智慧海洋　　研途有道

浅谈科研

——经验分享

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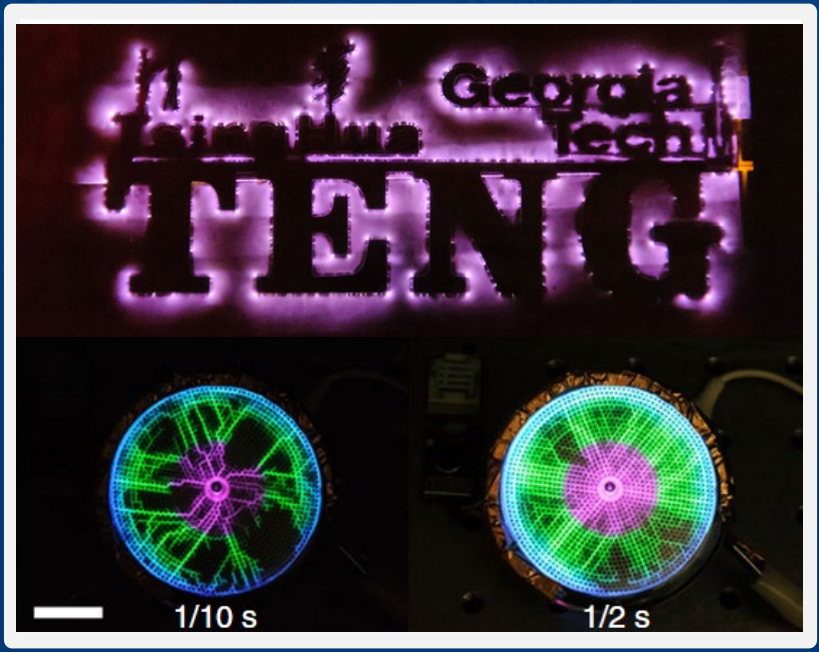
导师：徐敏义 教授

大连海事大学
DALIAN MARITIME UNIVERSITY

2022年3月14日

目录



一、如何快速学会科研

1．清楚毕业要求

硕士研究生学位论文开题报告：

一、 学位论文选题背景、研究目的和意义

1、选题背景：说明选题的科学依据，提出明确的科学问题

2、文献综述：通过文献综述，阐述国内外的研究现状、发展趋势及存在的科学技术问题。

3、研究目的和意义：明确研究目的、选题的理论意义和实际应用价值。

二、主要研究内容及拟解决的关键问题。

三、研究方案：包括拟采取的研究方法、技术路线、可行性分析。

四、研究计划：包括进度安排、内容、预期目标和预期结果

硕士研究生学位论文中期进展报告：

一、研究内容简介（300～500字）

二、研究工作进展（说明是否按开题报告预定内容及进度进行，已完成的工作情况及取得的阶段性成果。）

三、目前存在的主要问题和拟解决的途径

四、下一步的工作计划（说明进度安排，论文预计完成时间，如期完成全部论文工作的可能性。）

硕士研究生学位论文

一、如何快速学会科研

2．论文阅读积累

论文大量积累的作用：

1）文献综述

——无论开题还是毕业论文，都需要几十篇论文的引用。加上没用到的，积累的只能更多。

2）了解前沿动态

——知道行业最新的研究热点，不要研究几年前的事情。

3）培养论文感觉

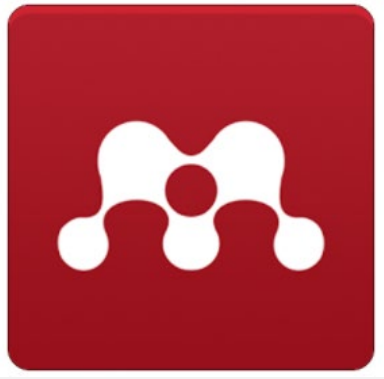
——精读论文一百篇，不会写来也会编

4）提前分类，从容调用

——小论文也需要40篇以上的引用，集中在intro部分。提前分类有助于讲好故事。

常用文献整理软件

endnote



mendeley

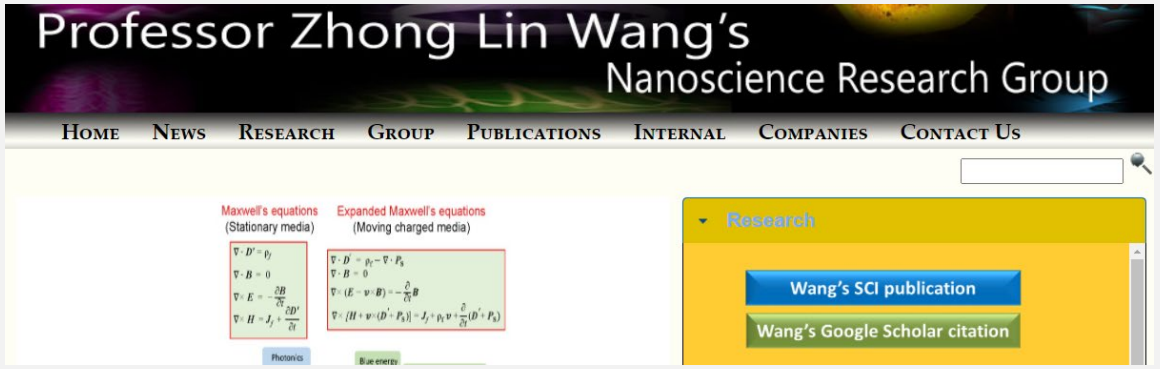
zetero

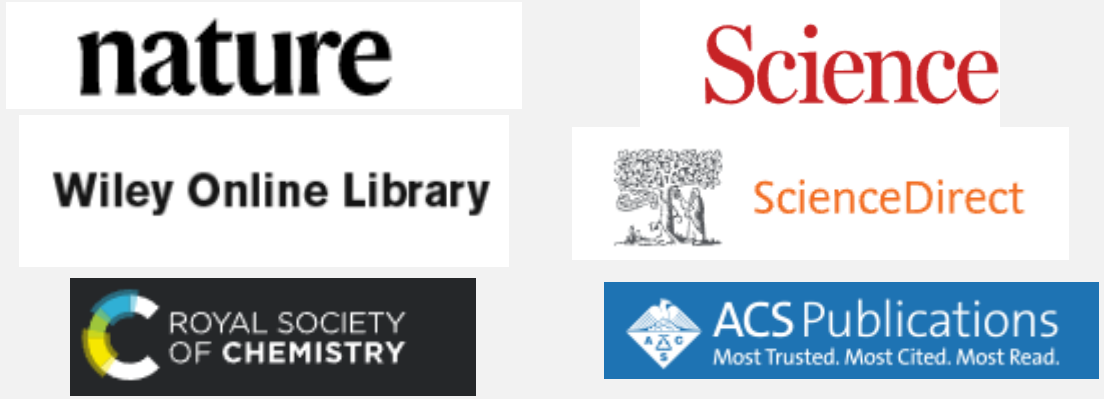
citavi

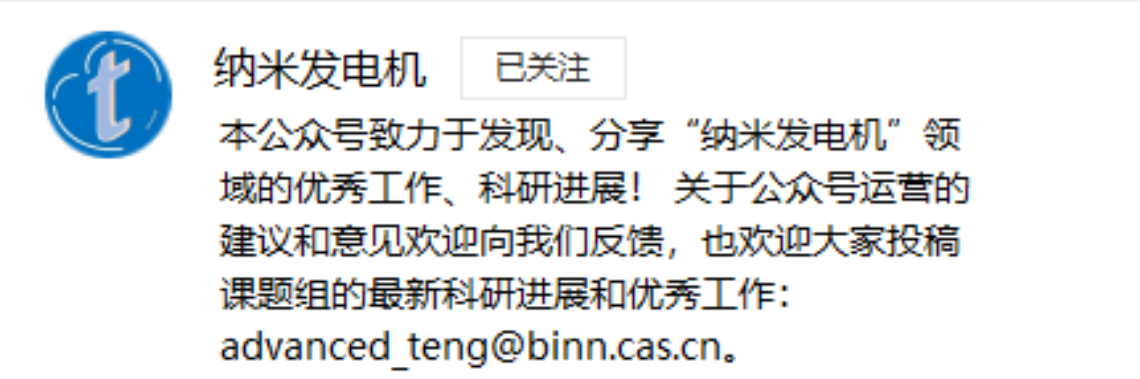
一、如何快速学会科研

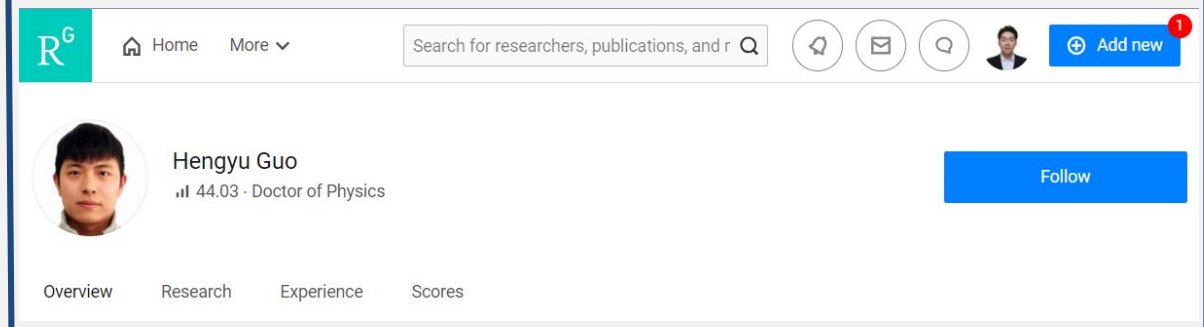
2．论文阅读积累

最新论文获取途径：









一、如何快速学会科研

3．培养审稿思维

培养审稿思维的作用：

1）迅速掌握评判论文好坏的标准

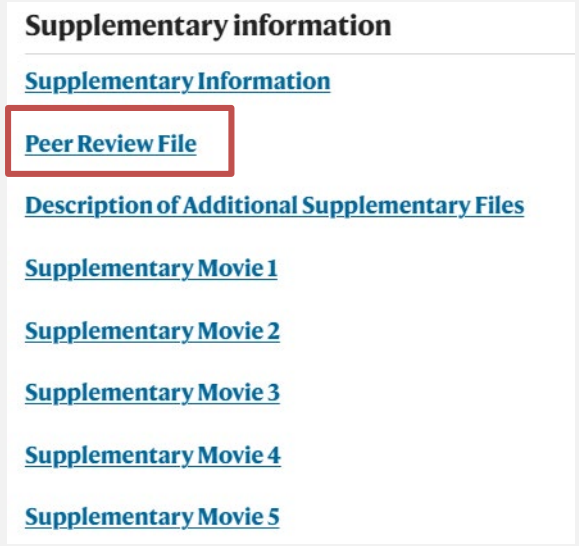
——评判论文好坏不是简单的、线性的任务。需要大量的积累才能大体掌握。

2）提前了解审稿流程

——学习审稿、修稿流程。

3）审稿等于提前了解

——论文从提交到发表需要较长时间，但如果你来审稿，将会提前数月看到别人看不到的论文。



Supplementary information

Supplementary Information

Peer Review File

Description of Additional Supplementary Files

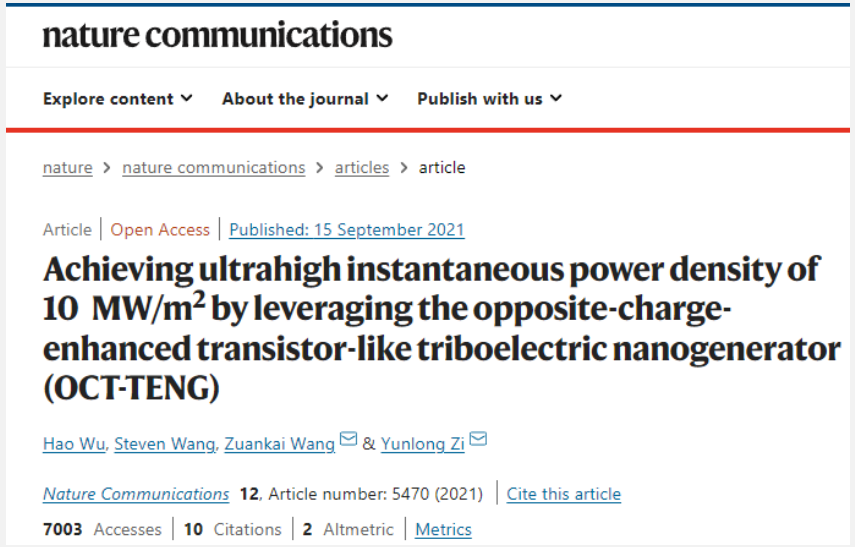
Supplementary Movie 1

Supplementary Movie 2

Supplementary Movie 3

Supplementary Movie 4

Supplementary Movie 5



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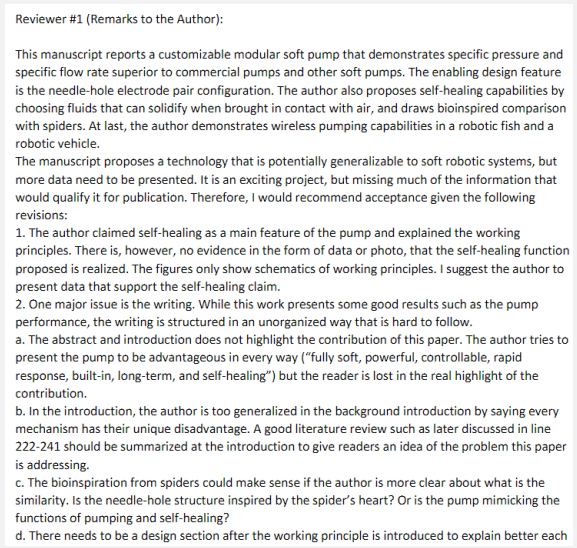
Article | Open Access | Published: 15 September 2021

Achieving ultrahigh instantaneous power density of 10 MW/m^2 by leveraging the opposite-charge-enhanced transistor-like triboelectric nanogenerator (OCT-TENG)

Hao Wu, Steven Wang, Zuankai Wang & Yunlong Zi

Nature Communications **12**, Article number: 5470 (2021) | Cite this article

7003 Accesses | **10** Citations | **2** Altmetric | Metrics



Reviewer #1 (Remarks to the Author):

This manuscript reports a customizable modular soft pump that demonstrates specific pressure and specific flow rate superior to commercial pumps and other soft pumps. The enabling design feature is the needle-hole electrode pair configuration. The author also proposes self-healing capabilities by choosing fluids that can solidify when brought in contact with air, and draws bioinspired comparison with spiders. At last, the author demonstrates wireless pumping capabilities in a robotic fish and a robotic vehicle.

The manuscript proposes a technology that is potentially generalizable to soft robotic systems, but more data need to be presented. It is an exciting project, but missing much of the information that would qualify it for publication. Therefore, I would recommend acceptance given the following revisions:

1. The author claimed self-healing as a main feature of the pump and explained the working principles. There is, however, no evidence in the form of data or photo, that the self-healing function proposed is realized. The figures only show schematics of working principles. I suggest the author to present data that support the self-healing claim.

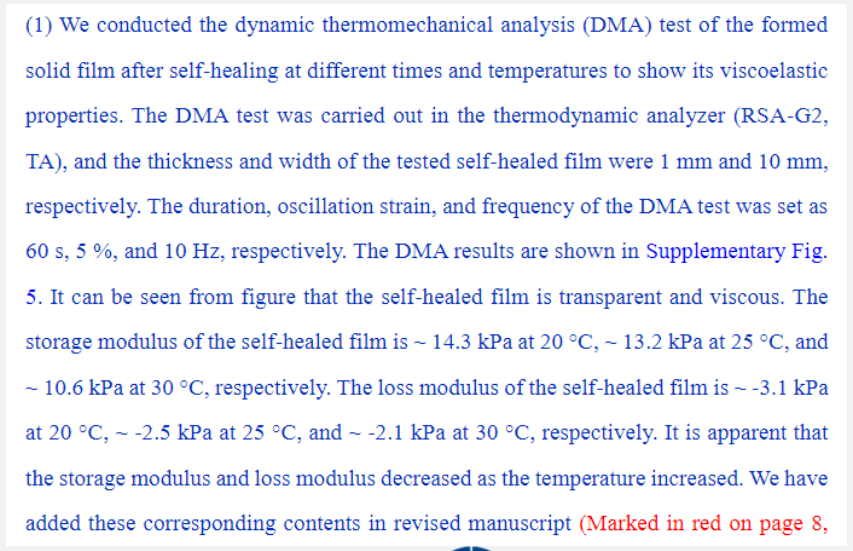
2. One major issue is the writing. While this work presents some good results such as the pump performance, the writing is structured in an unorganized way that is hard to follow.

a. The abstract and introduction does not highlight the contribution of this paper. The author tries to present the pump to be advantageous in every way ("fully soft, powerful, controllable, rapid response, built-in, long-term, and self-healing") but the reader is lost in the real highlight of the contribution.

b. In the introduction, the author is too generalized in the background introduction by saying every mechanism has their unique disadvantage. A good literature review such as later discussed in line 222-241 should be summarized at the introduction to give readers an idea of the problem this paper is addressing.

c. The bioinspiration from spiders could make sense if the author is more clear about what is the similarity. Is the needle-hole structure inspired by the spider's heart? Or is the pump mimicking the functions of pumping and self-healing?

d. There needs to be a design section after the working principle is introduced to explain better each



(1) We conducted the dynamic thermomechanical analysis (DMA) test of the formed solid film after self-healing at different times and temperatures to show its viscoelastic properties. The DMA test was carried out in the thermodynamic analyzer (RSA-G2, TA), and the thickness and width of the tested self-healed film were 1 mm and 10 mm, respectively. The duration, oscillation strain, and frequency of the DMA test was set as 60 s, 5 %, and 10 Hz, respectively. The DMA results are shown in Supplementary Fig. 5. It can be seen from figure that the self-healed film is transparent and viscous. The storage modulus of the self-healed film is ~ 14.3 kPa at 20 °C, ~ 13.2 kPa at 25 °C, and ~ 10.6 kPa at 30 °C, respectively. The loss modulus of the self-healed film is ~ -3.1 kPa at 20 °C, ~ -2.5 kPa at 25 °C, and ~ -2.1 kPa at 30 °C, respectively. It is apparent that the storage modulus and loss modulus decreased as the temperature increased. We have added these corresponding contents in revised manuscript (Marked in red on page 8,

一、如何快速学会科研

4．快速掌握科研工具

工欲善其事，必先利其器

硬件	软件	信息检索能力十分重要
如何搭台子? 如何快速制作器件? 如何使用伺服电机? 如何搭建电路? 为啥机器我用就不好用? 为啥我做不出我想做出的东西? 为啥我做的多个器件效果不稳定?	如何绘制数据图? 如何绘制效果图? 如何建模? 如何仿真? 如何让自己写的东西没有语病? 如何记录工作思路?	

一、如何快速学会科研

5．快速掌握科研工具

工欲善其事，必先利其器

如何搭台子?

1) 铝型材便宜便捷，但过多时装配太烦。

2) 10mm亚克力刚度足够，大方好看，但精度不高。

3) 5mm铝板精度高、刚度足够，但价格贵。

4) 3D打印件灵活，但精度、装配全看个人水平。

5) 尽量多使用标准件。

为啥我做出的东西和我想的不一样?

1）永远不要高估自己或工厂的制作精度、装配水平。

2）设计一定留有容错空间

为啥机器我用就不好用?

买贵的机器就好了 ✗

其实是你不会用 ✓

敬畏之心

学会调平

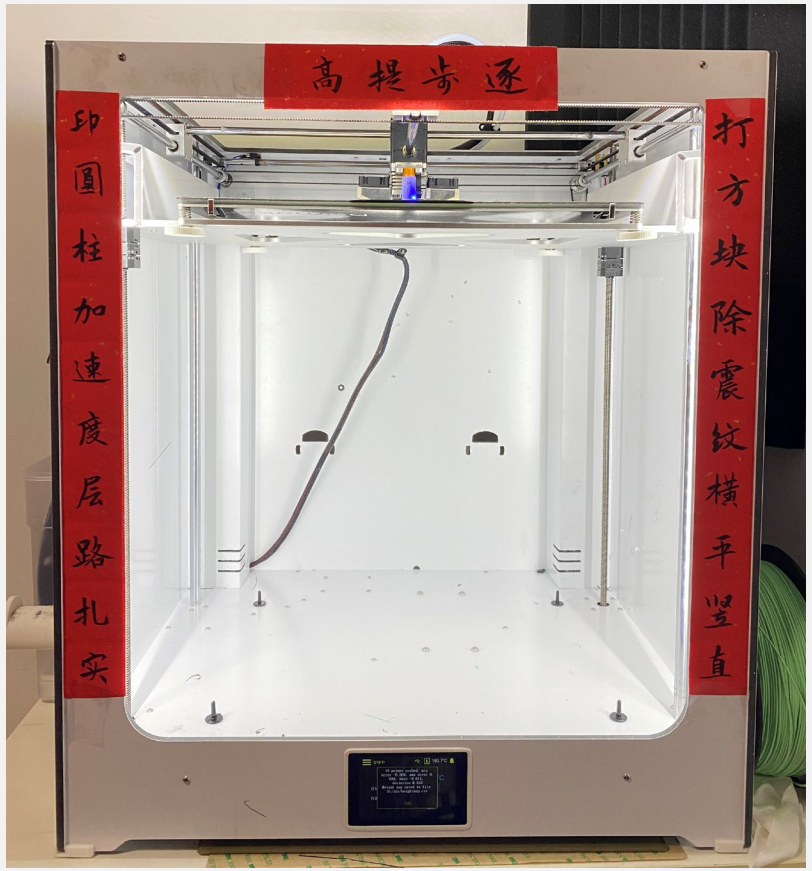
不要压轴

打完擦胶

清理垃圾

擦掉黑油

观察再走



一、如何快速学会科研

6．从“抄”开始

论文就是八股文：

模仿论文结构

模仿思路

模仿配色

模仿语法

模仿实验

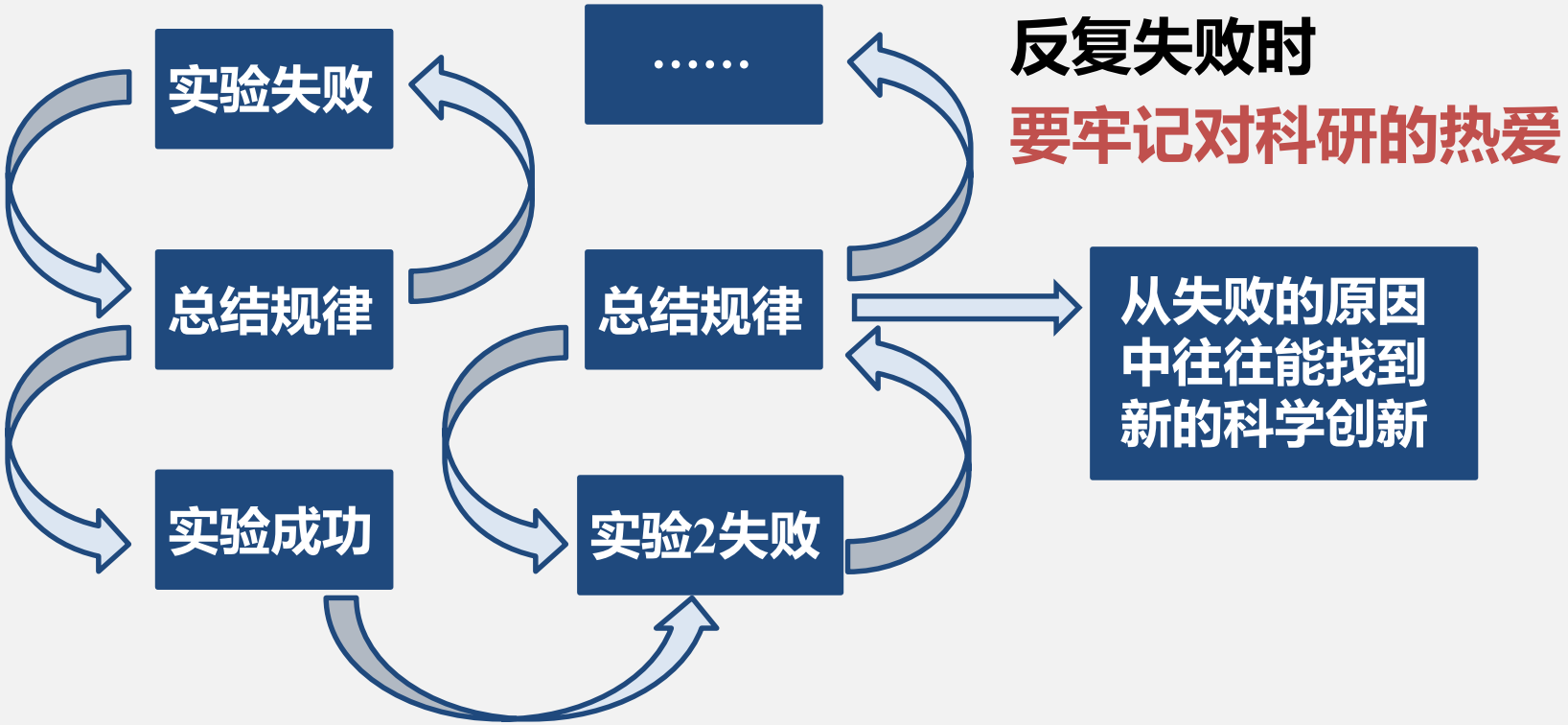
要跨级模仿

切忌抄具体的东西

7．降低预期，调整心态

“战略上藐视敌人，战术上重视敌人”

降低实验预期，轻松成功反而是不正常的。但要努力达到目标实验效果



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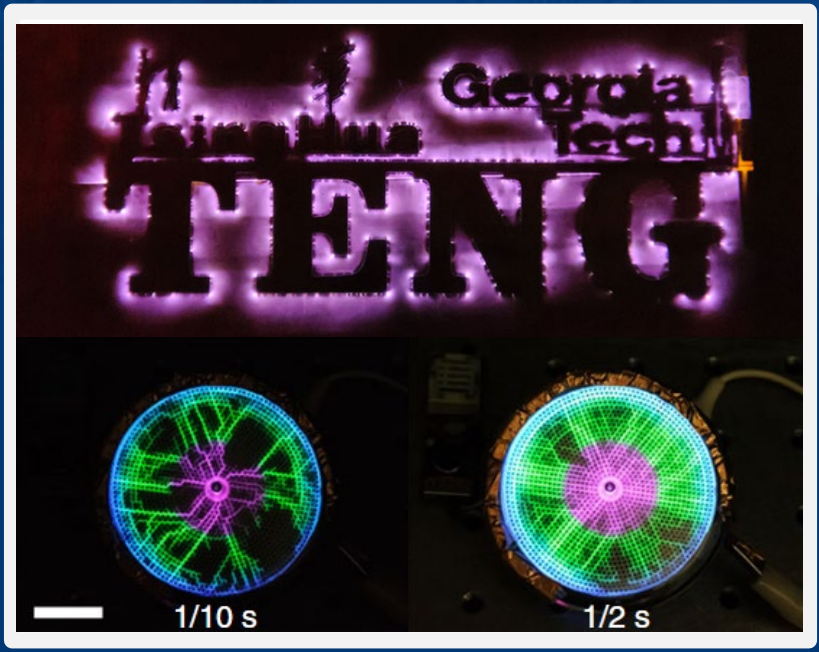


一、如何快速学会科研

二、如何加快成果产出速度

二、如何加快成果产出速度

1．勿忘初心

科研对于新手来说难度高、压力大

不要在忙碌中忘记目标

知道自己的工作真正需要什么

自己做的成果才是自己的

从自己觉得最简单的事开始

二、如何加快成果产出速度

2．培养和老师沟通的习惯

- 老师看起来好严格，不敢和老师聊天
- 实验进展不顺利，没脸和老师说了
- 我就觉得自己最厉害
- 跟老师说了也说不明白

- 老师可能是除了你自己以外最关心你能不能毕业的人了
- 实验好还是坏跟老师沟通都能得到良好的反馈
- 大家智商都差不多，老师的经验更珍贵
- 学会用科学术语描述科研相关的问题

二、如何加快成果产出速度

3．甄选研究方向

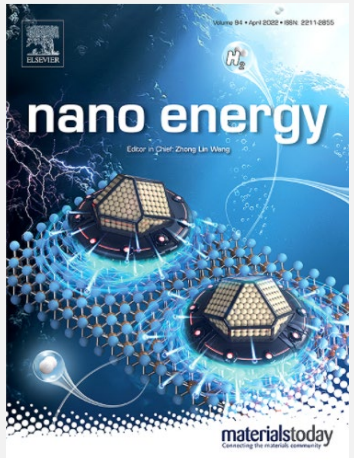
适合研究生的研究：

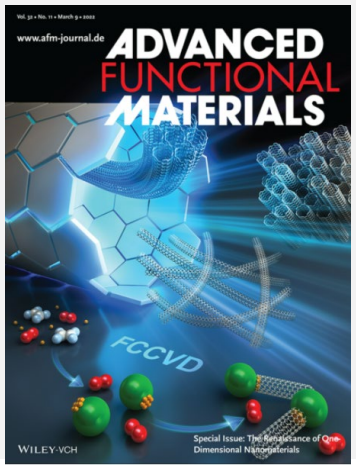
1）有的科学研究几代人都正常
不要定太过宏伟的目标
1年的周期较为合适

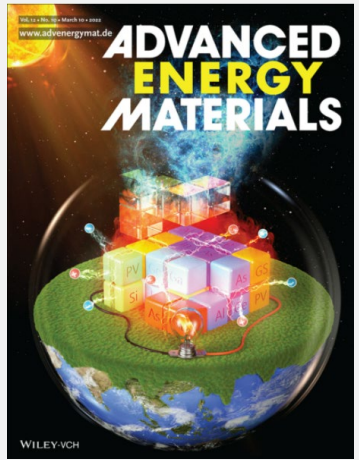
2）不要搞没有意义的研究，
不然写好了也发不出去。

3）创新点是立于不败之地的秘诀

4.目标期刊明确







nature food
ARTICLES
https://doi.org/10.1038/s43016-021-00449-9
Check for updates

Stimulation of ambient energy generated electric field on crop plant growth

Xunjia Li[1,2], Jianjun Luo[1,3]✉, Kai Han[1,3], Xue Shi[1,3], Zewei Ren[1,3], Yi Xi[4], Yibin Ying[2], Jianfeng Ping[2]✉ and Zhong Lin Wang[1,3,5]✉

二、如何加快成果产出速度

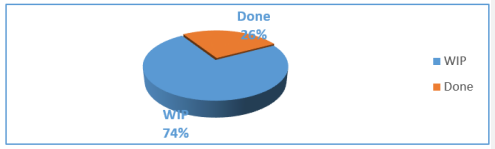
5．计划周密

清晰的计划能够加快效率

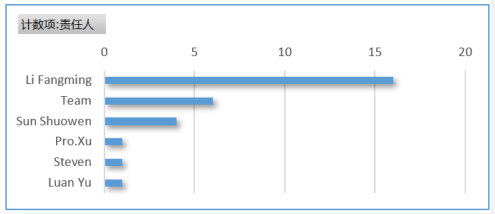
项目名称	TENG EHD PUMP			今日	2022年3月14日
任务总数	29	Done	5	WIP	14	Hold	0	完成率	17.0%

17.0%

Tasks by Status	
行标签	计数项:状态
WIP	14
Done	5
总计	19



Tasks by Status	
行标签	计数项:责任人
Li Fangming	16
Team	6
Sun Shuow	4
Pro.Xu	1
Steven	1
Luan Yu	1
总计	29



项目名称: TENG EHD PUMP

https://cli.im/BgJSZE?iframe=1

计划工期 实际延迟工期 周末 今日 实际开始 实际完成 编辑模式

Task Contents 工作计划	Owner 责任人	Bar 进度	Start Date 计划开始日期	Work 工作日	Due Date 计划完成日期	Status 状态	Actual Start 实际开始日期	Finish Date 实际结束日期
during winter vacation	Li Fangming	100%	2022/02/08	16.0 d	2022/03/01	Done	2022/02/09	2022/03/01
make a Gantt chart	Li Fangming	100%	2022/02/09	3.0 d	2022/02/11	Done	2022/02/10	2022/03/02
Design the New TENG	Li Fangming	100%	2022/02/12	2.0 d	2022/02/14	Done	2022/02/15	2022/03/02
Preparation of devices	Li Fangming	100%	2022/03/01	10.0 d	2022/03/14	WIP		
Make the New TENG	Li Fangming	144%	2022/03/01	8.0 d	2022/03/10	WIP		
Try the charge pump for TENG	Sun Shuowen	100%	2022/03/10	3.0 d	2022/03/14	WIP		
Make the pressure sensor	Luan Yu	80%	2022/03/10	4.0 d	2022/03/15	WIP		
plan for the paper	Team	100%	2022/02/15	10.0 d	2022/02/28	Done		2022/03/02
story	Li Fangming	93%	2022/03/01	11.0 d	2022/03/15	WIP		
framework	Li Fangming	100%	2022/03/01	5.5 d	2022/03/07	Done		2022/03/01
plan the figure（草图）	Li Fangming		2022/03/01					
experiments and data	Sun Shuowen	48%	2022/03/01	20.0 d	2022/03/28	WIP		
experiments	Sun Shuowen							
demo	Li Fangming			15.0 d				
writing the paper	Li Fangming	48%	2022/03/01	20.0 d	2022/03/28	WIP		
画数据图	Sun Shuowen							
画示意图	Li Fangming							
abstract and introduction	Li Fangming							
results	Li Fangming							
discussion	Li Fangming							

日期显示: 03/14 计划工期 实际延迟工期 周末 实际开始 实际完成

2022年2月 2022年3月

6.严格落地

科研好点子、好方向并不稀缺

能把工作快速落地的能力最稀缺

二、如何加快成果产出速度

7．快速发表第一篇文章

知道很多道理但仍旧过不好这一生？

重点是实践

从0到1的过程最痛苦，

长痛不如短痛

8. 注意身心健康

1）释放压力

2）早睡早起

3）适度运动

内在有激情，

但还要从容不迫


Thank you!