How to write a scientific paper ?

科技论文撰写

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屠呦呦获 2015 年诺贝尔生理学或医学奖

- 我国科学家屠呦呦，理由是“有关疟疾新疗法的发现”
- 爱尔兰的 William C. Campbell 和日本的 Satoshi ōmura，获奖理由是“有关蛔虫寄生虫感染新疗法的发现”

第16卷 第5期 药 学 学 报 Vol. XVI, No. 5
1981 年 5 月 ACTA PHARMACEUTICA SINICA May, 1981

中药青蒿化学成分的研究 I

屠呦呦 倪慕云 钟裕容 李兰娜
崔淑莲 张慕群 王秀珍 梁晓天*

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提要 近年来我们对中药青蒿的化学成分进行了较系统的研究，其中抗疟有效成分—青蒿素(qinghaosu)为具有过氧基的新倍半萜内酯，有专文报道[1~4]。本文报道其它倍半萜内酯，黄酮，香豆素及挥发油的分离鉴定，其中青蒿甲素及丙素(qinghaosu I 及 III)为新化合物。

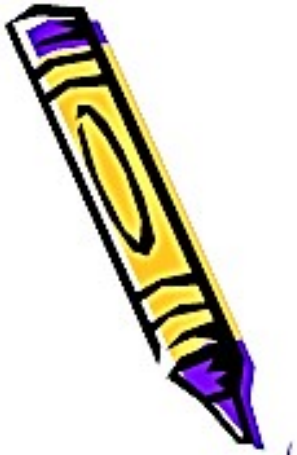
中药青蒿为常用中药之一，在我国已有二千多年沿用历史，除截疟外，尚有清热凉血等功效。

青蒿的化学成分据文献报道有挥发油，油中含有蒿酮(artemisia ketone)，异蒿酮(iso-artemisia ketone)，按油精(cineol)，左旋樟脑(l-camphor)，丁香烯(caryophyllene)，α-蒎烯(α-pinene)，倍半萜烯醇及酯类等[5,6]，两种香豆素—东莨菪内酯(scopoletin)及东莨菪甙(scopolin)[7]，烯炔化合物[8]，倍半萜内酯—arteannuin A 及 B[9,10]，黄酮—万寿菊黄素6,7,3′,4′-四甲基醚(quercetagetin 6,7,3′,4′-tetramethyl ether)[11]，廿九烷，廿五烷，饱

为什么要做研究？

- 研究≠研发
  - 研究的目的是发现新知识、发明新技术
  - 研发：基于已有的知识和技术进行研制、开发
- 科学研究扩展人类的知识
- 没有科学研究就没有技术进步

为什么要写论文?



- 把你的工作告诉同行
  - 经过同行评审（peer-review），成为科学文献
- 基础研究的主要成果
  - 基础研究通常离实际应用有较大距离
  - 只有很少的研究工作能很快进入实际应用

前沿研究-> 实验室成熟技术/工业界新技术 -> 工业界成熟技术

论文好写吗?

- 很容易!

  只要有了好的研究工作，写论文不过就是用文字把你的工作描述出来

- 很难!

  如果没有研究工作支撑的话

论文是“做”出来的而不是“写”出来的

“写”的时间其实最多只占10%

如何做研究？

研究活动的大致过程- TPIC：

Topic -> Problem -> Idea -> Concrete work (theoretical analysis, experiments, etc.)

-> Paper writing -> Submit

小结一下

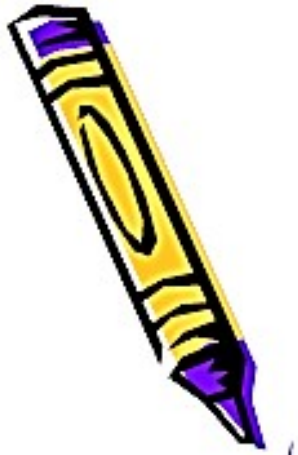
Topic -> Problem -> Idea -> Concrete work

对一项具体的CS研究工作来说：

- 找到好的问题是关键
- 有了好的idea，问题就解决了一大半
- 具体、坚实的工作是必经的过程

Contents

如何写论文？



你需要说的其实就是这些：

- Problem X is important
- Previous works A, B, and C have been done
- A, B, and C have their weakness
- Your work D
- Theoretic analysis
- Experimental comparison against A, B, and C
- Why D is better
- Strength and weakness of D
- Future work on D

Outline

科学论文有比较清晰的结构，一般包括：

- Title
- Abstract
- Introduction
- Previous work
- Your contribution
- Support (theoretical or experimental)
- Discussion
- Conclusion
- Reference

Title

- 清楚地表达出主要工作
- 字数忌长（尽可能不要超过20字）
- 有吸引力

An example:

“甲地区乙时期丙昆虫交配过程的跟踪研究及其结果”

“昆虫交配后吃掉配偶的原因探讨”

“昆虫求偶过程中的献身行为”

“Eat me!”

The title of an <Science> paper

Title

1 特点

1) 点明主题； 2) 简明扼要

2 表示法

2) 采用不含从句短语，其前的冠词可省略

例：阵列阴极稳定性的研究

Study of the Stability of an Array Cathode

2）采用动名词短语

例：振荡器稳定性的改进

Improving the Stability of Oscillators

3) 采用“ on 短语”

例：论超立方体网络中的容错路径选择

On Fault-Tolerant Routing in Hypercubes

Author

1 作者姓名

可写成如： Li Xiangdong

为防止外国人产生误解，帮助国外杂志编辑人员区分，可写成一下三种写法：

1) 姓氏字母全部大写

如： LI Xiangdong

2) 姓氏下面划一横线

如： Li Xiangdong

3) 姓氏后面加逗号

如： Li, Xiangdong

Author

School of Automation Engineering, Shanghai University of Electric Power, Shanghai 200090, China

2 作者工作单

1) 直接标在姓名下方

Department of Foreign Languages, School of Humanities , Xidian University, Xi'an 710071, China

西安电子科技大学人文学院外语系, 中国西安, 邮编：710071

2）标在论文第 1 页的脚注中

The author is with the department of foreign languages, the school of humanities at Xidian university, Xi'an 710071, China

注：美式英语通常用 with，而英国往往用介词 at

示例1：

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International Journal of Refrigeration 27 (2004) 415–421

REVUE INTERNATIONALE DU FROID
INTERNATIONAL JOURNAL OF
refrigeration

www.elsevier.com/locate/ijrefrig

Transient thermal behavior of a water heater system driven by a heat pump

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[1] Member of IIR, commission E1.

Abstract

Purpose: Summarize your contributions

Style:

- What is the problem
- What is your work
- Features of your work
- Advantages of your work
- Results

基于可调谐 F-P 滤波器的光纤光栅解调系统

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摘要：为了进一步提高光纤光栅解调系统的性能，提出和研究了一种新颖的基于可调谐 F-P（Fabry-Perot）滤波器的光纤光栅解调技术，并以此为基础构建了探测系统。系统使用一个固定波长的参考光纤光栅作为波长参考元件，通过对传感光纤光栅与参考光纤光栅的波长测量与差值运算，消除了可调谐 F-P 滤波器腔长漂移对测量精度的影响。给出压电陶瓷电压对应的伸长量，有效地减小了压电陶瓷非线性对测量的影响，提高了光纤光栅波长的测量精度。在测量范围内，最大非线性偏差为 0.5%。

关键词：光纤光栅；非线性；二次函数；可调谐 F-P 滤波器

A novel fiber Bragg grating sensor interrogation system utilizing a tunable Fabry-Perot filter

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（State Key Laboratory of Precision Measurement Technology and Instruments, Tsinghua University, Beijing 100084, China）

Abstract: To improve the performance of FBG interrogation system, a novel fiber Bragg grating sensor interrogation system based on a tunable fiber Fabry-Perot (FFP) filter was demonstrated. Firstly, a reference fiber Bragg grating (FBG) was used as a wavelength reference element. By measuring the wavelength difference between reference FBG and sensor FBG, the drift of tunable FFP filter's cavity length was compensated. Secondly, a quadratic fit function was made with software based on experiment results. This function showed a good fit to the relationship between the displacement of PZT and control voltage. It was used to calculate the wavelength of the sensing FBG. In experiment, a strain of 0 ~ 1800 $\mu\varepsilon$ was applied to the sensing FBG and the maximum nonlinearity deviation of measured wavelength was 0.5%. Experiment results show that the measured error caused by the drift of FFP filter's cavity length and PZT's nonlinearity is greatly reduced and a higher accuracy is obtained.

Key words: fiber Bragg grating; nonlinearity; quadratic fit function; tunable fiber Fabry-Perot filter

研究目的

过程与方法

• In this paper, an innovative dual-mode multifunction heat pipe type chemisorption ice maker was designed, in which the compound adsorbent of activated carbon–$CaCl_2$ was used to improve the mass and heat transfer performance of adsorbent. For this test unit, the heating, cooling and heat recovery processes between two adsorbent beds were performed by multifunction heat pipes without additional power consumption. Two operation modes were possible for the advanced chemisorption refrigeration system. The first operation mode was a highly efficient mass and heat recovery sorption cycle where driving heat source temperature was about 145 ℃. The second operation mode was a two-stage heat recovery sorption cycle in which available driving heat source temperature was about 103 ℃. The experimental results show that the first operation mode cycle can increase the coefficient of performance (COP) by 69% when compared with basic cycle. The second operation mode cycle can operate effectively with relatively low-grade generation temperature, and the performance of the two-stage heat recovery cycle was improved by more than 23% when compared with conventional two-stage cycle under the same generation temperature of 103℃ and cooling water temperature of 30℃.

(Nearly 200 words)

结果与结论

Examples for Abstract（1）

Abstract （摘要）

词汇的使用

① 趋于使用大词 (big words) 而不用普通词

about——approximately 大约

begin——commence 开始

cheap——inexpensive 便宜的

use——utilize 利用

careful——cautious 谨慎的

care——caution 谨慎

buy——purchase 购买

give——accord 给

in the end——eventually 最终

try——endeavor 力图

ask——inquire 询问

Abstract （摘要）

②趋于使用单个动词而少用短语动词

take in——absorb 吸收，接纳

put out——extinguish 熄灭，消灭

use up——consume 用完，耗尽

break up——rupture 破裂，破坏

come across——encounter 相遇，面临

take into pieces——dismantle 拆除，解散

take away——remove 移开

make up——invent 创造

Abstract （摘要）

③注意科技文中的词汇固定搭配 。

例：晶体管和电子管相比有不少优点。

Transistors have a number of advantages over electron tubes.

注：在 advantages 后面要用介词 over 来表示“与.....相比”。

例：必须求出该电阻上的电流和电压。

It is necessary to find out the current through and the voltage across the resistors.

注： 在 current 和 voltage 后要求用不同的介词，前者接 through, 后者接 across. 而不能写成：

The current and voltage on the resistor.

Abstract （摘要）

④ 避免使用缩略词

lab——laboratory

mike——microphone

bike——bicycle

phone——telephone

auto——automobile

ad——advertisement

Abstract （摘要）

⑤ 趋于使用名词表示动作

analyze——make an analysis of

study——make a study of

compare——make a comparison of A with B

indicate——give an indication of

illustrate——provide/give an illustration of

limit——provide/give a limit to

describe——provide/give a description to

Abstract （摘要）

e.g. The device has been analyzed in detail.

A detailed analysis of the device has been made.

我们对该设备进行了详细的分析。

Digital computers are briefly introduced in the book.

A brief introduction to digital computers is given in the book.

本书对数字计算机作了简要的介绍。

Noise limits the channel capacity.

Noise provides a limit to the channel capacity.

噪声限制了信道的容量。

Abstract （摘要）

⑥ 科技论文中，表示同一概念的词汇应尽可能多样化，避免频繁使用同一词汇和表达。

如：论述

可使用： discuss, treat, cover, deal with , present, describe 等词汇。

Introduction

Purpose: Background and organization of the paper

Style:

- Problem X is important
- A, B, and C have been done
- A, B, and C have their weakness
- Our work D
- Features and advantages of D
- Results
- Organization of the paper

Previous work

Purpose: Why your work, the differences

Style:

- Categorization of previous works
- One or two sentences for a work
  - Strength
  - Weakness

Don't over-criticize previous works

Your contribution

Purpose: Introduce your work

Style:

- Motivation
- Definition, notation
- Algorithm
  - Pseudo-code
  - Diagram
  - Explanations

If you were the reader, what questions will you ask?

Theoretical analysis

Purpose: Theoretical support to your work

Style:

- Definition, notation (can be omitted if exist)
- Lemma
- Theorem
- Proof

Put tedious details in Appendix

Experiments

Purpose: Experimental support to your work

Style:

- Experimental design

  Be sure that other researchers can repeat your experiments according to your descriptions

- Comparison

- Discussion

  What is revealed by the experiments?

Put tedious details in Appendix

Discussion

Purpose: The relationship between your work and some very related works

Style:

- Work A
  - Why it is very related
  - Difference to your work
- Work B
  - Why it is very related
  - Difference to your work

Conclusion

Purpose: Summary and future work

Style:

- Summary
- Future work

Acknowledgement

Reference

Appendix

6. 致谢 Acknowledgements

- 对经费资助单位，论文选题指导老师，实验数据测定的工作人员等表示感谢。

Acknowledgments

This work was partially supported by National Natural Science Foundation of China (Grant No. 61503237, Grant No. 61573290), Shanghai Natural Science Foundation (Grant No. 15ZR1418300), Shanghai Science and Technology Commission Key Program (Grant No. 15160500800), Shanghai Key Laboratory of Power Station Automation Technology (No.13DZ2273800), Shanghai Education Commission Excellent Youth Project (No. ZZsdl15144).

7. 参考文献 References

（1）列入文献的著作，只限于自己阅读过的和论文中引用过的，而且是正式发表的出版物。

（2）按正文中引用文献的先后排列，书写格式不同杂志有不同的要求。

杂志： R.Zana, P.Lianos; J.Colloid Interface Sci 1991, 90, 224~236.

书： G.Z.Li, W.Zhang. In Adsorption and Aggregation of Surfactant in Solution (eds. K.L.Mital. D.O.Shah), Surfactant Science Series volum 109. Marcel Dekker Press, New York, 2002.pp 189~199.

上海交通大学 SHANGHAI JIAO TONG UNIVERSITY

7. 附录与符号表

- 有些内容如果需要附加内容解释，如数学公式的推导，实验数据表等则可以以附录形式给出；

- 对于数学公式和物理量比较多的论文，一般需要给出符号表对符号的物理意义，单位等给出解释。

Contents

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中国学位论文数据库
万方数字资源系统
万方-电力在线动态平台
中国科技论文统计与分析网
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中国标准全文数据库
国研网
中经网
人大复印资料
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北大标准
南大标准

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IEL（IEEE）数据库
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Begell House-热能工程研究文集 NEW
PQDT学位论文全文数据库
SpringerLink英文全文数据库
俄罗斯在线期刊
EBSCO英文数据库(ASP、BSP)
Calis西文期刊目次数据库
WISEBOOK外文原版电子图书
金图英文原版电子书

其它

超星发现系统 NEW
新东方多媒体数据库
EBSCO英语分级阅读中心
网上报告厅
环球英语多媒体资源库
起点自主考试学习系统
维普智立方 试用
维普考试资源系统 试用
冰果英语 试用
一站式OA资源检索平台Socolar 试用
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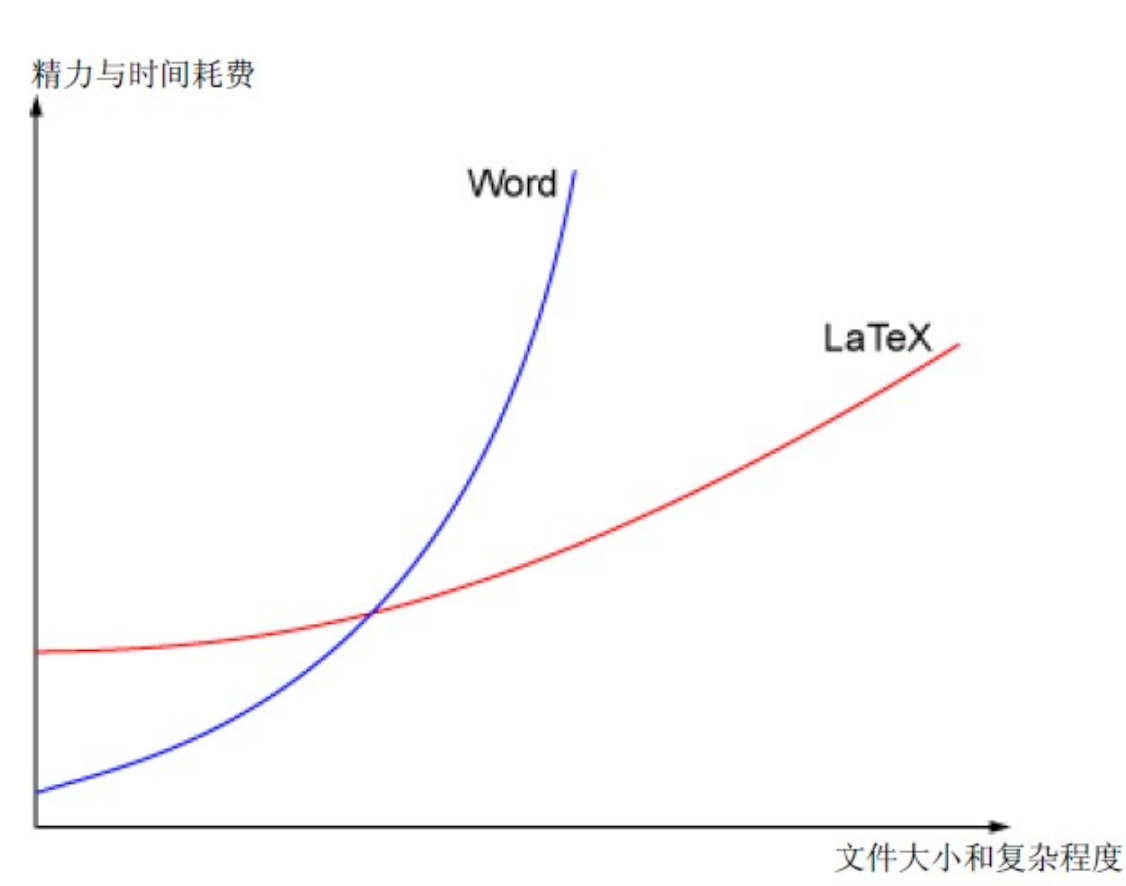
LaTex vs. Word



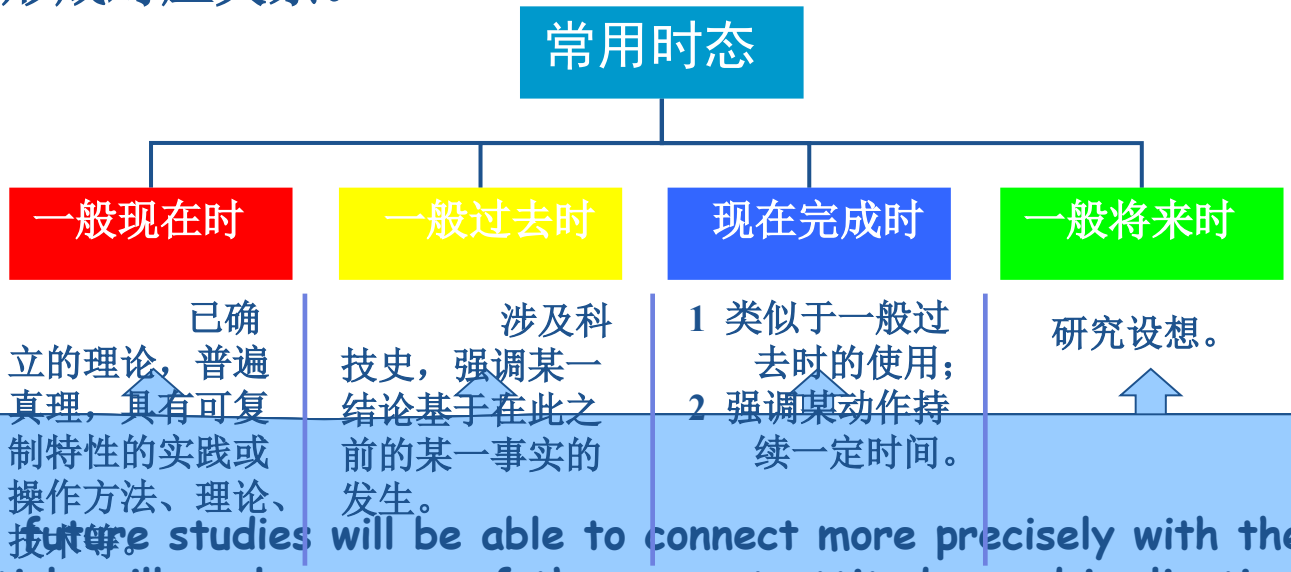
Tense （时态）

科技论文中常用的时态有一般现在时、一般过去时、一般将来时以及现在完成时。按照惯例，有些时态形式可以与作者所要传达的信息内容形成对应关系。

时态及语态

Tense （时态）

科技论文中常用的时态有一般现在时、一般过去时、一般将来时以及现在完成时。按照惯例，有些时态形式可以与作者所要传达的信息内容形成对应关系。



- "Perhaps future studies will be able to connect more precisely with the data." ;
- "This article will explore some of the current attitudes and implications to using numerical simulation method." ;

时态及语态

Tense （时态）

论文中凡涉及研究领域内已存在的理论和知识 (包括他人在此之前发表过的论文) 时均采用一般现在时来表示对理论贡献者们的尊重。因而， Introduction 和 Discussion 的绝大部分内容 (即涉及研究领域内已有的理论和知识的部分) 应采用一般现在时。按照 Day 的建议，摘要通常应该采用一般过去时，因为作者在这里主要是介绍自己的工作。下表概括了科技论文主要组成部分的时态使用一般规则。

时　态	引 言	方 法	结 果	讨 论
现在时	大量使用	很少使用	很少使用	大量使用
过去时	偶尔使用	大量使用	大量使用	偶尔使用

时态及语态

Voice （语态）

科技论文主要说明事实，一般用被动语态。但使用被动语态并不是科技论文写作所要遵循的绝对的原则。实际上主动语态比被动语态语感更强，更有表达力，且被动语态往往违背 “精确”、“简洁”的要求，因而可能情况下尽量用主动语态。譬如：

•“A exceeds B” 读起来要好于“ B is exceeded by A” 。

使用主动语态还有助于避免过多使用类似于” is""was""are" 和” were" 这样的弱动词。

论文通篇采用被动语态会导致读者不明白是在引用别人的工作，还是作者自己的工作。因而具体使用哪种语态首先取决于句子所要强调的重点，同时应该考虑表达的简练和精确。

Lexical Features （词汇特征）

英文科技论文的词汇具有以下特征：

- 专业术语（ Professional terms ）
- 意义具体的动词（ Single concentrated verbs ）
- 合成词（ Compound words ）
- 缩写词（ Contracted words ）
- 语义确切的词（ Words with a special meaning ）
- 名词词组（ Noun clusters ）
- 名词动词组合（ Noun verb combination ）

词汇及语法

- get together-collaborate
- waterproof
- e.g.
- risk assessment
- crossing-river
- shield impelling
- connecting passage
- grout injecting
- prestressed-concrete
- earth covering

词汇及语法

Adjective and Adverb （形容词和副词）

在科技论文中使用形容词和副词要慎重。

像“ fairly”，“ quite”，“rather”，“ several”，“ very”，“ somewhat”，“ much”，“ amazing”，“mainly”，“ briefly”这样的修饰词在科技论文中最好不用。例如爱希比教授认为，“ this very important point”不及“ this important point”来得简洁客观，而“ this point”则更佳。

另外，论文中能用形容词做定语的，不用名词来做定语。比如用experimental results 而不用 experiment results 。

词汇及语法

Art （冠词）

中文作者对英文冠词掌握通常不够好，例如经常会忘记定冠词 "the"，克服的方法之一是检查名词，如果名词前没有加不定冠词 "a" 或 "an"，而该名词又非抽象名词或不可数名词，则要考虑是否要在前面加上定冠词 "the"。下表总结了一些使用定冠词的规则以供参照。

第二次提及	– We proposed a new model. The model is…
最高级	– The most important parameter
序数词	– The first slide
特指	– The only research in this field
通用知识 / 独有事物	– The Government/the moon
Of 短语	– The behavior of the soil
以人名定义的现象等	– The Doppler effect

词汇及语法

Participle （分词）

中文作者在写英文论文时常常会写出这样的句子：

- After closing the incision （切口） , the animal was placed in a restraining cage.
- Having completed the study, the bacteria （细菌） were of no further interest.

从语法上分析，这两个句子的隐含主语分别为： the animal 和 the bacteria，但作者省略掉的真正的主语其实是 the experimenter 。所以这两个句子都造成了歧义。这是典型的使用分词从句造成的错误。如果改用一般从句，这种错误就避免了：

- After the incision had been closed, the animal was placed in a restraining cage.
- Once the study was completed, the bacteria were of no further interest.

词汇及语法

Reporting / evaluative verbs

- **Typical reporting verbs**
  - Others found / reported / showed / proposed / used / developed / studied / suggested / observed / described / discussed / demonstrated / presented / gave
- **Typical verbs used to report an author's argument, belief, or claim**
  - The author argues / contends / maintains / believes / claims (by the writer does not totally agree; the writer is not convinced) / implies (suggests sth. without saying it directly)
- **Useful reporting verbs for summarizing an author's ideas**
  - The author suggests / points out / notes / stresses / emphasizes / pays particular attention to / adds / goes on to say / begins by (+-ing verb) / concludes that (+noun phrase)

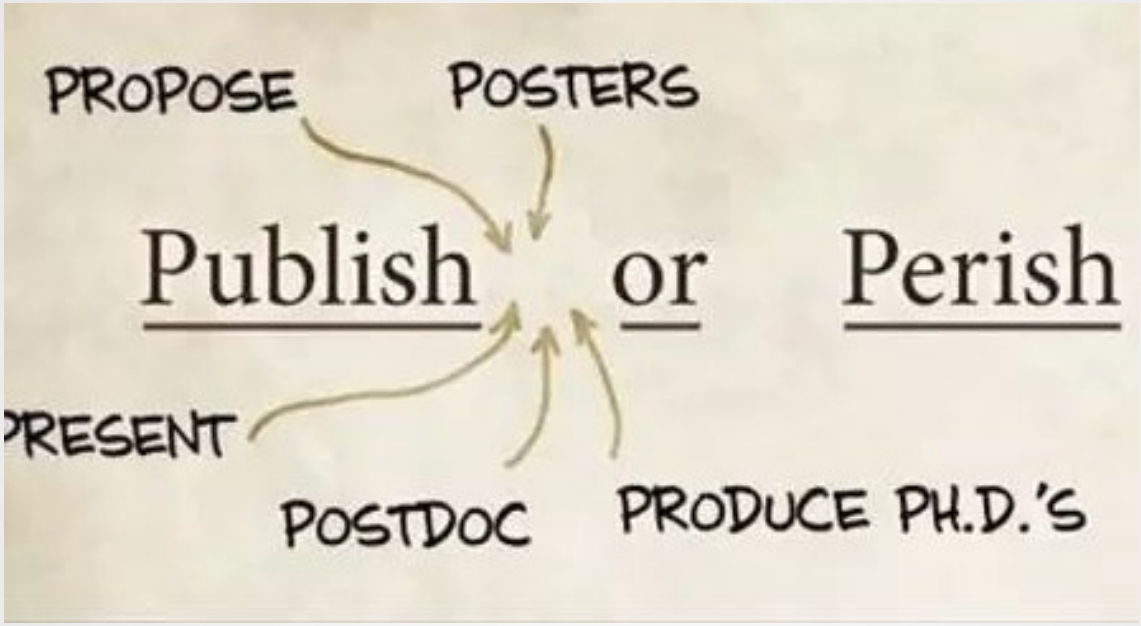
以上是撰写英文科技论文的基本常识，在这里有必要指出：需要注意
在科技论文中避免使用抱歉词句。譬如：

“Unfortunately, there was insufficient time to complete the last set of tests.”

只能让读者认为作者计划不好，懒惰，能力不够。

写一篇好的英文科技论文需要反复推敲，修改。写完初稿后最好把
它搁在一边两三天后再拿过来修改。在最终定稿前要仔细检查格式、标点符号，核对参考文献等等，哪一样细节都不应该忽视。

态度?



不能抄袭!

不能一稿多投!

切记!

Thank you!