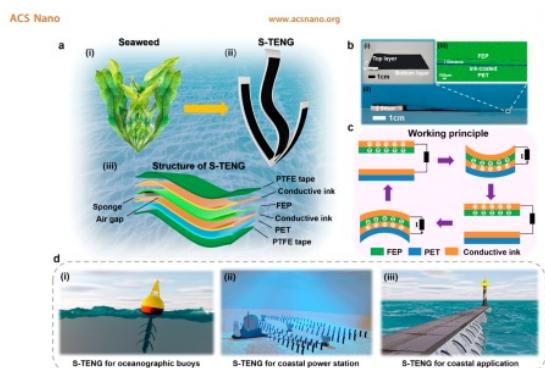


Figure 1. Schematic drawing of the S-TENG and its applications: (a, i) seaweed, the biotic prototype of the S-TENG; (a, ii) the S-TENG surface morphology on the S-TENG; (c) Working mechanism of the S-TENG. (d) Applications of the S-TENG on the marine internet of things.

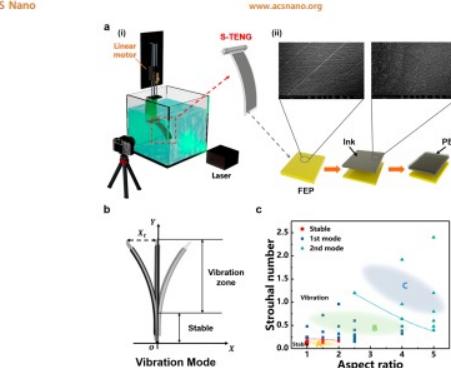


Figure 2. Experimental apparatus and vibration characteristics of the S-TENG. (a, i) Experimental apparatus of the S-TENG; (a, ii) scanning electron microscope (SEM) photo of the FEP and conductive ink-coated PET; (b) 1st mode of the S-TENG and coordinate system selection diagram; (c) the vibration regime map of the S-TENG.

random wave induced motions. The T-TENG appears to be a quite effective approach of large scale wave energy harvesting. An *et al.*¹ have created a working scaled TENG (WF-TENG) wave energy converter. Vibration of ocean waves with respect to the wave parameters and the structural parameters were investigated systematically. A maximum peak of 6.5 mW and an average power of 0.28 mW were obtained by the WF-TENG, which is capable of powering a digital thermometer. In a study on a fully enclosed TENG wave energy converter published by Wang *et al.*,² optimizations of materials and structures were conducted. Low frequency wave energy was converted to power light-emitting diodes (LEDs) and to different sensors connected to the Internet of Things (IoT). In general, those published TENGs have exhibited advantages such as having a simple structure and low cost and being lightweight and robust. However, most of the previously published wave energy TENGs are designed for harvesting energy from the ocean surface waves. Though the majority of the marine applications are surface ones, supplying renewable electricity to underwater applications should not be left out. In order to encompass energy harvesters in a larger volume of the ocean to provide power to the IoT sensors, a wave energy TENG that can work at both surface areas (float) and underwater areas (submerged) is desperately needed. On top of that, the wave energy TENG will be more impressive if it can be easily integrated with the marine equipment.

In this study, a flexible seaweed-like triboelectric nanogenerator (S-TENG) is first proposed to supply *in situ* power to marine distributed sensors. The idea of developing a seaweed-like TENG is inspired because of the close observations we made on a common sea plant, seaweed. The process in which the seaweed vibrates with the wave is measured by the electron microscope LEXT OLS4000, which is shown in Figure 1b(ii). From the above, the air gap due to the sponge and surface morphology of the FEP and ink-coated PET film can be observed. The device (Figure S1) with concave structures makes contact electrification and electrostatic induction simultaneously, ensuring a good correspondence between the wave and electrical signal of the S-TENG. It is better to set the two triboelectric layers to "contact" state initially so that the TENG could produce output even with the wave. When the wave passes through the S-TENG, two triboelectric layers are brought into contact with each other, and the contact area correlates with the wave excitation.

As the S-TENG vibrates periodically under the wave excitations, the FEP membrane will make contact with and separate from the PET membrane periodically as shown in Figure 1a(i). After certain contacts with the ink-coated PET, the FEP membrane will become negatively charged. According to the essence of electrostatic induction, an equivalent amount of positive charge will occupy the ink electrode on the PET when the ink electrodes of PET and the FEP membrane have sufficient contact. As the S-TENG bends, the electrons will flow from the electrode attached to the FEP to the electrode attached to the PET (through the external circuit); therefore, a transient current is generated. Subsequently, as the FEP and ink electrode get separated, the positive charges will flow back to the upper electrode. Due to its high Young's modulus as well as good ink adhesion, the PET and FEP membranes are selected for the other triboelectric friction layers for the S-TENG. The microstructure of the FEP and ink-coated PET film can be observed by a scanning electron

microscope Phenom Pro image as shown in Figure 2a(ii). The device with two wave detectors made contact electrification and electrostatic induction simultaneously, ensuring a good correspondence between the wave and electrical signal of the S-TENG. Considering that the flexed membrane of ethylene propylene (FEP) has a relatively low Young's modulus and high electromechanical coupling coefficient, it was selected as the dielectric material in the S-TENG.^{3,4,5} The corresponding material parameters are listed in Table S1. Equations 2 and 3 are the governing equations that determine the coupled fluid and structural motion of the S-TENG depicted in Figure 2b.

The S-TENG's vibration under the wave excitation is a typical forced vibration. The S-TENG can be approximated as a two-dimensional structure with high extensional rigidity and low bending rigidity, which satisfies the Euler-Bernoulli beam equation

$$m\ddot{y}'' + D\dot{y}' + \omega_0^2 y = -\Delta F \quad (1)$$

where Q is the total transferred charge; d_0 , r_0 and S represent the thickness of the membrane, the dielectric constant and the area size of the electrode, respectively; y denotes the displacement between the dielectric membrane and the electrode; σ denotes the charge density. According to the eq 1, the maximum displacement between the dielectric membrane and the electrode determines the maximum output of the S-TENG. The displacement between the dielectric membrane and the electrode changes as the S-TENG vibrates with the wave.

To further show the working principle of the S-TENG, the potential distributions across the two electrodes have been analyzed with COMSOL, a finite-element software for Multiphysics analysis as shown in Figure S3. The contour clearly depicts the potential difference driving the current between the two electrodes. Due to its flexible essence, the S-TENG can be applied (as a power supply module) to many marine applications, such as floating buoys (surface), coastal power stations (underwater), and breakwaters (shoreside), as shown in Figure 1d.

Vibration and Electric Performance of the S-TENG. As shown in Figure 2a(i), a linear motor was used to simulate the vibration of the S-TENG. The laser and the video imaging was adopted to better observe the vibration performance of the S-TENG. The microstructure of the FEP and ink-coated PET film can be observed by a scanning electron

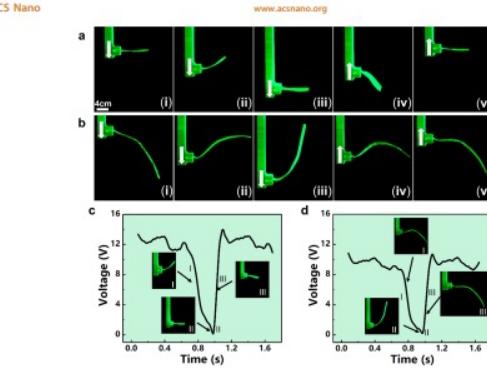


Figure 3. Sequential images of vibration behavior and analysis of the electrical signal for the 1st mode. (a) 1st mode: vibration behavior of the S-TENG with the dimensions 40×80 mm; (b) 2nd mode: vibration behavior of the S-TENG with the dimensions 40×200 mm. The voltage signal of the S-TENG corresponding to (c) the 1st mode; (d) the 2nd mode.

microscope Pro image as shown in Figure 2a(ii). The device with two wave detectors made contact electrification and electrostatic induction simultaneously, ensuring a good correspondence between the wave and electrical signal of the S-TENG. Considering that the flexed membrane of ethylene propylene (FEP) has a relatively low Young's modulus and high electromechanical coupling coefficient, it was selected as the dielectric material in the S-TENG.^{3,4,5} The corresponding material parameters are listed in Table S1. Equations 2 and 3 are the governing equations that determine the coupled fluid and structural motion of the S-TENG depicted in Figure 2b.

The first key parameter to evaluate the second order oscillation is the Strouhal number. In the experiments, the Strouhal number was increased from 0.08 to 2.4. The physical dimension for the experimental samples are listed in Table S2. Figure 2c is the two-dimensional map characterizing the vibration status with respect to the dimensionless parameters. The Strouhal number stays within 0.08 and the aspect ratio within 0.18, and the aspect ratio ranged from 1 to 2. As the Strouhal number and the aspect ratio increased, the S-TENG exhibited the first mode characteristic of a cantilever beam,⁶ as shown in Figure 2b. The vibration amplitude of the lower part was nearly zero, while the upper part was the vibration zone with the vibration amplitude increasing toward the trailing edge. As the Strouhal number and the aspect ratio increased further, the vibration gradually transitioned from the first mode (region A) to the second mode (region B). The transition between the first mode and second mode appeared when the Strouhal number ranged from 0.4 to 1.2 and the aspect ratio ranged from 2.5 to 5, as shown in Figure 2c. The S-TENG's vibration is excited by the wave. Theoretically, the vibration frequency equals the wave frequency. According to the experimental results in Figure 2c, when the aspect ratio is constant, the vibration mode is determined by the Strouhal

number. The dimension will influence the vibration mode but not the vibration frequency. It is likely that the triboelectric electrons generated by the two opposite cracks cancel out each other, which reduces the electric output of the S-TENG. Therefore, the first mode S-TENG turns out to be better for energy conversion.

As our studies have shown that the 40×80 mm S-TENG can be excited to the first mode under a wide range of Strouhal numbers (as Figure 2c), experiments on the S-TENG's electric performance were carried out on the 40×80 mm S-TENG. The S-TENG also has X-shaped internal dielectric layers. In the remaining half cycle, the S-TENG reaches the largest downward displacement (Figure 3a(v)), before it returns back to the horizontal equilibrium position (Figure 3a(v)). The periodic vibration leads to periodic contact separation between the internal dielectric material and the electrode. The process of the second mode vibration (see Figure 3b) is similar to the process of the first mode vibration except that there are two vibration crests in the second mode. When the profiles of the electrical signal and the vibration images are scrutinized, it can be observed that the vibration of the S-TENG yielded the following stages: first mode (Figure 3c(i)), reaching the maximum stroke (Figure 3c(ii)), and then the second mode condition (Figure 3c(iii)). These stages were also clearly reflected in the corresponding output voltage signals. The similar voltage signal can be observed in Figure 3d. However,

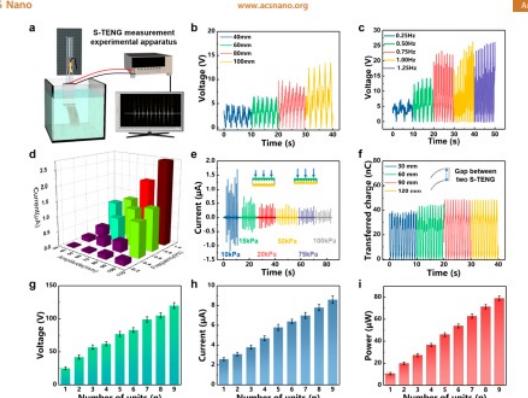


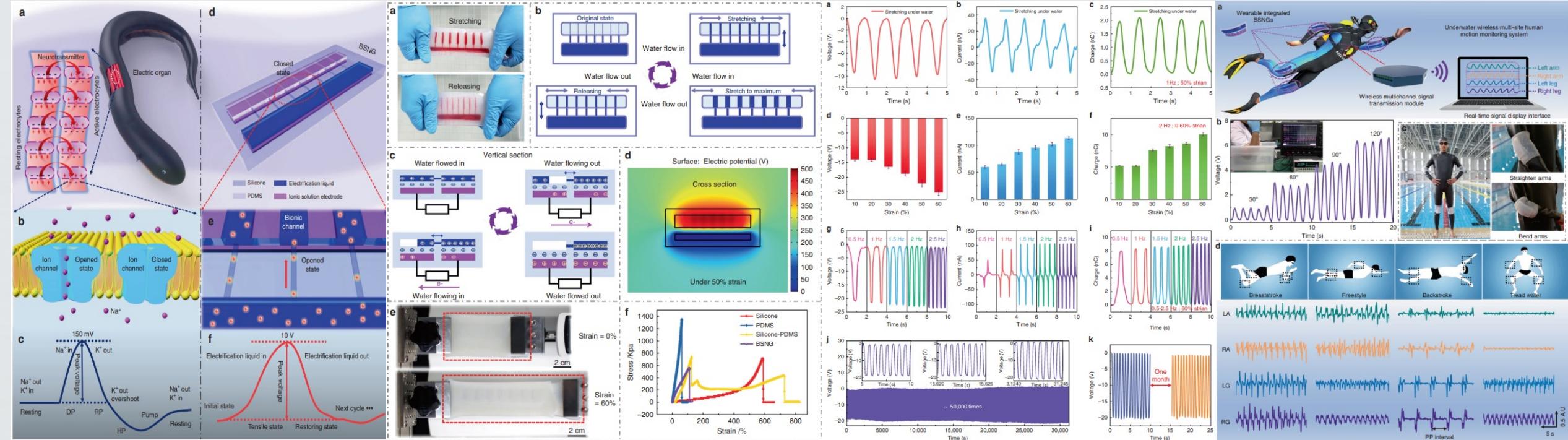
Figure 4. Output performance of the S-TENG. (a) Experimental apparatus of the S-TENG; (b) the effect of the frequency of the linear motor's motion on the open-circuit voltage of the S-TENG; (c) the effect of the frequency of the linear motor on the open-circuit voltage of the S-TENG; (d) the transferred charge of the S-TENG under different pressures; (e) the output current of the S-TENG with different parallel distances; (f) the output current of the S-TENGs with different numbers of units; (g) the output voltage of the S-TENGs with different numbers of units; (h) the output current of the S-TENGs with different numbers of units; (i) the output power of the S-TENGs with different numbers of units.

the maximum output voltage of the second mode is lower than the first mode. It is likely that the triboelectric electrons generated by the two opposite cracks cancel out each other, which reduces the electric output of the S-TENG. Therefore, the first mode S-TENG turns out to be better for energy conversion.

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一篇论文的配图，选取一个主色调（1/3到一半）、使用近似色作为辅助色。其他颜色为互补色、组合色

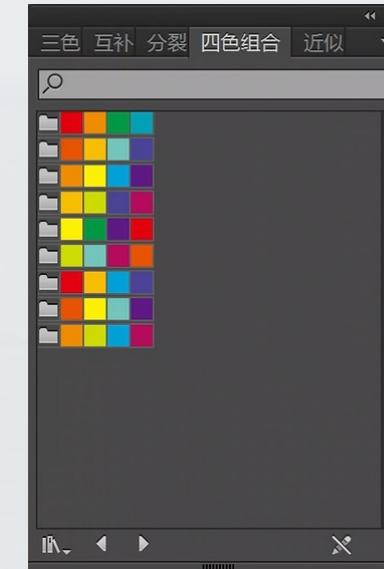
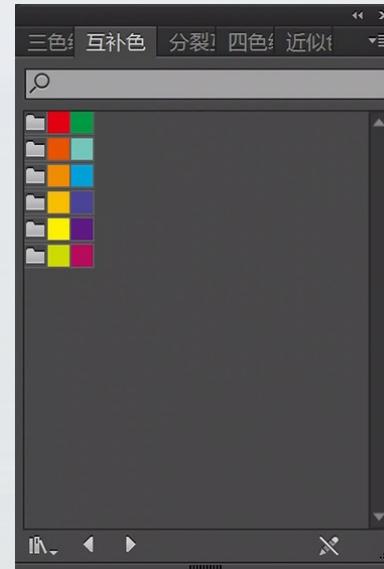
首尾呼应！



Zhou Li et al., *Nature communication*, 2019

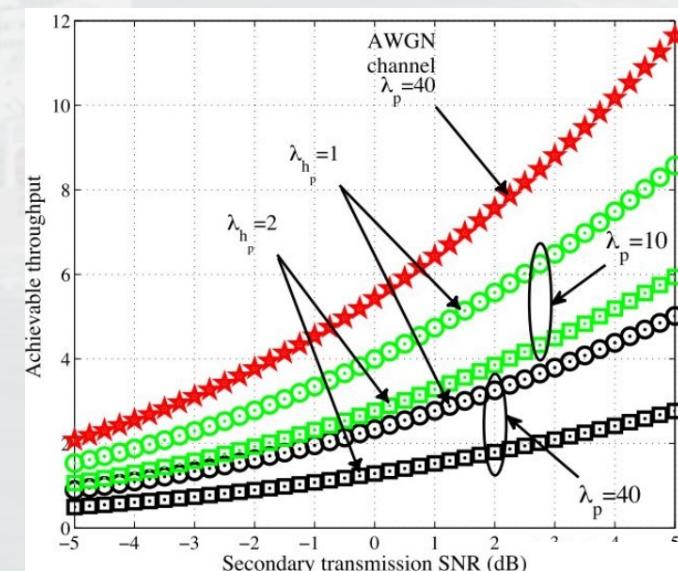
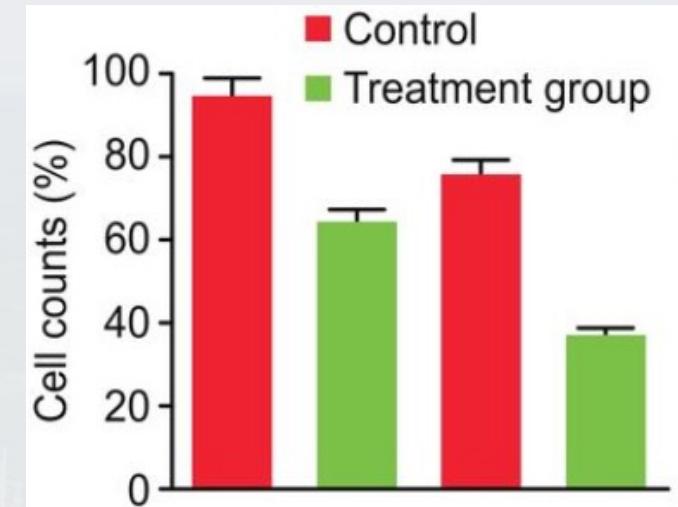


近似色、互补色、组合色



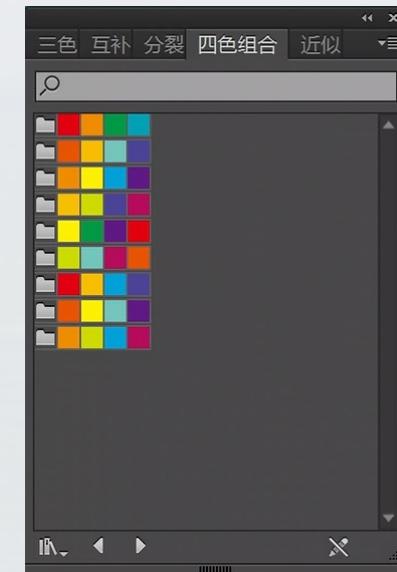
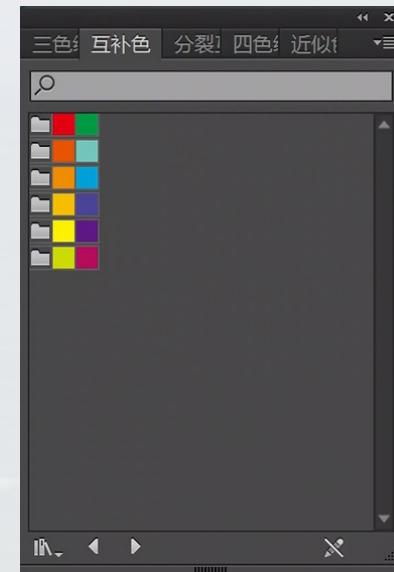
Tips

1. 两类数据之间最好不要使用互补色，三类及以上可以
2. 尽量选**柔和**的色调，避免饱和度过高/低
3. 颜色不宜过多、过杂，**避免**同一幅图中同时出现红绿色
4. 渐变背景较难驾驭，尽量用近似色



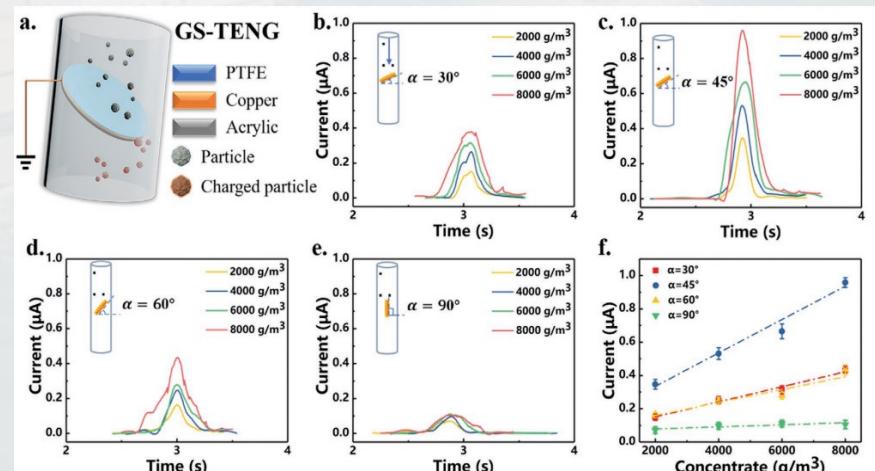
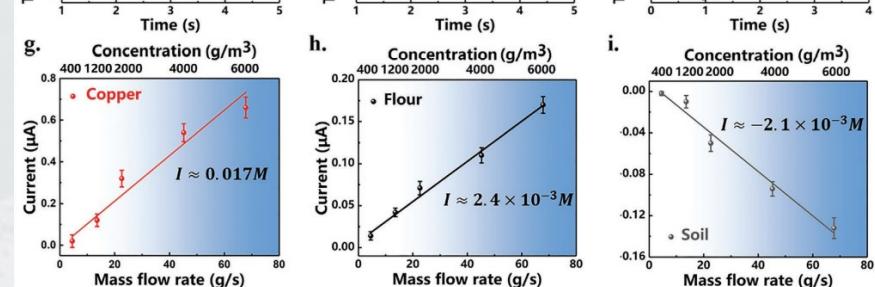
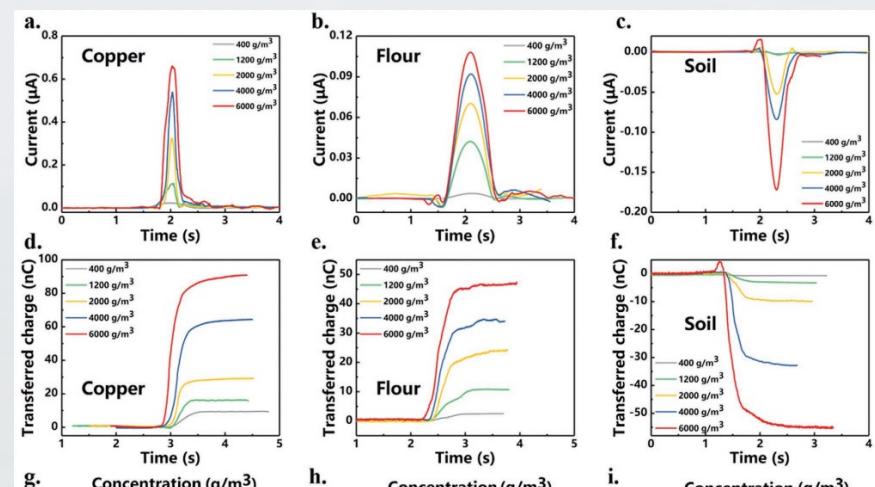


近似色、互补色、组合色



Tips

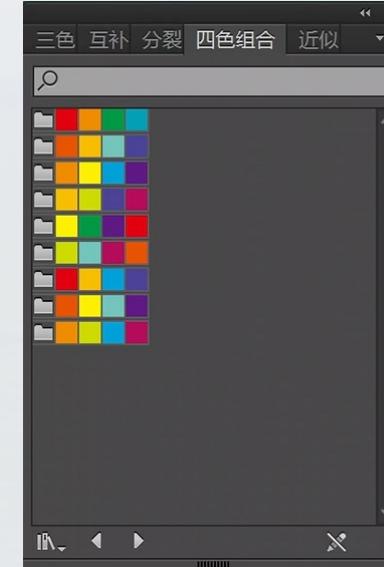
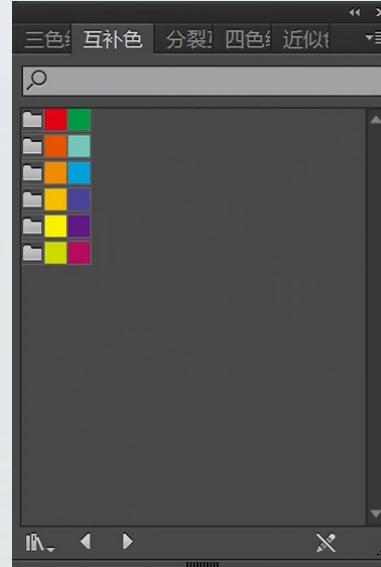
- 两类数据之间最好不要使用红绿互补色，三类及以上可以
- 尽量选柔和的色调，避免饱和度过高/低
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- 渐变背景较难驾驭，尽量用近似色



Yan Wang et al., *Adv. Mater. Technol.*, 2021

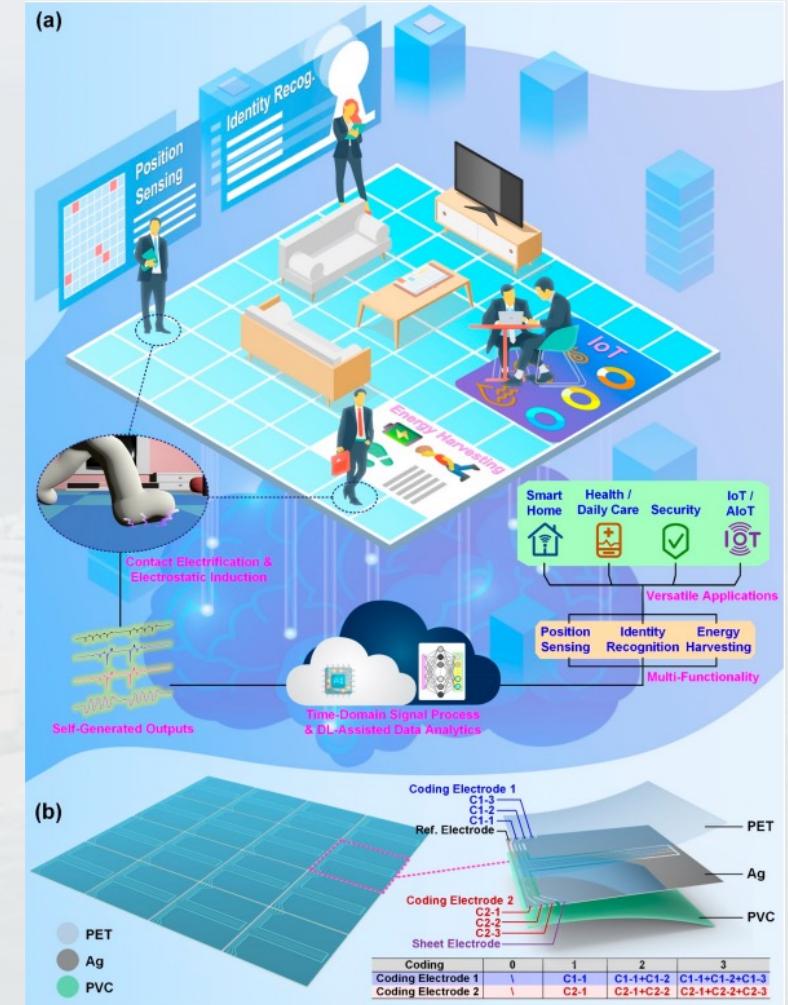


近似色、互补色、组合色



Tips

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3. 颜色不宜过多、过杂，**避免**同一幅图中同时出现红绿色
4. 渐变背景较难驾驭，尽量用近似色



Chengkuo Lee et al., ACS nano, 2021



常用的配色网站

The Color Hunt interface displays three color palettes side-by-side:

- Today**: A palette consisting of four horizontal bars. The top bar is light red, the second is red, the third is dark green (#335D2D), and the bottom bar is olive green.
- Yesterday**: A palette consisting of four horizontal bars. The top bar is light yellow, the second is teal, the third is dark teal, and the bottom bar is orange.
- 2 days**: A palette consisting of five horizontal bars. The top bar is bright green, the second is medium green, the third is light green, the fourth is pale yellow, and the bottom bar is cream-colored.

Each palette includes a small box below it showing its popularity rating (8, 203, or 276 hearts) and the time it was created (Today, Yesterday, or 2 days).

<https://colorhunt.co/>

001 Warm Flame

002 Night Fade

<https://webgradients.com/>

<https://uigradients.com/>

丁香淡紫 DINGXIANG DANZI	玫瑰紫 MEIGUIZI	古鼎灰 GUDING HUI	玫红 MEIGUOHONG	玫瑰红 MEIGUOHONG	玫红 MEIGUOHONG	玫红 MEIGUOHONG
DB368C	DB371D	D276A3	3822CF	GUIDINGHUI	QINGHUAKEZI	QINGHUAKEZI
DAZHONGHONG	DIANSHIHONG	LJUNGMENGHONG	BC08A48	龙鳞鱼紫 LONGQINYUZI	BC08A48	龙鳞鱼紫 LONGQINYUZI
		YINGCAOZI COFFEE	CC0F95	LIUJUANZI GOBEAF	73	73
		C0F98			17	17
		D276A3			20	20
					1	1
					102	102
					169	169
					201	201

<http://zhongguose.com/>



论文大图的构思与排版

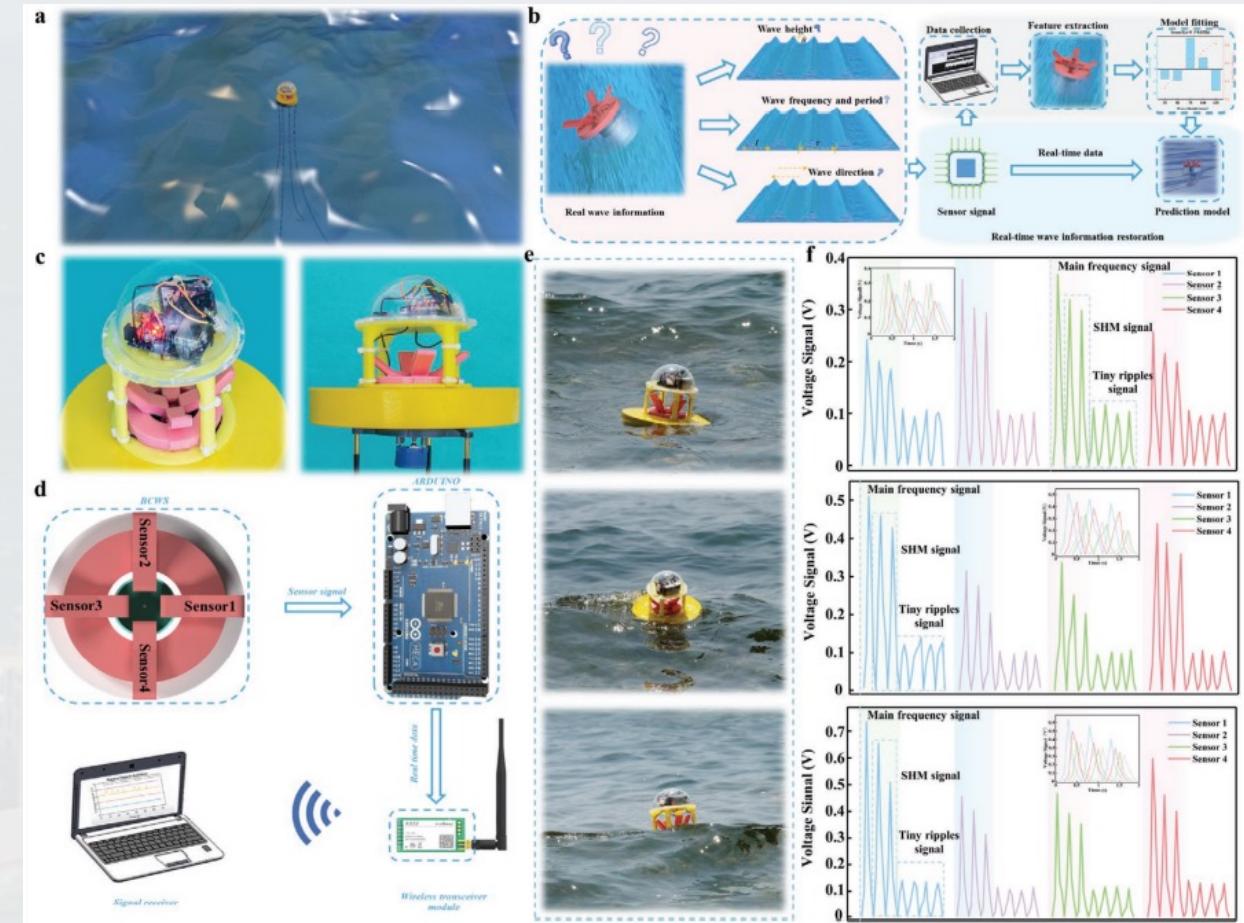
1. 正文部分整体框架 (5-6张大图)

- 场景、器件 (1-2张)
- 实验部分 (2-4张)
- 实验演示 (1张)
- 每部分之间逻辑递进

2. 每一部分格局框架

- 美化排版 ($3 \times 2 / 2 \times 2$)
- 实验部分不建议做 2×3
- 每张小图不一定等大 (虚线框架)
- 错落有致、分布均匀
- 多余的数据放Supporting Information

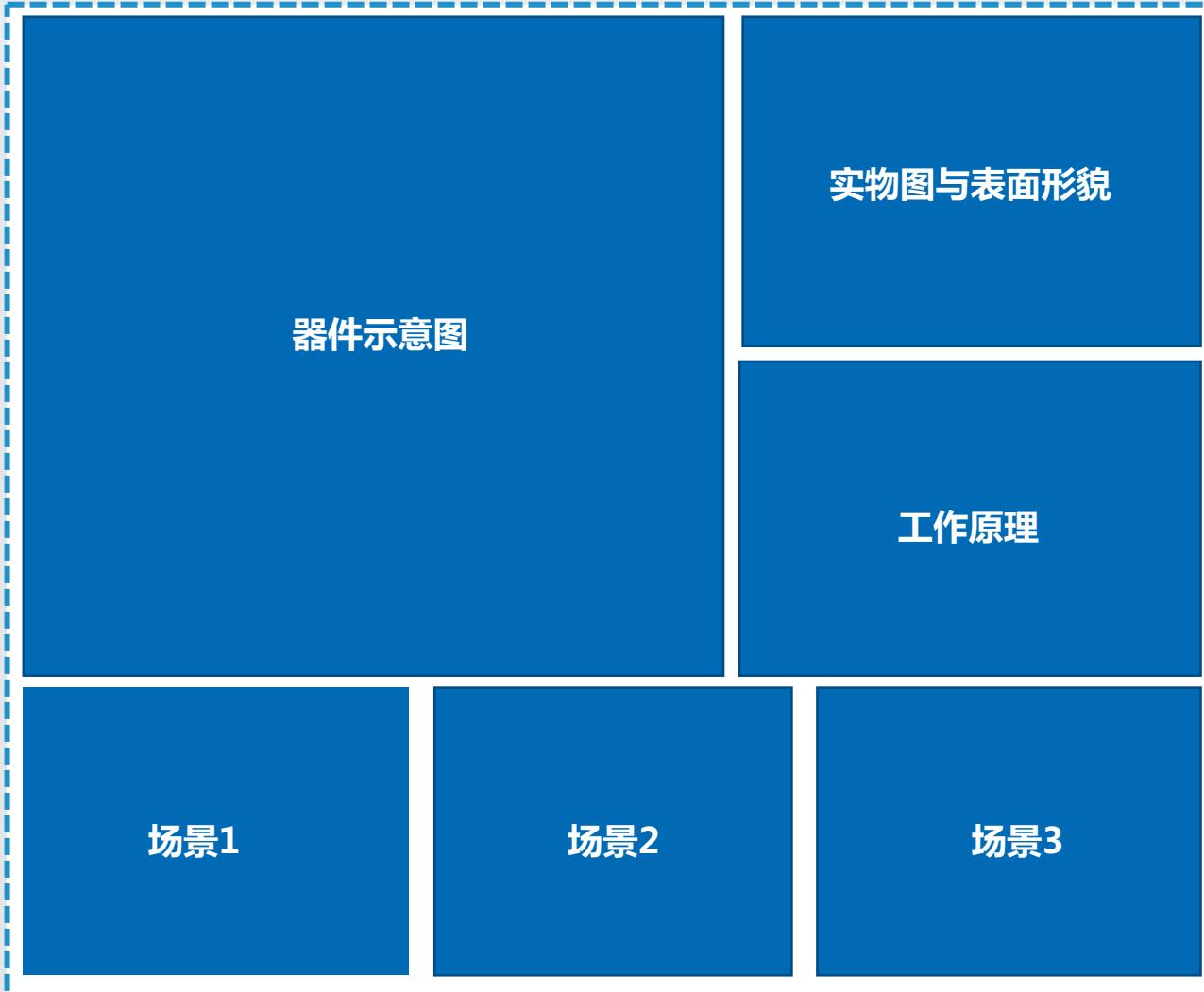
先定框架再下笔 !



Xinyu Wang et al., *Adv. Mater. Technol.*, 2021



论文大图的构思与排版

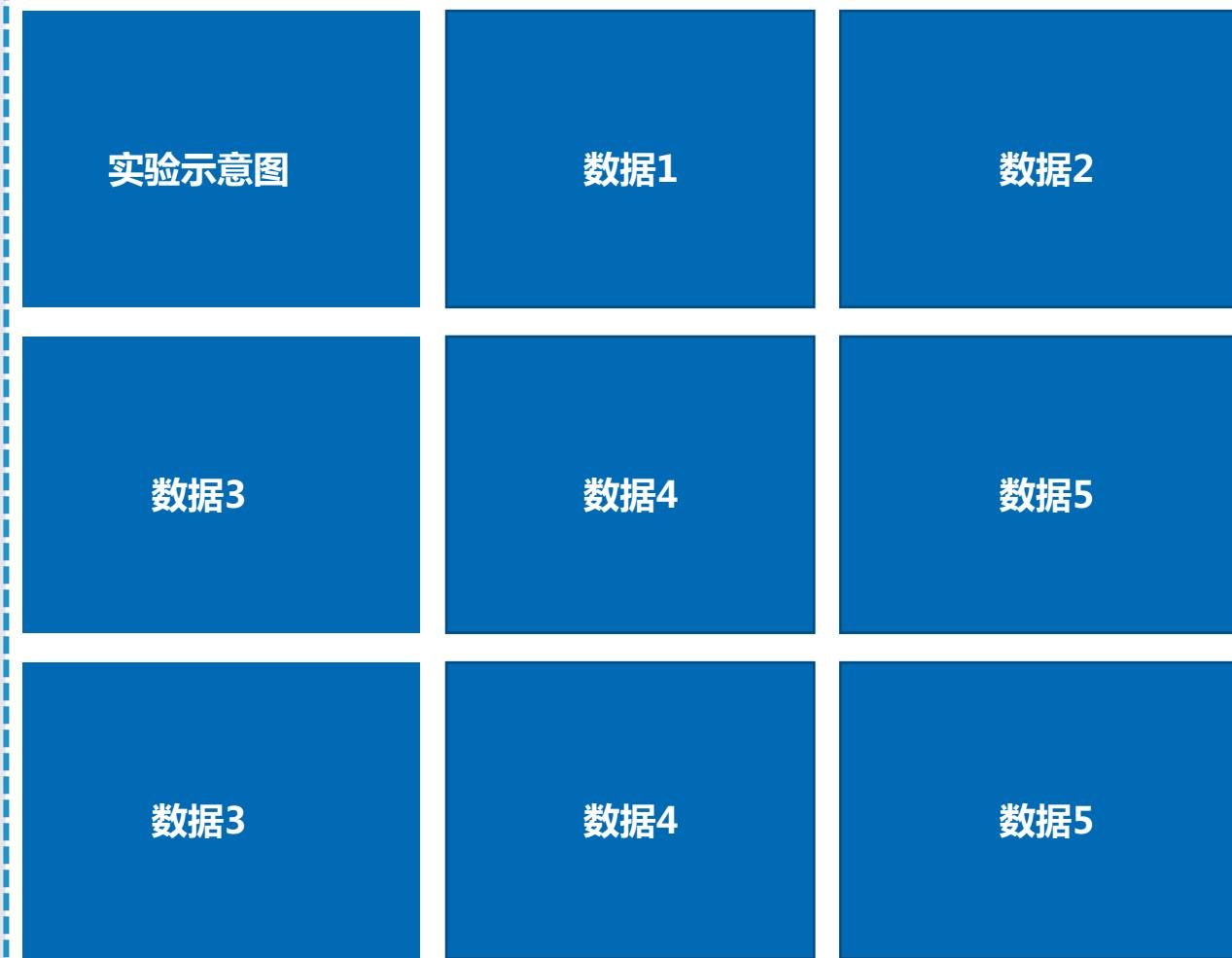


Tips

1. 背景全白 (RGB255) / 透明
2. 不一定构建外部框架
3. 图片等大、对齐
4. 图片文字批注不用艺术字、不斜体
5. 先定框架，再做细节处理
6. 图片去白对齐、柔化边缘、亮度锐化
7. 用数据图填满大图，而不是用示意
图填满大图！



论文大图的构思与排版



一张六宫格实验数据图的文章工作量远远不够！

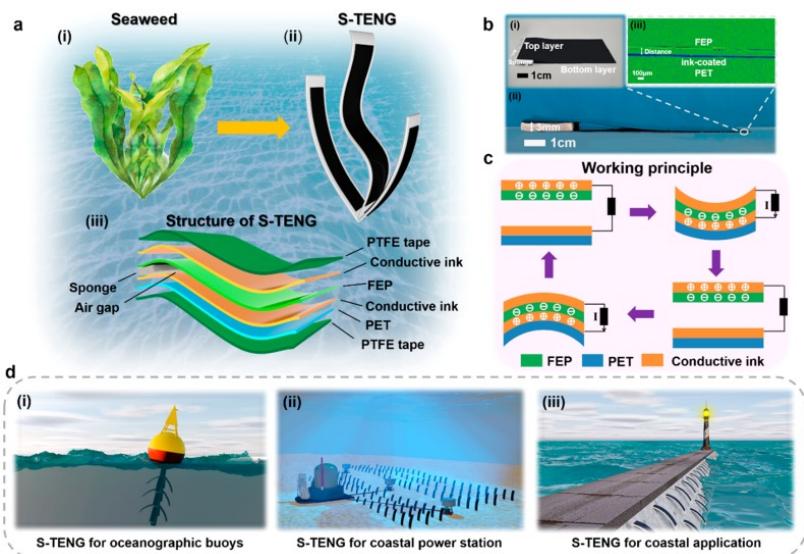
论文的本质依然是用数据说话！

Tips

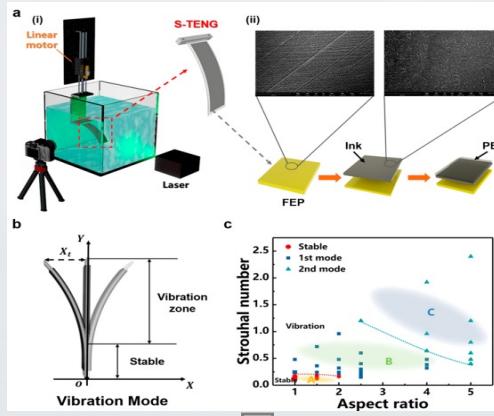
1. 背景全白 (RGB255) / 透明
2. 不一定构建外部框架
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7. 用数据图填满大图，而不是用示意
图填满大图！
8. 择优择重点，多余的图放SI



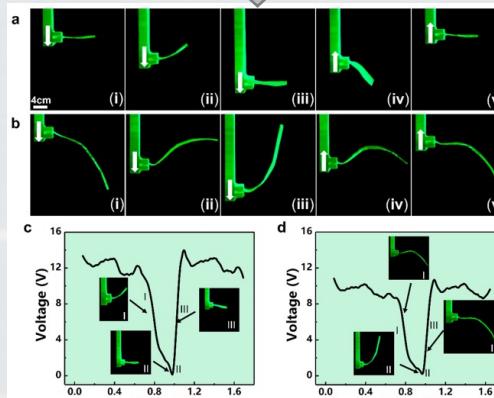
总一分一总



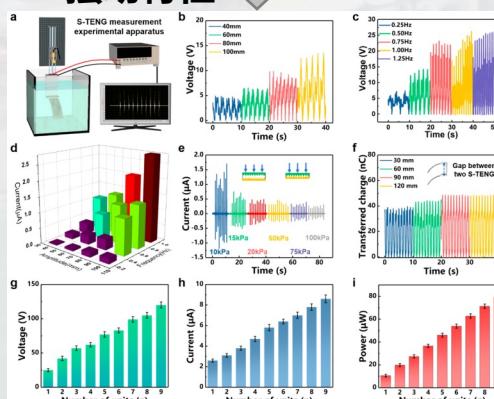
总：× × 场景提出 × × 器件



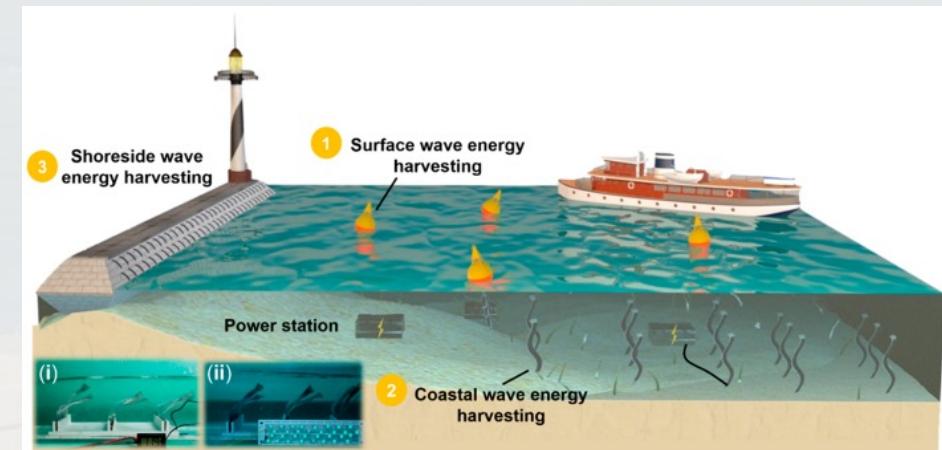
动力学模型 ↓ 实验装置



摆动特性 ↓



最优解 (是什么, 怎么样)



总：× × 器件未来应用于 × × 场景



「01」 论文图片绘制

「02」 汇报PPT绘制

「03」 总结与心得



文献汇报PPT的构思与排版

1. 逻辑梳理

- 摘要（为什么做、怎么做、结论与展望）
- 研究背景（1页）、实验部分（3-6页）、结论（1页）
- 每部分体现逻辑递进

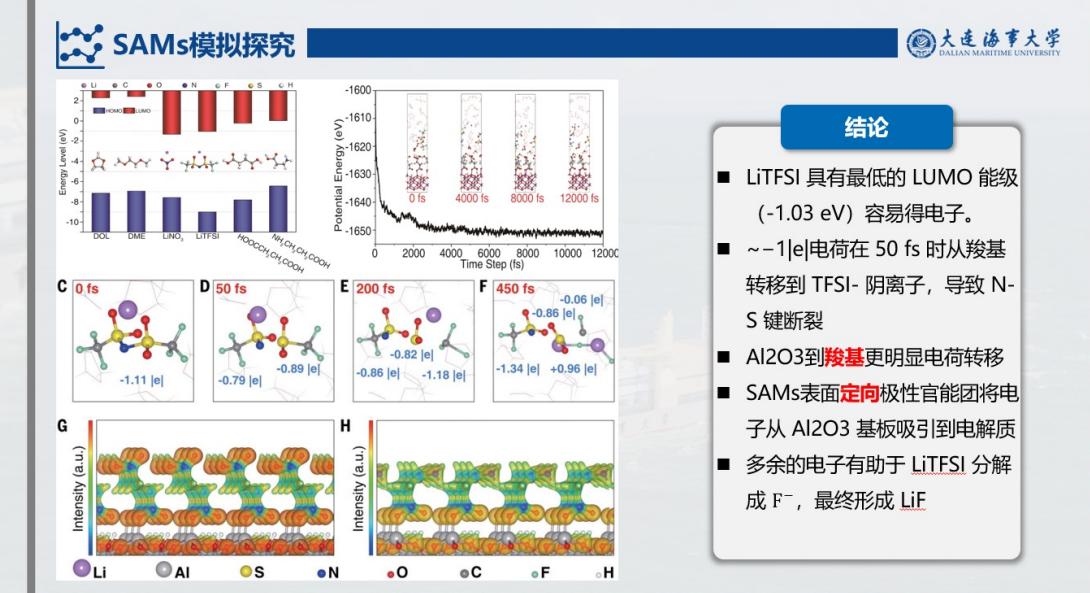
2. 每一部分排版

- 研究背景采用递进式
- 主体部分采用图片+结论（左右式、上下式）
- 图文并茂，不等于所有图文复制粘贴！
- 关键字/词/句的提炼与标注

汇报过程又快又准

让别人看懂，让自己说透

体现汇报人自己的思考





工作汇报PPT的构思与排版

1. 逻辑梳理

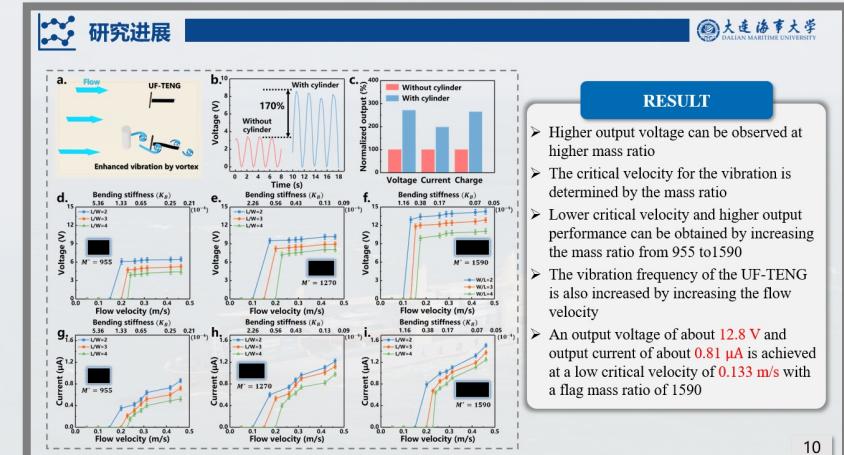
- 研究背景、工作进展、下一步计划
- 合适的应用场景—国内外现状—TENG
- TENG只是一项技术，并非一件产品！

2. 排版方式

- 研究背景（1-2页）、**实验进展**（3-6页）结论（1页）
- 图文并茂、关键字/词/句的**提炼与标注**
- “主线任务”（多页）与“支线任务”（1页）进行排版
- 按照时间线定期排列、按进度表定期总结（1页）

重视迭代过程，保存平时的后处理照片/数据图

多拍照，无意的照片可能会是整项工作的点睛之笔！





「01」学术论文图片绘制

「02」工作汇报PPT绘制

「03」总结与心得



总结与心得

技巧很重要，但**逻辑思维**更重要

- 审美需建立在整体性分析上
- 作图/PPT过程体现逻辑
- 保持美观、易懂、趣味性与科学性

Tips

1. 对整体的把控多思考。
 2. 对细节的处理多练习。
 3. 多参加学术讲座提升自己大局观和思维能力
- 勤能补拙，多学习、多动手锻炼自己。



常用科研软件

1. 三维模型建立/绘制

- Solidworks
- CAD

2. 模型渲染

- Cinema 4D
- 3dmax/ Maya
- Keyshot

3. 后处理

- Ps/ PPT (位图)
- Ai (矢量图)
- Pr/ Ae

4. 实验图绘制

- Origin
- Matlab
- python

5. 文档编辑与文献管理

- Office/ WPS
- Adobe Acrobat Reader DC
- Mendeley/ EndNote

6. 其他

- LabVIEW
- COMSOL
- Ansys



学汇百川 德济四海

A large cargo ship with multiple decks and shipping containers is sailing on a choppy blue sea under a clear sky.

Thank You !