摘　要

本文研究了科技英语论文的翻译和写作应注意的几个基本问题。分析了科技英语论文翻译中一些常见的问题，并就科技英语论文翻译原则问题方面进行了探讨。提出了科技英语翻译的三大基本原则：忠实性原则、通顺性原则、美学原则。并就如何运用这三大原则进行了系统阐述。系统分析了化学科技英语论文翻译和写作在词汇和句法两个方面的基本特点。对化学科技英语论文摘要的基本组成、写作的基本要求和基本技巧进行了系统研究，并结合国内外已经发表的四篇化学化工科技论文的英文摘要进行了具体写作研究。由于科技英语论文写作涉及到英语和某个科技专业方面的许多具体问题，如英语句法、词法及各个专业表达方面的特殊要求，因此本文结合自己所学的化学专业，就化学科技英语论文的写作，选取了在 Advanced Material（2006 年第 18 期）发表的一篇化学论文为例进行了具体分析，并对这篇文章当中出现的英语语言表达方面的一些问题进行了研究和探索，进一步明确了在科技英语论文写作过程中容易出现的一些科技英语规范化方面的问题。

关键词：　科技英语，翻译，写作，错误分析

ABSTRACT

This thesis is about the translation and writing of EST (English for science and technology). It briefly analyzes some common problems in translating and writing ESC and puts forward three principles for translating EST: the principle of fidelity; the principle of expressiveness and the principle of elegance. This thesis also elaborates systematically on how to put the principles into practice as well as the lexical and grammatical characteristics of EST. Based on the analysis of four publicly published papers in chemical academic periodicals both at home and abroad, it also discusses the composition, basic demands and skills in writing EST papers. Because EST writing is too much a complicated issue, which covers so many aspects, such as English lexical and grammatical writing skills and the specific questions on scientific specialties, this writer selects a chemical paper published in Advanced Material 2006, 18 as a material for analysis of some expression mistakes. Finally, this paper gives some typical mistakes frequently made in writing scientific and technological papers.

Keywords: English for science and technology, translation, writing, typical mistakes, analysis

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第一章　探索有关科技英语翻译的原则问题

1.1 引言

当今世界，科学技术迅猛发展，科技资料浩如烟海，科技论文有 80 % 以上都是用英文发表或出版。因此，科技英语书写和翻译工作越来越引起人们的重视。如何避免科技英语（English for Science and Technology，简称 EST）论文中的语言差错，是许多科技工作者是十分关心的问题之一。一般来说，许多科技工作者有一定的英语基础，也有相当强的专业知识，但是在书写英语论文时在选词和构句方面常犯一些错误，甚至有些是错句。无论是初学科技英语翻译者还是初学科技英语写作者的译文或科技英语文章中都屡见不鲜，就是在某些公开出版的书刊中也时有出现，本文选取了在国外已经公开发表的英语化学论文为例加以分析研究。原因可能是多方面的，有的可能是由于英语基础不够牢固导致；有的可能是对科技英语论文的一般特点缺乏了解导致的；有的可能是因为不熟悉相关专业一些细节要求导致的。如化学物质的英语名称要采用国际标准命名法的名字，而不要采用其俗名，这是因为俗名可能是地域性的；各种化学计量写法方面的要求也是很多的，如 3 g and 4 g 的写法是不对的，而应该写为 3 and 4 g。有的是由于对化学化工科技论文的句法结构特点不够熟悉导致的。总之，影响化学化工科技英语论文的书写质量因素是多方面的。

大凡人们谈起翻译就会想到口译和笔译。在笔译中，又可分为科技翻译、文学翻译、政论文翻译和应用文翻译等。而当今科技英语论文写作其实是与科技英语论文的翻译紧密联系、密不可分的。大多数人都是在大量阅读相关专业的科技文章之后，采取模仿的方法和手段进行写作的，若要写出好的科技英语论文必须懂得科技英语论文的翻译方面的要求、标准、难点与处理方法等。

简单地说，翻译就是“把一种语言文字的意义用另一种语言文字表达出来”(引自现代汉语词典)。科技英语翻译与文学英语翻译在语言运用上，修辞手法的选择上，是有区别的。前者注重逻辑思维，讲究语言上的规范和表达上的妥当，后者注重形象思维，讲究语言上的形象和表达上的生动[1]。但这并不是说， 科技英语翻译和写作不讲究修辞。同样，它也讲究译文的流畅。因此，科技英语的文章或译文在水平方面是有优劣之分，高低之别的。

The R^3/T^2 is the same for all planets.

一切星球的 R^3 与 T^2 之比的比值相等。

原句虽然不长，理解也不难，但是要把它译成规范的汉语，也要费一番功夫，如变换句型，调整词序。“for all planets” 在原句中是状语，但在汉语表达上需要转换成定语。如果把原文译成“R^3 与 T^2 之比对于所有的星球来说是相同的。” 这种译文就是

照葫芦画瓢，不会得到明晰的概念，也不会收到较好的效果。

1.2 翻译中应满足的原则[2-6]

1.2.1 忠实原则

西方翻译理论学派的代表人物之一，Gatford 认为翻译是对比语言学的一个分支，其目的是建立对等关系，翻译实践的中心问题是在目的语中找到对等项。从翻译理论上讲，各种翻译标准都是在实践中寻找等值成分，如英汉对应的词语、句子、意义等，就是在理论上要忠实于原作品的思想、观念和论证风格，必须将原作品的内容完整而准确地表达出来，不得有任何篡改、歪曲、遗漏或任意增删等现象。

翻译是两种语言和文化的相互交际形式，东西方社会文化的差异常常给英语翻译带来理解和表达上的困难，特别是在科技英语领域更是突出。正如 Nida 在他的《翻译理论与实践》一文中认为，“翻译远远不仅是一门科学，也是一门技术，而且真正理想的翻译说到底是一门艺术”。因此，在翻译过程中，对科技英语的理解和表达就显得十分重要。理解是表达的前提，不能正确地理解原文，就不可能进行确切的表达。在通常情况下，理解和表达是相互联系、反复交替的统一过程，不能截然分开。在对原文理解的时候，就会考虑到表达；在表达时，可进一步加深理解。对于每个专业词汇都应反复推敲，仔细研究。因为，词无“定”译，译无“定”法，不是仅靠几本词典就可以解决问题。在翻译实践中，经常会遇到多词一义、一词多义等现象，这时就应透彻理解原文，忠实地表达原文。

根据对科技英语特点进行分析发现，要做到在翻译中遵守“忠实”的原则，首先要从宏观的层面把握好整篇文章的大概意思。对英语科技文章大意的理解主要是通过提炼文章的中心思想来实现的。而在提炼文章中心思想的过程中，主要又是根据各段落的中心思想来揣摩的。明了文章大意后，就要深入微观层面，对其段、句、词进行认真的分析，反复的推敲，然后再回到文章的宏观层面，看翻译是否遵守了“忠实”。有人往往认为在科技英语翻译中使用直译才忠实原文，这实际上是一种认识上的误区。英汉语言千变万化，既有语言结构和表达上的共同点，也有语言结构和表达上的差异点。在大多数情况下可使用直译法进行翻译，但有时会遇到某些词在词典上找不到恰当的词义，如果按照词典上的意思套译，就会使译文含糊不清，难以理解。这时则需要根据原文词语的基本含义，结合语言环境、上下文关系、逻辑关系和汉语的表达习惯，对原文的某些词作一定的词义引申，选择符合科技文体的恰当词义，以达到译文忠实的目的。

在忠实性原则的前提之下，也要灵活处理科技英语翻译及写作过程中出现的问题，具体地说应同时遵循如下几个原则。

1. 习惯性原则问题

英文 robot 定名为“机器人”是不准确的，其本质不是“人”而是“机器”，称其为“拟人机”或“智能机”更确切。但是考虑到社会上已普遍接受“机器人”这个称呼，就约定俗成，不再改称，以免引起新的混乱。但专家认为，科技名词还是应该

向科学性靠拢，这是一个基本原则。

2. 简明性原则

radiodetectingranging 意思是“无线电探测与定位”，按英文词首 radar 音译定名为“雷达”。longrangeandtacticalnavigationsystem 全称是“远程战术导弹系统”，现按其缩写词 LORTAN 音译定名为“罗坦系统”。

3. 协调性原则

probability 这一概念，在数学中定名为“概率”，而在物理学及其他学科中，过去多翻译为“几率”或“或然率”。其实“概率”、“几率”、“或然率”说的都是一回事。现在统一按其主学科数学定名为“概率”。

4. 国际性原则

采用“原文音+义”的方法，把 AIDS 翻译成“艾滋病”；采用音译的方法，把 clone 翻译成“克隆”等，这样便于在国际交往中对等互译。科技术语的翻译在科技英语翻译中占有举足轻重的地位。在实际工作中，应力争做到译名的简洁性、易记性和统一性。如把“firewall”译为“网络和信息安全防护系统”就不如“防火墙”简洁。

1.2.2 通顺原则

在翻译实践中，译文语言必须通顺易懂，符合现代语言的规范要求，不要死译硬译，导致文理不通，结构混乱和逻辑不清等现象。就这一点来说，所涉及的内容小到文章中一个词的理解，大到对整个文章结构的把握。在遵循通顺原则时，首先，我们要根据文章背景，准确地翻译出纯科技词，要根据不同的语言环境来正确理解通用科技词和表达抽象概念的词的含义，要结合文章的大体意思来理解派生词和缩写词。词是构成句子的基本单元，在正确理解了词的含义后，我们要做的就是通顺地来翻译出句子的意思。在这个过程中，主要考虑对句子结构的分析和语言表达习惯的把握。英美人行文十分追求语言变化，不仅有意让句型、结构和词汇相互错开，而且在词汇的选择上也避免雷同，对同一概念的事物、行为或状态往往使用不同的词汇。因此，文章中经常出现同义结构互相替换的现象。这在科技英语论文写作当中也是都要十分注意的问题。在后面的例文分析中，对出现了语法完全正确、作者意图也基本表达清楚了，只是在文章中同一词汇在一小段文字当中多次出现重复的现象进行了分析，这在英语语言运用方面还是一个不可忽视的问题。而汉语科技文章针对同一概念的事物、行为或者状态，基本上都用同一词汇表达，很少变换，不怕重复，是为了表达上的准确性。如果不注意英汉科技文献的表达差异，翻译中就有可能出现词义不一致的错误，从而引起概念不清，译文不“通顺”的结果。

1.2.3 美感原则

1.2.3.1 对称美

对称是美学上一个重要概念。世界上众多美的事物大多是均匀对称的。科技英语中这种对称结构是屡见不鲜的，因为这种结构能表达十分复杂的科学概念，用相同的结构表达相似的意义，从而收到等值或等效的结果。所以，在翻译的过程中一定要保持原有的对称结构，使译文能够继续保持那种对称美的效果。

1.2.3.2 流畅美

在科技英语中，因为常表达各种生产和科学实验的过程和步骤，因此，必须环节相通，连贯顺畅。在实际的翻译过程中，作为满足“忠实”与“通顺”这两个原则的补充，流畅美就是我们不得不考虑的问题。

1.2.3.3 逻辑美

相对于其他英语文章来说，科技英语最具特色的美就是逻辑美，因为科技英语是表达科技事实、概念、原理和解释自然现象的，因此，在翻译时要把握住逻辑缜密、推导合理、无懈可击的原则，使译文不但呈现出极强的说服力，而且还体现出文章的逻辑美。

1.2.3.4 简洁美

精炼简洁是公认的美，它体现在万事万物之中。科技英语的一个突出特征就是精练，因为科技语言总的要求是以最少的文字符号传递最大的信息。科技英语的这种精练简洁既表现在词汇层，也表现在句法层。所以在翻译的过程中，要深入细致地分析词汇和句法，以使翻译效果达到极佳。

因此，在进行科技英语文章的翻译时，就不能仅仅满足于“忠实”和“通顺”，而应极力探索其中蕴藏的美感，在译文的遣词造句、布局谋篇中加以体现，使人们在对科技英语文章的翻译过程中能得到美的享受。针对化学英语论文的翻译与写作固然有其特殊性要求，但大的原则上，还是要符合这样一些基本原则的。

第二章 研究科技英语词汇及其句法特征

2.1 引言

从构成语言的语音、词汇和语法这三大基本要素上来说，科技英语与普通英语是没有区别，但并不是说科技英语就没有自己的特点。科技英语的特点主要通过语言结构和词汇来体现，其中主要是用词准确、语言简练、表达客观、条理清晰、内容确切，并具有很强的专业性和实用性。可能其中有的部分未必一定遵循这样的规律，如科技英语中多出现被动语态这一句法结构，但这并不是说在一切情况下都要用被动语态来表达。有的情况下用主动语态表达更简洁、连贯，如 Figure 5 shows that...要比 it is shown in figure 5 that...更好。从科技英语词汇方面来看，通过大量阅读科技资料及作为《技术与教育》杂志英文译审的几年实践工作当中，把科技英语词汇和句法方面特点作如下分析和总结。

2.2 科技英语词汇特征分析[7-13]

2.2.1 一词多义(Polysemy)

科技英语一词多义现象一直是语言学和语义学研究中的一个关键问题。在科技英语庞大而纷繁的词汇体系中，有相当数量的词汇在语义上都具有“一词多义”的特征。

一般来说， 一词多义的形成和产生主要有两种情况:

2.2.1.1 意义转移(sense transfer)

随着科技的发展，社会新规律的发现，各种新概念也应运而生。为此需要大量新词来表达。表达一个新概念不一定非创新词不可，人们可以利用语言中现有的词汇材料，赋予新含义。这是根据两种事物或现象之间的类似或联系在某种比喻的基础上产生的。这样就有了语义性新词。bond(结合物，联结，合同)，这一意义同另一意义——“键”(如 hydrogen bond 氢键）之间存在着某种联系： 都指某种“将两者结合起来的物或方式”， 于是 bond 便被用来转指另一个意义——键。再如 activity 活动——活动性——活性；coordination 配合，协调——配位； reduction 降低——（化合价降低）——还原； rectification 纠正或校正——不断进行校正——精溜; surface tension 表面紧张或拉紧——表面张力; mouse 老鼠——mouse 鼠标， library 图书馆——书库——library(程序，信息)库； kill 杀——kill 消除(病毒)， probe 调查——probe 用于科学考察的宇宙飞船； package 包(包裹)——软件包。

虽然科技语言是一种客观严肃的语言，但并不意味着某些科技英语词汇丝毫不带有某种心理因素。人们因为憎恶“窃听”这一不光彩行径， 因而用了一个令人厌恶的、昼伏夜出的动物——“bug (臭虫)” 来命名那些窃听装置。人们对客观世界的认识的

不断提高和深化也是造成某些词汇产生多义的原因之一。如"cube"一词，原来仅指"立方体"，后来人们发现当要求某一立方体的体积时，只需将其边长自乘三次就可以得到这一结果。于是"cube"一词便在数学上获得了一个新义——"三次幂"。"green"一词概括了所有"绿色"的特征，可以修饰一切具有该特征的事物，意义广泛。因为该词修饰的各类事物又是十分具体的，用在不同的事物上便会产生许多意味上的差异。如"绿色"的蔬菜总是新鲜的，而"绿色"的水果大都是未成熟的，因此"green"进而又获得了"新鲜的"、"未成熟的"等新义。

2.2.1.2 词汇在实际的语言过程中总是要彼此发生联系的

一方面，在言语中的各个词是连接在一起的，在句子中，词汇间存在着密切的相互关系，不同的词汇组合可以造成意义差异和多义。如：

Batch filters can be coupled to continuous plant by using several units in parallel, or by providing buffer storage capacity for the feed and product. 间歇过滤也可以通过使用几套装置并联的方法或者为产品及料液提供缓冲储存的办法应用于连续化的生产。be coupled to 是结合、连接、联系的意思，这里引申为"应用于"。再如 the film was aged at room temperature for 24h and then heated at 353 k for 20min.此句中的 aged 是老化之意，整个句子译为"该膜在室温下老化 24 小时，之后加热到 353 k, 并保持 20 分钟。""measure"一词，在"angular measure"中指"(角) 测度"；而在"greatest common measure"中则指"(最大)公约数"。

2.2.2 外来词借入

现代社会的高度信息化，国际交往的日益频繁，使得外来词语不断进入英语语言，大大丰富了它的词汇。科技英语中的外来语，数量可观。它们已融合在英语语言并根深蒂固。如: robot 机器人(捷克语)，sputnik 人造卫星(俄语)。英语还在不断地从拉丁语和希腊语中衍生出新的科学技术方面的词汇。希腊词素如 syn-(共同)和-tron(器)构成 synchrotron 同步加速器；拉丁词素 sub-(次，亚)和-son(声音)构成 subsonic 亚声的；再如 cryogenics 低温学、nanometrics 纳米技术、tomography X 线断层摄影技术等等。

2.2.3 利用前缀或后缀构成新词

大多数科技英语新词以此方法构成。前缀构成如:auto-"自动"，autoalarm 自动报警器；multi"多"，multisystem 多制式；poly-"多"polysynthsis 多元合成；mono-"单"，monophobia 孤身恐怖；后缀构词如:-graphy"摄影术" Computerized Tommography(CT)；-naut"操作人员"，Internaut 因特网网上漫游者；cide"杀"，ecocide 生态灭绝；-oholic"癖，瘾"，teleholic 电视癖等等。

下表列出笔者整理出来的部分化学物质名称的词汇。这些词汇都是由词根和词缀构成的。笔者根据其构成规律设计了此表。

表 2-1　部分常见有机物构词规律

烷烃(尾缀-ane) 数字(前缀)	化学名称	烷烃(尾缀-ane) 数字(前缀)	化学名称
methane	甲烷	ethane	乙烷
propane	丙烷	butane	丁烷
pentane	戊烷	hexane	己烷
heptane	庚烷	octane	辛烷
nonane	寅烷	decane	癸烷
undecane	十一烷	dodecane	十二烷
tridecane	十三烷	tetradecane	十四烷
petradecane	十五烷	hexdecane	十六烷
heptdecane	十七烷	octodecane	十八烷
nondecane	十九烷	isoane	二十烷
烷基取代基 (尾缀-yl)	化学名称	烷基取代基 (尾缀-yl)	化学名称
methyl	甲基	ethyl	乙基
propyl	丙基	butyl	丁基
iso-butyl	异丁基	terbutyl	叔丁基
pentyl	戊基	iso-pentyl	异戊基
neo-pentyl	新戊基	hexyl	己基
烯烃 (尾缀-ene)	化学名称	炔烃 (尾缀-yne)	化学名称
ethene	乙烯	ethyne	乙炔
propene	丙烯	propyne	丙炔
butene	丁烯	butyne	丁炔
pentene	戊烯	pentyne	戊炔
环烃 (前 cyclo-)	化学名称	卤基(泛称 halo-) 卤烃(前缀)	化学名称
cyclopropane	环丙烷	fluoro-	氟
cyclohexane	环己烷	chloro-	氯
methylcyclohexane	甲基环己烷	bromo-	溴
3-methyl-cyclohexene	3-甲环己烯	iodo-	碘
cyclohex-1,4-diene	1,4-环己二烯	1-bromo-4-chloro-benzene	对氯溴苯
醇(~ alcohol)及酚 (后缀 ol)	化学名称	醇及酚的盐 (后缀 ate)	化学名称

methanol; methyl alcohol	醇	sodium methanolate	甲醇钠
ethanol; ethyl alcohol	乙醇	potassium ethanolate	乙醇钾
propanol; propyl alcohol	丙醇	aluminum triisopropanolate	三异丙醇铝
butanol; butyl alcohol	丁醇	sodium benzylolate	苯甲醇钠
phenol	苯酚	sodium phenolate	苯酚钠
1,2,4-tri-benzene triol	1,2,4-苯三酚	monopotassium pinacolate	片呐醇单钾
醚 (~ ether)	**化学名称**	**环氧烷(前缀 epoxy-) 环氧**	**化学名称**
methyl ether	甲醚	epoxyalkane	环氧烷烃
ethyl ether	乙醚	epoxyethane	环氧乙烷
propyl ether	丙醚	epoxypropane	环氧丙烷
butyl ether	丁醚	epoxyhalopropane	环氧卤烷
ethyl methyl ether	甲乙醚	3-chloro-1,2-epoxypropane	环氧氯丙烷
醛(~ aldehyde) (后缀-al)	**化学名称**	**酮(~ ketone) (后缀-one)**	**化学名称**
formaldehyde	甲醛	acetone	丙酮
acetic aldehyde; ethanal	乙醛	butanone; ethyl methyl ketone	丁酮
propionic ahdehyde	丙醛	pentanone	戊酮
n-butyl aldehyde; butaldehyde	丁醛	2,4-hexanedione	2,4 己二酮
酸 (后缀-ic acid)	**化学名称**	**相应盐(或酯) (后缀-ate)**	**化学名称**
methanoic acid	甲酸	formate	甲酸盐(酯)
acetic acid	乙酸	acetate	乙酸盐(酯)
propionic acid	丙酸	propionate	丙酸盐(酯)
butyric acid	丁酸	butyrate	丁酸盐(酯)
valeric acid; pentanotate	戊酸	pentanotate; valerate	戊酸盐(酯)
hexanoic acid; caproic acid	己酸	caproate	己酸盐(酯)
酰基 (后缀-yl)	**化学名称**	**酰胺 (后缀-amide)**	**化学名称**
formyl	甲酰基	formamide	甲酰胺
acetyl	乙酰基	acetamide	乙酰胺
propionyl	丙酰基	propionamide	丙酰胺
butyryl	丁酰基	butyramide	丁酰胺
valeryl	戊酰基	pentanamide	戊酰胺
胺 (后缀-amide)	**化学名称**	**酯(~ ester) (后缀-ade)**	**化学名称**

methylamine	甲胺	methyl ester	甲酯
ethylamine	乙胺	ethyl ester	乙酯
propylamine	丙胺	propyl ester	丙酯
butylamine	丁胺	ethyl acetate	乙酸乙酯
amylamine	戊胺	methyl propionate	丙酸甲酯
腈(-nitrile) ~ cyanide	**化学名称**	**酰氯(-yl chloride) 酸酐(~ anhydride)**	**化学名称**
acetonitrile; ethane; methyl cyanide	乙腈	acetyl chloride	乙酰氯
propionitrile; propane nitrile; ethyl cyanide	丙腈	butyryl chloride	丁酰氯
butyronitrile	丁腈	acetic anhydride	乙酐

表 2-2 常见无机物构词规律

非 含 氧 酸（尾缀-ic acid）		
氢卤酸 haloid acid	氢氟酸	hydrofluoric acid
	氢氯酸	hydrochloric acid
	氢溴酸	hydrobromic acid
	氢碘酸	hydroiodic acid
氢硫酸		hydrosulfuric acid

表 2-3 某化物

某化物(尾缀-ide)		
某化物		例子
碳化物	carbide	silicon carbide 碳化硅
氮化物	nitride	magnesium nitride 氮化镁
氧化物	oxide	calcium oxide 氧化钙
氟化物	fluoride	sodium fluoride 氟化钠
硫化物	sulfide	hydrogen sulfide 硫化氢
氯化物	chloride	barium chloride 氯化钡
溴化物	bromide	potassium bromide 溴化钾
碘化物	iodide	silver iodide 碘化银
氢氧化物	hydroxide	aluminum hydroxide 氢氧化铝

表 2-4 含氧酸及对应盐

含氧酸及对应盐		
某酸(尾缀-ic acid)		对应盐(尾缀-ate)
硼酸	boric acid	borate
碳酸	carbonic acid	carbonate
氮酸	nitric acid	nitrate
硅酸	silicic acid	silicate
磷酸	phosphoric acid	phosphate
硫酸	sulfuric acid	sulfate
硫代硫酸	thiosulfuric acid	thiosulfate
氯酸	chloric acid	chlorate
溴酸	bromic acid	bromate
碘酸	iodic acid	iodate
铬酸	chromic acid	chromate
重铬酸	dichromic acid	dichromate
亚某酸(尾缀-ous acid)		对应盐(尾缀-ite)
亚硼酸	borous acid	/
亚硝酸	nitrous acid	nitrite
亚磷酸	phosphorous acid	phosphite
亚硫酸	sulphurous acid	sulfite
亚氯酸	chlorous acid	chlorite
亚溴酸	bromous acid	bromite
亚碘酸	iodous acid	/
含氧次某酸(前缀 hypo-；尾缀-ous acid)		对应盐(前缀 hypo-；尾缀-ite)
次磷酸	hypophosphorous acid	hypophosphite
次卤酸	hypohalous acid	hypohalite
次氯酸	hypochlorous acid	hypochlorite
次溴酸	hypobromous acid	hypobromite
次碘酸	hypoiodous acid	hypoiodite
次硫酸	sulphoxylic acid	sulfoxylate; hyposulfite
次硝酸	nitroxylic acid	nitroxylate
含氧偏某酸(前缀 meta-；尾缀-ic acid)		对应盐(前缀 meta-；尾缀-ate)
偏硼酸	metaboric acid	metaborate

偏钒酸	metavanadic acid	metavanadate
偏硅酸	metasilicic acid	metasilicate
偏磷酸	metaphosphoric acid	metaphosphate
含氧高某酸(前缀 per-; 尾缀-ic acid)		对应盐(前缀 per-; 尾缀-ate)
高氯酸	perchloric acid	perchlorate
高锰酸	permanganic acid	permanganate
高碘酸	periodic acid	periodate
高铁酸	ferric acid	ferrate

2.2.4 有些专业词汇长且复杂

macromolecular 大分子的，高分子的 thermoplastics 热塑性塑料，热塑性的，supersaturation 过饱和，countercurrent contacting 逆流接触，electromagnetic 电磁，大光明 noncondensing 不能冷凝的。再如其它科技领域的词汇：:telemicroscope 望远显微镜(tele-+micro+-scope)，phonophotograph 声波照相(phono + photo + graph)，magnetohydrodynamics 磁流体力学(magneto-+hydro+dynamics)，anamorphosis 畸形变体(ana+morph+-osis), polyoxotungstoeuropate $K_{12}[EuP_5w_{30}O_{110}]$，photochromic 等等。但它们往往是由一些基本的科技英语词素组合而成，所以掌握一些基本的科技英语词素，以及它们的组合规律对我们快速记忆科技英语词汇及快速理解英语科技资料是非常有益的。遇到长而复杂的单词，借以考察其构词也能猜明其词意。

2.2.5 大量采用缩写

科技英语新词大量采用缩略语，其优点是可以缩略文章篇幅空间，加快文本传输速度。且缩略词简练易记，一目了然，因而十分流行。首字母缩略词如 NMR （nuclear magnetic resonance） 核磁共振，PVC(polyvinyl chloride)聚氯乙烯；PVA(Polyvinyl Alcohol) 聚乙烯醇；EDTA（Ethylene Diamine Tetraacetic Acid） 乙二胺四醋酸；UNIQUAC (universal quasichemistry activity coefficient)准化学活度系数；LAS (linear dodecylbenzene sulfonate)线性十二烷基磺酸盐。对原有两词进行裁减加工缩略如：knowbot(knowledge robot)智能机器人，DBASE(Data Base)数据库等等。

2.2.6 科技论文中词汇选用特征

使用正式词汇。这是因为“要求科技英语词汇基本条件是：正式、客观、准确；正式词汇表达能够体现文章的科学性；使用正式词汇表达，能够避免出现歧义”。“为达到科技论文语言客观性与准确性，选词及用词原则大致可以归纳为：使用技术词汇和专业词汇；避免通俗表达。”下面所列为常见的正式词汇和非正式语体对照，仅供参考。

表 2-5 常见的正式词汇和非正式语体对照表

非科技文体词	科技文体用词	非科技文体词	科技文体用词
take in	Absorb	ask	inquire
push in	insert	begin	commence
push down	depress	buy	purchase
put up	erect/establish	carry	bear
put together	aggregate、assemble	change	transform
put in	add	cheap	inexpensive
wear away	erode	end	conclude
take away	remove	finish	complete
send for	summon	get	obtain
use up	consume，exhaust	give	accord
carry out	perform	have	possess
come across	encounter	method	technique
make up	invent	obtainable	available
put up with	tolerate	avoid	circumvent
go with	accompany	quick	rapid
fill up	occupy	say	remark/comment
bring out	introduce	similar	identical
break up	rupture	touch	contact
put out	extinguish	try	endeavor
look at（over）	examine	use	employ/utilize
find out	discover	put	place
drive forward	propel	fire	flame
keep up	maintain	happy	excited
turn upside down	invert	careful	cautious
set fire（light）to	inignite	care	caution
make…weak	weaken	heart	center
take…into pieces	dismantle	enough	sufficient
turn…into liquid	liquefy	by whereby	which
be made up of…	be composed of…	in	which wherein
about	Approximately	in the end	eventually

2.3 科技英语的句法特点[14-21]

科技英语文章的一般特点是文体质朴、平铺直叙、结构严谨、语言浓缩以及逻辑性强。这种文章注重客观性，描述平易、精确，一般不带任何感情色彩；而且主次分明，没有歧义。在句法上，其有以下主要特点，分别阐述之。

2.3.1 多用陈述句

科技英语中要表述一些定义、定理和定律，要描述实验过程和阐述自然现象。因此，大量使用陈述句。例如：

1. Surface active agents or surfactants are chemical compounds that when dissolved in water or another solvent, orient themselves at the interface between the liquid and a solid, liquid, or gaseous phase and modify the properties of the interface.

表面活性剂指那些溶解在水或其它溶剂中后，能够在液-固、液-液、液-气界面定向排布并改变界面性质的化合物。

2. It is made by sulfonation of linear dodecylbenzene, which is made by alkylation of benzene with a straight chain dodecene whose double bond is not necessarily in the terminal position

它是由线性十二烷基苯的磺化而制成。十二烷基苯则由苯与直链十二烯烷基化制得，十二烯并不要求双键在一端。which is made...... terminal position 定语从句，修饰 dodecylbenzene。whose double bond is not necessarily in the terminal position 是定语从句中的定语从句。

2.3.2 长句、复合句使用多

科技英语描述的是科学技术和自然现象。因此，科技作者所注重的是事实和逻辑推理，所给出的定义、定律、定理或描绘的概念等都必须严谨、精确，绝不能含糊。所以，与非科技英语相比，科技英语的长句就使用较多。"这是因为英语句法结构重'形合'，任何一个名词或名词词组，为了对它进行完整而明确的阐述，可以借助各种修饰结构（介词短语、不定式短语、分词短语定语从句或同位语从句等）。"一个句子往往长达八行、十行，甚至还要长。面对这样的句子，我们首先应找出句子的主要成分。其它部分不外是些起修饰作用的从句或短语等。在这些长句中往往是一个句子中有若干个并列分句或从句，从句带短语，短语带从句，从句套从句；互相依附、相互制约；一层接一层，一环扣一环。句子结构错综复杂，句子显得十分冗长，使读者眼花缭乱。例如：

1. Although this factor is an advantage for hot air welding or high-frequency welding, it is a disadvantage if, as was still the case a few years ago, thermoplastic material is to be melted for injection moulding by means of an external supply of heat.

虽然这一点对于热空气焊接或高频焊接是一个有利因素，但如果像几年前那样，热塑性塑料注塑要借助外部供热进行熔化注塑的话，这就是个不利因素。　该句主句为...it is a disadvantage....。as was still the case a few years ago,是 if 条件句中的插入语，as 代表下文中的 thermoplastic material i... supply of heat 这种状况的。Although 引导的是主句的让步状语从句。

2. Its use is usually restricted to preliminary work in which products will be held for additional separation at a later time, when most of the volatile component must be removed from the batch before it is processed further, or for similar noncritical separations.

简单精馏的应用通常局限于初步的分离工作，它的产品一般要留下待以后再分离，即当进行进一步分离之前，必须用简单精馏把物料中的大部分挥发性组分分离出去，

或者用于类似的不重要的分离。 本句的主体结构为：Its use is usually restricted to… or for similar noncritical separations。 in which products …further 是定语从句。when … further 是这个定语从句中的起补充说明作用的状语从句。在科技文体翻译中，这种长句子应该尽量转化为短句子来译，这样更清楚些。

3. Surfactants are not only important as the active constituent of cleaning agents (soaps, detergents, etc.), which is their main use, but are also vital in the stabilization of emulsions (e.g., in foods and cosmetics), as mold release agents in the plastics industry, in flotation, in oil well drilling, and in a host of other applications。

表面活性剂不只是做为洗涤剂（肥皂及洗衣粉）的活性组分很重要，这当然也是其主要应用，同时在如乳化液的稳定（如食品、化妆品中）、在塑料工业中脱模、在采矿工业中浮选、采油钻井中及许多其它方面都有应用。本句主要结构为 Surfactants are not only…… but are also ……。which is their main use 是定语从句，修饰 cleaning agents，起补充说明作用。but are also vital 后面有五个介词短语做状语。

4. For many years investigators were seldom concerned with or aware of the distinction between a colloidal particle composed of numerous molecules of ordinary size held together by intermolecular " secondary valence" forces of one sort or another and a polymer molecule made up of atoms held together exclusively by covalent bonds.

本句貌似很长，不易理解；其实却是简单句。其中 investigators 是主语，were 是谓语，由 or 连接的 concerned with 和 aware of 以及它们后面的部分是表语。表语中的 distinction 是介词 with 和 of 的宾语，between...是修饰 distinction 的介词短语作定语。我们知道 between 在大多数场合下，都与 and 连用，所以在 between 后面，and 前面以及 and 后面的部分，都是由 and 连接的介词 between 的两个宾语。本句的修饰成分都是由短语组成的，显然在科技英语文章中短语应用较从句多。

2.3.3 较多使用被动语态

科技书刊中，描述的多是事物、过程及现象等，所以句子的中心对象是它们(事物)，而不是操作它们的人，因而句子往往以被动语态出现。根据英国利竣大学 John Swales 的统计，科技英语中的谓语至少三分之一是被动语态。这是因为科技文章侧重叙事推理，强调客观准确。第一、第二人称使用过多，会造成主观臆断的印象。因此，尽量使用第三人称叙述，采用被动语态。这种现象在技术操作或实验说明书中尤为明显。例如：

1. The crucible is charged with about 175% of clean sodium from which the oxide coating has been removed， the air is completely displaced by passing ammonia for 10 minutes， and the pot is heated strongly so as to melt the sodium rapidly.

上例句子中竟有四处出现被动语态，这在科技英语中并非鲜见特例。

2. In this system, the microfiber-seeding template can easy be removed from product because of the high hydrophilicity of polyacrylamide (PAM). The microfibrous morphology of the PANI is confirmed by SEM image.

3 . IR and ESR spectra of the irradiated fibre mats indicate a conceivable photochromic

mechanism, i.e. MoVI is reduced under ultraviolet irradiation. Meanwhile, PVA is oxidized to unsaturated ketone or aldehyde.

2.3.4 使用虚拟语气

在科技英语中，虽然作者可能不必表达什么主观意愿，但虚拟语气还是应用较多的。主要是一些条件句，通常用来表达与一些已存在的事实相反的假设，例如：

1. If these were not removed the petroleum products would have a foul smell and on combustion would produce the very corrosive gas, sulfur dioxide (SO_2).

如果不除去这些物质的话，石油产品就会有难闻的气味，在燃烧的时候就会产生一种腐蚀性很强的气体二氧化硫 SO_2。这是一个表示与现在事实相反的虚拟语气的（被动语态）句子。

2. If this liquid were heated to a high enough temperature to boil it under normal atmospheric pressure many of the hydrocarbons in it would decompose.

如果这种液体在常压下加热到沸腾的温度，其中的许多烃就会分解。 该句也表示与现在事实相反的虚拟语气句。

3. but once on the substrate it would provide very little protection were it not for the plastic tape over it.

但一旦它粘上某基面后，如果不是因为塑料胶带的话，它所能提供的保护微乎其微。这个句子也是虚拟条件句。were it not for the plastic tape over it 相当于 if it were not for the plastic tape over it。

2.3.5 名词化结构在文中的应用

许多在汉语中用动词、形容词表达的概念，在英语中是用由动词、形容词转化来的名词或动名词来表达的。大量使用名词化结构是科技英语的特点之一。在科技英语的文章中，常有用一个 “表示动作意义的名词+of+名词+修饰语”的名词词组代替一个句子的情况。也就是说，在普通英语中用动词表达的内容在科技英语中常用名词表达，这种名词词组称为名词化结构。《当代英语语法》（刘世同，学院出版社）在论述科技英语时提出，大量使用名词化结构是科技英语的特点之一，因为科技英语的文体要求行文简洁、表达客观、内容确切、信息量大，强调存在的事实，而非某一行为，例如:

1. Archimeds first discovered the principle of displacement of water by solid bodies.

阿基米德最先发展固体排水的原理。句中 of displacement of water by solid bodies 是一个介词短语结构，一方面代替了同位语从句(that water was displaced by solid bodies)，另一方面强调了 displacement 这一事实。

2. They are either applied as a precoat to the filter cloth or added to the slurry, and deposited with the solids, assisting in the formation of a porous cake.

助滤剂或者是预涂到滤布上，或者是加到滤浆中，与固体一起沉积，有助于形成多孔滤饼。

3. The separation of the components of a liquid mixture by treatment with a solvent in which one or more of the desired components is preferentially soluble is known as

liquid-liquid extraction.

通过用一种可以将液体混合物中某一所需组分优先溶解的溶剂来将液体混合物中各组分进行分离的方法，称为液液萃取。The separation of the components of a liquid mixture 即是名词性的短语，但表达的是个动宾关系，应译为将可"液体混合物中各组分进行分离" by treatment with a solvent in which... 这个由 by 引导的 treatment with a solvent 名词性短语也是动宾结构，译为"通过用……的溶剂来进行处理"

4. On a large scale continuous hydrolysis of fats to fatty acids by steam becomes attractive and the acids are neutralized subsequently with sodium hydroxide.

大规模地用水蒸汽连续地将脂肪水解为脂肪酸，之后再用 NaOH 中和成为肥皂，在工业上越来越有吸引力。名词性结构 continuous hydrolysis of fats to fatty acids by steam 是本句的主语。

2.3.6 某些句子成分多后置现象

科技学者们为了明确地、完整地表达一个概念，经常利用从句或短语修饰各种成分，从句使句子显得很长。为了使句子保持平衡，同时使句子的语义更加明显突出，往往把较短的句子成分提前，或者把本该紧跟某些词类的成分后置。倒装现象在科技书刊中也常遇到，如形式之一是 it 作形式主语，放在句首，而把实际主语放在谓语后面的倒装。在科技文章中，由于对语言简练和内容准确要求比较高，所以后置定语经常被使用。在科技英语文章中使用非限定性动词代替从句或并列分句的情况经常出现。这样不仅精简了句子结构，而且也使句子内容一目了然。例如:

1. The separation operation called distillation utilizes vapor and liquid phases at essentially the same temperature and pressure for the coexisting zones.

蒸馏这种分离操作是利用在共存区内温度和压力基本相同的气液两相相互接触而进行的。called 是过去分词做定语修饰 operation。

2. Crystallization equipment can be classified by the method used to obtain supersaturation of the liquor, and also by the method used to suspend the growing crystals.

结晶设备可以根据获得过饱和溶液的方法来进行分类，也可以按照悬浮正在增长的晶体方法来分类。used to obtain ...liquor 和 used to... suspend crystals 均为过去分词做定语修饰 method。

3. The difficulty in developing a videophone stems from having to stuff huge amounts of information through a thin copper-wire phone line; compare this task with pouring water from a gallon jug into a straw.

开发电视电话的困难主要在于得把大量的信息通过细小的铜质电话线传输，这就好比是将一加仑水从罐子里倒进一根麦秆相比。在该句中，in developing a videophone 是介词短语作定语，来修饰 difficulty。

4. Important in the space program are coatings that either absorb or reflect radiation and that sacrifice themselves in the process of dissipating the intense heat generated on vehicle reentry into the atmosphere

涂料在宇航工业中也具有重要意义，它们能反射或吸收射线，在航天器返回地球

大气层时，能牺牲自己将产生的大量热疏散出去。 此句的主句为倒装结构，用来强调表语。正常语序为：coatings that either ... and that... are important in the space program。两个 that 引导的是均为修饰 coatings 的并列的定语从句。in the process of dissipating the intense heat generated on vehicle reentry into the atmosphere 是介词短语做后一个定语从句的状语。generated 是过去分词，做 heat 的定语。

第三章 化学科技英语论文摘要写作要求和技巧的研究

3.1 引言

科技工作者在查阅科技文献时，主要是通过科技文献摘要数据库来查找和了解一篇科技论文所谈主旨内容的，有些科技工作者他们不可能对大量的科技资料都能通篇阅读。他们通过互联网来查找某些网上文章时，也都仅用文章标题或文献摘要来判断该文章与其所进行的科学研究有多大的关联，文献对于他的价值有多大。一篇高质量的文章很有可能会因为其摘要写得不佳而不为人所注意。

按照国家标准，摘要的内容是文章的梗概，应不加评论和补充解释，内容要简明、确切。以 400 字以内为宜。纯指示性摘要可以更简短、控制在 200 字之内。外文摘要不宜超过 250 个实词[22]。

3.2 分析与结论

3.2.1 What is an abstract

An abstract is a brief, accurate, and comprehensive summary of the contents of the article without added interpretation or criticism. The definition given by *CAMBRIDGE INTERNATIONAL DICTIONARY OF ENGLSIH* is:.an abstract is "a shortened form of a speech, article, book, etc. , giving only the most important facts or arguments."[23] It allows readers to survey the contents of the article which follows quickly. In preparing the abstract, it is important to keep the sentences short and simple by covering with just one topic each and excluding irrelevant information. Nevertheless, an abstract should be informative by presenting the quantitative and/or qualitative information contained in the document.

3.2.2 An effective abstract [24-26]

- Captures the attention of the reader
- Previews the content and what the reader can learn
- Describes the contribution of the topic to the field.
- Enables readers to quickly and accurately identify the substance of your work and to decide its relevance to their own interests.
- Advertises your work!

3.2.3 Requirements of abstracts and their problems[27-34]

3.2.3.1 structure

a) Background: Briefly set up the background and context to the study, its rationale and significance. (1-2 sentences)

b) Problem: Here you need to identify the particular research problem under investigation, the purpose of the study, and any specific research objectives or hypotheses. (1-2 sentences)
c) Methods: Outline the approach you took and the methods you used to investigate the problem. Describe the extent of the study, what you did or measured, and how you did it. (1-2 sentences)
d) Results: Give any important data. Be specific, not vague. Quantify if possible; avoid terms such as "most" or "some" if you have the specific numbers. State the major interpretations and findings, how the findings relate to the original research problem, and any limitations on the results. (2-3 sentences)
e) Implications: Finish by stating the contribution of the work and its implications. There may be implications for associated problems, or for previous studies, e.g., reinterpretation of a previous model may be necessary in the light of your findings. Do your results have general or specific application or relevance? (1-2 sentences)
f) Key words: Ensure the abstract contains all your key words (for databases).

3.2.3.2 Length

100 – 250 words, depending on the situation.

3.2.3.3 Tenses

In a abstract in English we usually use three tenses: past, present, future. For the experimental part we often choose past tense as the experiments were done in the past, e.g.: “the temperature was measured for…”; for the discussion part we prefer the present tense, e.g.:“temperature measurements are shown in Figure 1” but this is Passive Voice and with more words compared with the next sentence, which I think is much better: “Figure 1 shows temperature decreases when……” when it comes to conclusion, two tenses may be used: the present tense or future tenses, For example, “Future studies will investigate how ionic strength affects crystal growth.”

3.2.3.4 Common problems

a) Too long. If your abstract is too long, it may be rejected - abstracts are entered on databases. Abstracts are often too long because people forget to count their words (remember that you can use your word processing program to do this).
b) Too much detail. Abstracts that are too long often have unnecessary details. The abstract is not the place for detailed explanations of methodology or for details about the context of your research problem because you simply do not have the space to present anything but the main points of your research.
c) Too short. Shorter is not necessarily better. If your word limit is 200 but you only write 95 words, you probably have not written in sufficient detail. You should review your abstract and see where you could usefully give more explanation - remember that in many cases readers decide whether to read the rest of your research from looking at the abstract. Many writers do not give sufficient information about their findings
d) Failure to include important information. You need to be careful to cover the points listed above. Often people do not cover all of them because they spend too long

explaining, for example, the methodology and then do not have enough space to present their conclusion.

3.2.4 Abstract tips[35-38]

a) Avoid long-winded, complex sentences.

b) Be concise!

c) Avoid repeating information given in the title.

d) Be exact and unambiguous.

e) Avoid personal pronouns: such as "I", "me", "my", "mine", "we", "us", "our", "ours", "they", "them", "their", "theirs" – DO NOT USE! For example, we use "These results demonstrate that…" instead of "Our results demonstrate that….."; we use "A new process was developed for…" in place of "We developed a new process for…" Do not include tables, diagrams, equations, or structural formulae in the abstract.

3.2.5 Sample abstracts

3.2.5.1 Preparation of SBS Graft Adhesive Modified by CPVC[39]

Abstract: Styrene – butadiene – styrene (SBS) grafted with acrylic exhibits better adhesion to PVC artificial leather. In order to futher improve the performance, high chloride content polymer (HCCP) is introduced into the system. HCCP is referred to chlorinated polyvinyl chloride (CPVC). The optimum graft copolymerization conditions are as follows: mixed solvents of toluene and butanone with ratio of 10:3 (wt), the feeding ratio of backbone polymers (SBS + CPVC): solvent : methyl methacrylate (MMA): benzoyl peroxide (BPO) are 100:400:70:2, and reaction temperature is 90±1℃. The ternary graft copolymerization of SBS, CPVC and MMA is investigated. And the product is characterized by IR. The results show that CPVC and SBS must be dissolved with a two - step process, SBS must be dissolved after the dissolution of CPVC. Large amount of CPVC should be avoided, or bondline is easily separated from the substrate during peeling strength test. Furthermore, the adhesive stability is poor. When the content of CPVC is between 20% and 30% (based on the total weight of SBS and HCCP), the adhesive has not only good stability and excellent water resistance properties but also high adhesion to PVC material.

Key words: Styrene – butadiene - styrene blocks copolymer; chlorinated polyvinyl chloride; methyl methacrylate; graft copolymerization

Why is this abstract POOR?

- Needless description of concrete processing conditions (should be in the body of the paper, not the abstract).
- Not concise! Needless explanation: "The results show that CPVC and SBS must be dissolved with a two - step process, SBS must be dissolved after the dissolution of CPVC." It would be much better if this sentence is like this: "The results show that

SBS must be dissolved after the dissolution of CPVC."

- Wrong tense –"In order to futher improve the performance, high chloride content polymer (HCCP) is introduced into the system." In this sentence the present tense is not used properly, instead, the past tense should be used as it is a part of the experiment.

3.2.5.2 Production Situation and Development Analysis of Dimethyl Carbonate[40]

Abstract: The main production techniques of dimethyl carbonate at home and abroad are introduced, its market situations are also analyzed. At present, the production capacity of dimethyl carbonate abroad is about 170 thousand～200 thousand tons per year, its producers mainly are located in America, Western Europe and Japan. However, the domestic total production capacity is above 100 thousand tons per year. The consumption situations and development trends of dimethyl carbonate in the field of polycarbonate, pesticide and paint are introduced respectively. The prospect of dimethyl carbonate production in China is viewed.

Key words: dimethyl carbonate; phosgene; polycarbonate; methyl tert–butyl ether

Why is this abstract POOR?

- not concise in the use of some figures: (1) 170 thousand～200 thousand tons per year; (2) above 100 thousand tons per year. We could use 170,000～200,000 instead of 170 thousand～200 thousand as it is not a very big number, which we choose to use million or billion.
- Failure to include important information. "The consumption situations and development trends of dimethyl carbonate in the field of polycarbonate, pesticide and paint are introduced respectively. The prospect of dimethyl carbonate production in China is viewed." The result is not given by the authors though the sentence is long enough to include the main result.
- The words in this abstract were not well chosen: "at present" should be replaced with "presently", which will make the sentence more concise. And "viewed" in the last sentence should be "given", as "prospect" here just means "possibility", which, of course cannot be viewed and sometimes "prospect" can also have the meaning of "view" as a countable noun[23].

3.2.5.3 SYNTHESIS OF DIETHYLENE GLYCOL BUTYL METHYL ETHER[41]

Abstract: Under the conditions of n(NaOH):n($C_5H_{12}O_3$) =1.5 : 1, benzene as water carrying agent and in the presence of N_2, sodium of diethylene glycol mono–methyl ether was prepared with diethylene glycol mono-methyl ether ($C_5H_{12}O_3$) and sodium hydroxide as starting materials. Diethylene glycol butylmethyl ether (DGBME) was synthesized through the Williamson reaction between butyl bromide (n-C_4H_9Br) and $CH_3OCH_2CH_2OCH_2CH_2ONa$. The influence of the reaction temperature, reaction time and mass ratios of n-C_4H_9Br to diethylene glycol mono-methyl ether on the yield of DGBME were studied. The content of the product was analyzed by GC and the structure of the product was characterized by FT-IR and 1H NMR. The optimal conditions for the synthesis of DGBME were found as follows: reaction temperature 80℃, reaction time 4.0 h and

$n(n\text{–}C_4H_9Br)/n(C_5H_{12}O_3)$ =1.06:1. Under the optimal conditions, the yield of DGBME was 92.14% and the content of DGBME in the product was above 99.5%.

Key words: diethylene glycol mono-methyl ether; Williamson reaction; diethylene glycol butylmethyl ether; sodium of diethylene glycol mono-methyl ether

Why is this abstract POOR?

- Molecular or structural formulae not necessarily added after the IUPAC name: diethylene glycol mono-methyl ether ($C_5H_{12}O_3$).
- Needless explanation about the chemical reaction between ($n\text{-}C_4H_9Br$) and $CH_3OCH_2CH_2OCH_2CH_2ONa$, which is definitely called Williamson reaction, as is very familiar to scientific researchers. The sentence may be shortened like this: Diethylene glycol butylmethyl ether (DGBME) was synthesized through reaction betweenn-C_4H_9Br and $CH_3OCH_2CH_2OCH_2CH_2ONa$.
- Repeating information already given: Under the conditions of $n(NaOH):n(C_5H_{12}O_3)$ =1.5 : 1, benzene as water carrying agent and in the presence of N_2, sodium of diethylene glycol mono–methyl ether was prepared with diethylene glycol mono-methyl ether ($C_5H_{12}O_3$) and sodium hydroxide as starting materials. There is no need to use the phrase "with diethylene glycol mono-methyl ether ($C_5H_{12}O_3$) and sodium hydroxide as starting materials", as is mentioned in the previous part of the sentence, which is clear enough for being understood, or at least "and sodium hydroxide as starting materials" is not needed.
- Unnecessary words: The optimal conditions for the synthesis of DGBME were found as follows: reaction temperature 80 ℃, reaction time 4.0 h and $n(n\text{–}C_4H_9Br)/n(C_5H_{12}O_3)$ =1.06:1. Under the optimal conditions, the yield of DGBME was 92.14% and the content of DGBME in the product was above 99.5%. In this sentence "Under the optimal conditions," repeats itself with part of the immediate previous sentence, so the word "optimal" is unnecessary. And "were as follows" could also be "were", which is a shorter and clearer sentence.

3.2.5.4 Photochromic polyoxotungstoeropate $K_{12}[E_uP_5W_{30}O_{110}]$/ polyvinylpyrrolidone nanocomposite films [42]

A novel photochromic nanocomposite film containing Polyoxotungstoeuropate $K12[E_uP_5W_{30}O_{110}]$ entrapped in polyvinylpyrrolidone has been prepared through a spin-on coating technique. Thus-obtained amorphous nanocomposite film was characterized by IR spectra, UV-vis absorption spectra, ERD, SEM, TG-DTA, and ESR. Results show that polyoxotungstoeuropate interacts with polyvinylpyrrolidone strongly and disperses homogeneously in the matrix. The composite film exhibits good photochromic properties. When irradiated with UV light, the transparent film changes from colorless to blue. Then, bleaching occurs when the film is in contact with ambient air or O_2 in the dark. The photochromism of the composite film is due to charge transfer by reduction of polyoxotungstoeuropate and oxidation of polyvinylpyrrolidone.

Small problems of this abstract

- "$K_{12}[EuP_5W_{30}O_{10}]$" should not be mentioned again in the abstract just following

"Polyoxotungstoeuropate", as it is included in the title.

- Wrong tenses –"has been prepared through a spin-on coating technique." The Past tense is much better than the present perfect tense for this sentence. And "a" is an unnecessary word here. Maybe it should be "the" instead of "a", which sounds like there are many kinds of spin-on coating technique.
- Misused Phrases. When the film is in contact with ambient air or O_2 in the dark. If this sentence is changed to "when the film is exposed to open air or …" will be much better. Because "be in contact with …" is not appropriate.

第四章 对化学科技英语论文中常出现的典型错误的研究

4.1 Orinial version of a selected paper[43]

Ordered Whiskerlike Polyaniline Grown on the Surface of Mesoporous Carbon and Its Electrochemical Capacitance Performance

By *Yong-Gang Wang, Hui-Qiao Li,* and *Yong-Yao Xia** Prof. Y.-Y. Xia, Y.-G. Wang, H.-Q. Li
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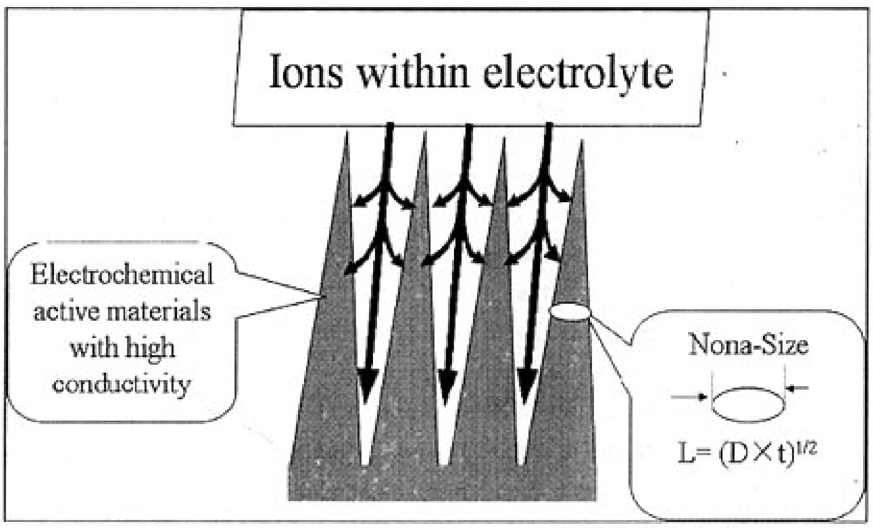
Over the past years numerous research groups in both academia and industry around the world have consciously increased efforts to design and develop advanced materials with dimensions ranging from a few to several hundred nanometers. Their motive is that the physical and chemical properties of *the nanoscopic substances*[1] can differ considerably from the properties exhibited by *the same materials in the bulk.*[1] [2] Recently, nanostructured electrode materials have attracted great interest, as they show better rates and capabilities than traditional materials. *With nanostructured electrode materials, the distance within the material*[3] over which the electrolyte must transport ions is dramatically smaller than with conventional electrodes composed of chemically similar bulk materials.[2-5] *Hence*[4], advanced materials with nanostructure have been studied widely as the electrode materials of energy-storage devices *(for example*[5] *batteries and, especially, supercapacitors).*[6]

Electrochemical capacitors combining the advantages of the high power of dielectric capacitors and the high specific energy of rechargeable batteries have played an increasingly important role in power source applications such as hybrid electric vehicles and short-term power sources for mobile electronic devices.[7,8] Nowadays, *much research on electrochemical capacitors is aimed at increasing power and energy density as well as lowering fabrication costs*[6] while using environmentally friendly materials. Some transition metal oxides, such as RuO_2 and IrO_2, exhibit prominent properties as pseudocapacitive electrode materials. The highest value for specific capacitance reported for amorphous hydrated RuO_2 is 840 F g^{-1}.[2,9] However, despite the remarkable performance of this material, its high cost excludes it from wide application. Although some low-cost metal oxides (such as MnO_2 or NiO) and conductive polymers also exhibit electrochemical capacitance behavior to some extent, their capacitance performances are much poorer than that of RuO_2. Among these materials, *polyaniline (PANI) has been considered as*[7] one of the most promising materials for electrode materials in redox supercapacitors because of its low cost, ease of synthesis, and relatively high conductivity. However, its capacitance value is much less than that of RuO_2.

It is well known that, in pseudocapacitive electrode materials, the pseudocapacitance is mainly produced by the fast faradaic reaction occurring near a solid electrode surface at an appropriate potential.[10] Therefore nanostructured materials can provide a relatively short diffusion path to improve the utilization of supercapacitor electrodes at high power density. Over the years, different morphologies of PANI have been obtained by changing the synthesis method. Nanotubes or nanofibers of PANI have been synthesized by using a porous membrane template.[11] By using the template-directed synthesis method, a unique and ordered structure can be built up directly, but post-processing is required in order to remove the template. In recent years, template-free methods have been studied widely to synthesize PANI with unique structures. Spherical PANI particles, for instance, have been obtained by dispersion polymerization in the presence of polymeric stabilizers.[12] Nanotubes or nanofibers of PANI have been prepared by the selfgrowth process.[13,14] Hollow microspheres of PANI have been synthesized by the emulsion method,[15] and nanowires of PANI have been prepared by interfacial polymerization.[16] However, the typical sizes of PANI reported in these template-free studies are all within the range 50–300 nm. On the other hand, as for template-free methods[8], controlling the ordered shape of PANI is also difficult.[14] Very recently, random connected nanowires of PANI *with typical size 30–60 nm*[9] were synthesized by electrochemical deposition, and a specific capacitance of 742 F g^{-1} was obtained for this nanowire network of PANI.[17] However, in order to further increase the electrochemical capacitance performance of PANI, a smaller nanometer-sized and well-ordered mesoporous structure must be considered. A much smaller size can greatly reduce the diffusion path, which can ensure the high utilization of electrode materials. On the other hand, well-ordered PANI could display higher electrochemical performance than conventional randomly connected PANI.[18] Moreover, well-ordered mesoporous material can facilitate ionic motion compared with conventional mesoporous material, in which the pores are randomly connected.[19] However, up to now no template-free methods have been found to fabricate well-ordered mesoporous PANI electrodes with typical nanometer-size (less than 50 nm). Therefore, the preparation of capacitor electrode materials with an ordered porous structure and nanometer-size *would appear to be of great interest*[10].

In this communication we report the growth of ordered whiskerlike polyaniline on the surface of mesoporous carbon by a novel synthesis process. The nanometer-sized PANI thorns and thus formed "V-type" nanopores yield a high electrochemical capacitance performance. Why such a structured electrode material shows the best capacitance performance can be summarized as follows (Fig. 1): First, the nanopores provide numerous "V-type" channels inside the active material, which facilitates the fast penetration of the electrolyte.

In other words, these channels ensure that enough ions contact the surface of the active material *in a short time*[11]. Second, the diffusion length L of ions within the electrode during the charge–discharge process can be estimated as $(Dt)^{1/2}$, where D and t are the diffusion coefficient and time, respectively. The value of t decreases rapidly at high charge–discharge current density. Therefore the nanometer-size, reducing the diffusion length (*L*), will ensure the high utilization of electrode materials. Third, the high conductivity of active material and support greatly reduces the energy loss *E*loss and power loss *P*loss due to *IR* loss (where *I* and *R* are charge–discharge current and resistance, respectively) at high charge–discharge current density. The specific capacitance of the PANI/mesoporous carbon composite is as high as 900 F g^{-1} at a charge–discharge current density of 0.5 Ag^{-1} (or 1221 F g^{-1} for PANI based on the pure PANI in the composite). This value is even higher than that of amorphous hydrated RuO_2 (840 F g^{-1}). *To the best of our knowledge*[12], this value is also the highest reported for PANI (very recently a specific capacitance of 724 F g^{-1} was reported for PANI nanowires[17]). Furthermore, the capacitance retention of this composite is higher than 85% when the charge–discharge current density increases from 0.5 Ag^{-1} to 5 Ag^{-1}, indicating its high power performance.



Our strategy can be briefly described as in Figure 2. The detailed preparation process can be found in the Experimental section. *The preparation process mainly involves*[13] 1) immersing mesoporous carbon in 20% ethanol solution (containing aniline and H_2SO_4) while stirring under vacuum for 1 h; 2) adding an equal volume of 20% ethanol solution (which does not contain aniline or H_2SO_4) *to the above mentioned solution quickly with intensive stirring*[14]; 3) then adding ammonium persulfate drop by drop to the solution mentioned in step 2 while stirring at 0 °C. The first step of the preparation process can introduce guest precursor (20% ethanol solution containing some aniline and H_2SO_4) to mesoporous carbon (Fig. 2, after process a). During the second step of the preparation process, after an equal volume of 20% ethanol solution has been added to the solution mentioned in first step quickly with intensive stirring, the concentration of aniline or H_2SO_4 *outside of the mesopores*[15] is reduced quickly. However, the concentration decrease of solution inside the mesopores is *not as quick as outside*[16]. The reason is that the narrow and long mesopores (the average diameter of these channels is 3–4 nm and their length is about 1 μm) limit the diffusion process. Furthermore, intensive stirring does not affect the solution inside these mesopores. Accordingly, a concentration gradient is produced between the solution inside the mesopores and the solution *outside of the mesopores*[15] (Fig. 2, after process b). When ammonium persulfate is added to this solution, PANI precipitates will first be formed close to the external surfaces of mesoporous carbon, where the concentration of aniline or H_2SO_4 is higher (Fig. 2, after process c). These initial precipitates provide nucleation centers that result in the extending growth of PANI (Fig. 2, after process d).

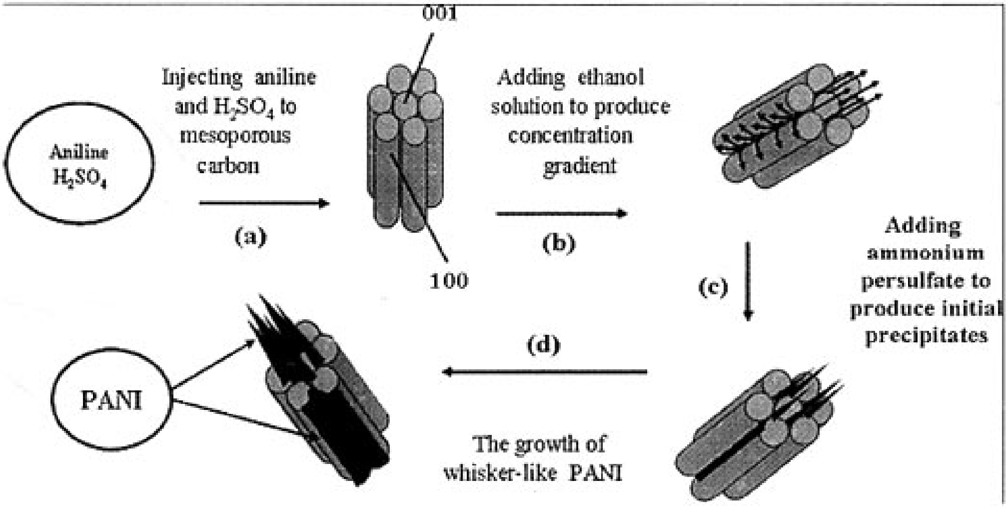


Figure 2. Scheme showing the preparation of whiskerlike PANI on the surface of mesoporous carbon.

The morphologies and microstructures of the support (mesoporous carbon) and the PANI/mesoporous carbon composite have been examined by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Figure 3 shows typical SEM and TEM images of prepared mesoporous carbon and PANI/mesoporous carbon composite. SEM observation indicates that the prepared mesoporous carbon is made of agglomerated small grains typically 0.5–1 μm in size (Fig. 3A). The TEM images of the mesoporous carbon shown in Figure 3B and C feature highly ordered carbon nanowires viewed from the [001] and [100] directions; these wires are in the same perfect hexagonally mesostructured arrays as the channels of their mother mold SBA-15. Comparing Figure 3A and D indicates that a salient morphology change takes place on the external surface of mesoporous carbon, which is due to the freshly deposited PANI on its surface. As shown in Figure 3E and F, TEM images of PANI/mesoporous carbon composite reveal that a great many PANI thorns cover the external surface of the mesoporous carbon, forming a whiskerlike phase. A higher-magnification TEM image (see Fig. 3F) further illustrates that the whiskerlike structure is composed of a significant number of PANI thorns extending from the exterior of the mesoporous carbon into the interparticle open space, forming a loosely packed microstructure.

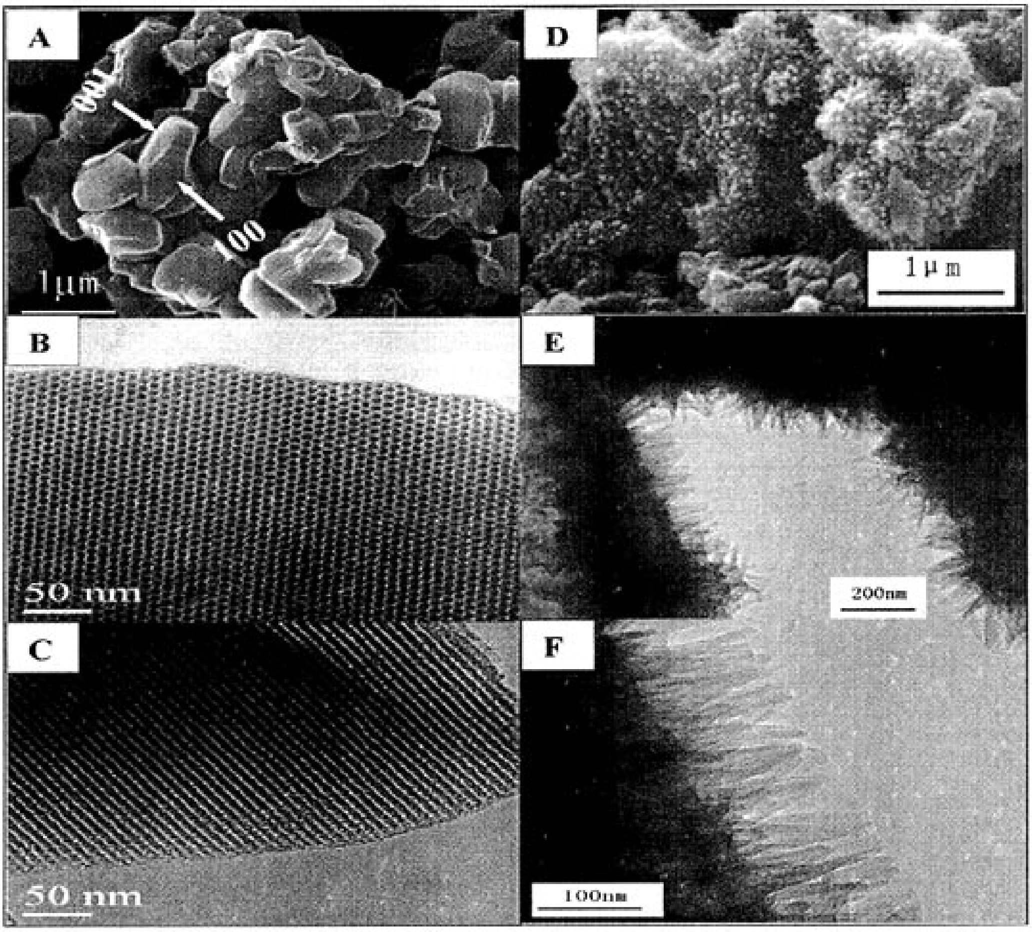


Figure 3. SEM and TEM images of mesoporous carbon and PANI/mesoporous carbon composite. a) SEM image of mesoporous carbon, b,c) TEM images of mesoporous carbon seen from the [001] and [100] directions. d) SEM image of PANI/mesoporous carbon. e,f) TEM images of PANI/mesoporous carbon at different magnifications.

The PANI thorns are about 10–20 nm in diameter and 80–100 nm in length. The specific surface areas of mesoporous carbon and PANI/mesoporous carbon are 1300 m^2 g^{-1} and 35 m2 g^{-1}, respectively. The decrease of specific surface area is mainly attributed to the mesopores of the support (mesoporous carbon) being filled by PANI whiskers. (The pore distributions of mesoporous carbon and PANI/mesoporous carbon composite are compared in the Supporting Information.)

IR spectra of mesoporous carbon and PANI/mesoporous carbon composite are shown in Figure 4. Characteristic peaks at 3500 cm^{-1} and 1096 cm^{-1} are observed in the IR spectrum of mesoporous carbon (Fig. 4, spectrum a). These peaks can be ascribed to –OH (3500 cm^{-1})

and C–C–O (1096 cm^{-1}), respectively. As shown in Figure 4, spectrum b, the characteristic peaks at 1559 cm^{-1} and 1488 cm^{-1} correspond to the quinoid ring and the benzene ring, respectively. The bands in the range 1200–1400 cm^{-1} are the C–N stretching band of an aromatic amine. *The characteristic band of polyaniline base*[17] is the N_Q_N stretching band at 1133 cm^{-1}. The bands at 1027 cm^{-1} can be ascribed to $-SO_3$. This result indicates that polyaniline was prepared in our experiment.

In order to evaluate the electrochemical characteristics of this kind of composite material, cyclic voltammetry (CV) tests and charge tests were employed to characterize the electrochemical capacitance performance of PANI/mesoporous carbon composite. Its electrochemical capacitance performance is summarized in Figure 5. The shape of the CV curves (within the potential window from –0.2 to 0.85 V vs. a saturated calomel electrode (SCE) at scan rates of 10, 20, and 50 mVs^{-1}) shown in Figure 5A indicates that the capacitance characteristic of the PANI phase is distinct from that of the electric doublelayer capacitance, which would produce a CV curve close to the ideal rectangular shape. The two couples of redox peaks (C_1/A_1 and C_2/A_2) observed in Figure 5A result in the redox capacitance. *With increasing scan rate, the redox current increases clearly*[18], indicating its good rate ability. The peak currents at C_1 are 0.024 A (at scan rate 10 mVs^{-1}),

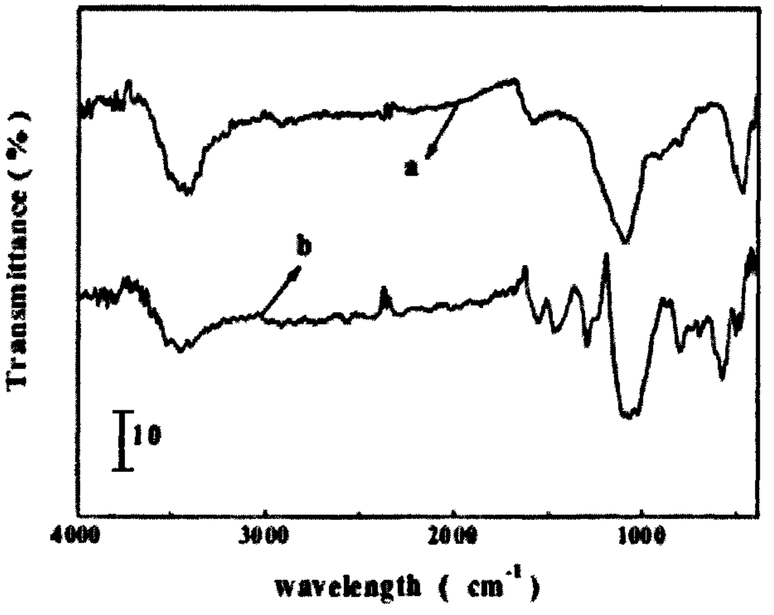


Figure 4. IR spectra of a) mesoporous carbon and b) PANI/mesoporous carbon composite.

0.041 A (at scan rate 20 mVs^{-1}), and 0.085 A (at scan rate 50 mVs^{-1}). It should also be noted that with an increase of scan rate, a positive shift of oxidation peaks (C_1 and C_2) and a negative shift of reduction peaks (A_1 and A_2) are observed, which is mainly due to the resistance of the electrode. (The impedance test is given in the Supporting Information.) Peaks C_1/A_1 are attributed to the redox transition of PANI between a semiconducting state (leucoemeraldine form) and *a conducting state* (polaronic emeraldine form). Peaks C_2/A_2 are due to the emeraldine–pernigraniline transformation. [20] Figure 5B shows the charge–discharge curves of the PANI/mesoporous composite at different current densities (current/(the mass of carbon/PANI composite within the electrode)) within a potential window (−0.2 to 0.7 V vs. SCE). Their specific capacitance can be calculated according to Equation 1,[21]

$$C_m = \frac{C}{m} = \frac{I \times t}{\Delta V \times m}$$

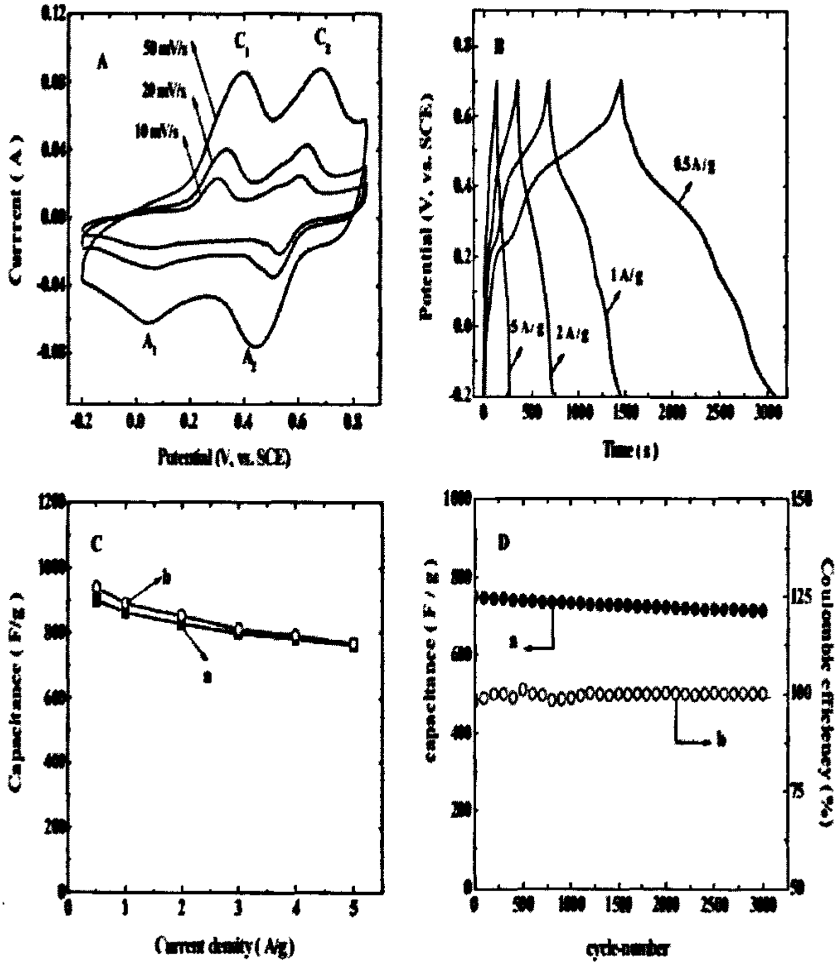


Figure 5. The electrochemical capacitance performance of PANI/mesoporous carbon. A) Cyclic voltammetry within the potential window −0.2 to 0.85 V vs. SCE at different scan rates. B) Charge–discharge tests within the potential window −0.2 to 0.7 V vs. SCE. C) Specific capacitance versus charge–discharge current density (a: discharge capacitance, b: charge capacitance). D) Charge–discharge cycle at a current density of 5 A g^{-1} within the potential window −0.2 to 0.7 V vs. SCE (a: discharge capacitance, b: coulombic efficiency).

where C_m is specific capacitance [F g^{-1}], *I* is charge–discharge current; D*V* is 0.9 V, and *m* is the mass of active material within the electrode. The discharge capacitance of the PANI/mesoporous carbon composite at a current density of 0.5 Ag^{-1} is 900 F g^{-1}. It should be noted that the supporting mesoporous carbon itself has a certain double-layer capacitance (150 F g^{-1}). After the capacitance provided by the mesoporous carbon itself has been deducted (the weight percentage of mesoporous carbon within this composite is 30 wt %), the specific capacitance of whiskerlike PANI phase within this composite is as high as 1221 F g^{-1}. *To the best of our knowledge, this value is the highest reported for PANI. This result demonstrates that the ordered whiskerlike structure can increase the utilization of PANI greatly. This is because this loosely packed whiskerlike structure can enable the electrochemical accessibility of electrolyte through the PANI phase, which is fundamental for materials showing the character of supercapacitors*[19]. Furthermore, the nanometer-size reduces the distance within the PANI phase over which the electrolyte must transport ions. The specific capacitances of the PANI/mesoporous carbon composite as a function of different current densities are shown in Figure 5C. As shown in Figure 5C, curve a, the discharge capacitance of the composite decreases with increasing charge–discharge current densities. The discharge capacitance of the composite is 900 F g^{-1} at a discharge current of 0.5 Ag^{-1}. *This value reduced to 768 F* g^{-1} *at a discharge current density of 5* Ag^{-1}[20]. The capacitance retention is about 85 %, with growth of current densities from 0.5 Ag^{-1} to 5 Ag^{-1}. This result suggests that this kind of composite material has good rate capability, which is very important for the electrode materials of a supercapacitor to provide high power density. *Similarly, with increasing current density*[21], the charge capacitance of the composite reduces from 940 F g^{-1}(0.5 Ag^{-1}) to 770 F g^{-1} (5 Ag^{-1}). The electrochemical stability of the composite materials was examined in 1M H_2SO_4 aqueous electrolyte by charge–discharge cycling at a current density of 5 Ag^{-1}. As shown in Figure 5D, dark data points, the discharge capacitance loss after 3000 consecutive cycles was negligible, at about 5%. This result indicates that materials of this kind have long-term electrochemical stability. Furthermore, during the cycling process, the coulombic efficiency (charge capacitance/discharge capacitance) remains at 100% (Fig. 5D, light data points).

In summary, the ordered whiskerlike growth of PANI on the surface of mesoporous carbon was subtly realized through the unique nanostructure of the support (mesoporous carbon) and an appropriate synthesis process. Loosely packed nanometer-scale PANI whiskers create electrochemical accessibility for electrolyte ions and reduce the distance within the PANI bulk *that ions must be transported during the charging or discharging process*[22], *which is fundamental*[23] for electrode materials of supercapacitors showing high specific capacitance and high-rate charge–discharge ability[24]. Furthermore, carbon materials have been widely used as a support for electrochemical catalyzers, battery electrode materials, and supercapacitor electrode materials. For this reason, it can be assumed that this method can be applied in other fields.

Experimental

Preparation of Mesoporous Carbon: The mesoporous carbon was similar to the CMK-3 reported by Jun [22], and platelike SBA-15 (reported by Yu [23]) was used as the template. The process can be described as follows: SBA-15 (1 g) was added to a solution obtained by dissolving sucrose (1.25 g) and H_2SO_4 (0.14 g) in H_2O (5 g). After being stirred under a vacuum of 0.1 MPa for 20 min, the mixture was placed in a drying oven for 6 h at 100 °C and another 6 h at 160 °C. The carbonization was completed by pyrolysis at 900 °C under N_2 flow. Finally the carbon/silica composite obtained after pyrolysis was washed with 5 wt% hydrofluoric acid at room temperature to remove the silica template.

Preparation of the PANI/Mesoporous Carbon Composite: 1) Mesoporous carbon (1 g) was immersed in ethanol solution (200 ml, 20 %, containing 2.8 g aniline (Aldrich) and 20 g H_2SO_4) while being stirred under vacuum for 1 h. 2) Ethanol solution (200 ml, 20%) was added to *the above mentioned solution quickly with intensive stirring*[25]. 3) Ammonium persulfate solution (the mass ratio of aniline/ammonium persulfate is 1:2.3) was added drop by drop to the solution mentioned in step 2 which was stirred at 0 °C for 5 h. The black–green product of the reaction was filtered and washed repeatedly with distilled water and alcohol. The resulting polymer was dried under vacuum at 50 °C for 24 h. The 70 wt% of mass load of PANI in the composites was evaluated by calculating the weight difference of mesoporous carbon. The as-prepared samples were characterized by SEM (Philip XL30), TEM (Jeol JEM-2010), and IR spectra (Nicolet FT-IR 360 spectrometer).

Preparation of the PANI/Mesoporous Carbon Composite Electrode: The mixture containing 85 wt%PANI/mesoporous carbon composite, 10 wt% acetylene black, and 5 wt% polytetrafluoroethylene (PTFE) was well mixed, and then pressed onto a stainless–steel grid (1.2 × 107 Pa) that served as a current collector (area was 0.5 cm^2). The mass load of the prepared electrode was 5 mg cm^{-2}. The electrochemical performances of the prepared electrodes were characterized by cyclic voltammetry (CV) and charge–discharge tests. The used electrolyte was 1M H_2SO_4 solution. The experiments were carried out using a three-electrode cell, in which platinum and the saturated calomel electrode (SCE, 0.242 V vs. the normal hydrogen electrode (NHE)) are used as counter and reference electrodes. The experiments were performed using a Solartron Instrument Model 1287 electrochemical interface controlled by a computer.

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4.2 The Corrected Version of the Paper

Ordered Whiskerlike Polyaniline Grown on the Surface of Mesoporous Carbon and Its Electrochemical Capacitance Performance**

By *Yong-Gang Wang*, *Hui-Qiao Li*, and *Yong-Yao Xia**

Over the past years numerous research groups in both academia and industry around the world have consciously increased efforts to design and develop advanced materials with dimensions ranging from a few nanometers to several hundred nanometers. Their motive is that the physical and chemical properties of *nanoscopic* substances[1] can differ considerably from the properties exhibited by the same substances *when represented in bulk*[1][2]. Recently, nanostructured electrode materials have attracted great interest, as they show better rates and capabilities than traditional materials. *With nanostructured electrode materials, the distance of material*[3] over which the electrolyte must transport ions is dramatically smaller than with conventional electrodes composed of chemically similar bulk materials.[2–5] *Therefore*[4], advanced materials with nanostructure have been studied widely as electrode materials for energy-storage devices *(i.e.*[5] *batteries and, especially, super-capacitors).*[6]

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It is well known that in pseudocapacitive electrode materials, the pseudocapacitance is mainly produced by the fast faradaic reaction occurring near a solid electrode surface at an appropriate potential.[10] Therefore nanostructured materials can provide a relatively short diffusion path to improve the utilization of supercapacitor electrodes at high power density. Over the years, different morphologies of PANI have been obtained by changing the synthesis method. Nanotubes or nanofibers of PANI have been synthesized by using a porous membrane template.[11] By using the template-directed synthesis method, a unique and ordered structure can be built up directly, but post-processing is required in order to remove the template. In recent years, template-free methods have been studied widely to synthesize PANI with unique structures. Spherical PANI particles, for instance, have been obtained by dispersion polymerization in the presence of polymeric stabilizers.[12] Nanotubes or nanofibers of PANI have been prepared by the selfgrowth process.[13,14] Hollow microspheres of PANI have been synthesized by the emulsion method,[15] and nanowires of PANI have been prepared by interfacial polymerization.[16] However, the typical sizes of PANI reported in these template-free studies are all within the range of 50–300 nm, *but when it comes to template-free methods*[8], controlling the ordered shape of PANI can also be difficult.[14] Very recently, random connected nanowires of PANI *with typical sizes of 30–60 nm*[9] were synthesized by electrochemical deposition, and a specific capacitance of 742 F g^{-1} was obtained for this nanowire network of PANI.[17] However, in order to further increase the electrochemical capacitance performance of PANI, a smaller nanometer-sized and well-ordered mesoporous structure must be considered. A much smaller size can greatly reduce the diffusion path, which can ensure the high utilization of electrode materials. On the other hand, well-ordered PANI could display higher electrochemical performance than conventional randomly connected PANI.[18] Moreover, well-ordered mesoporous material can facilitate ionic motion compared with conventional mesoporous material, in which the pores are randomly connected.[19] Up to now no template-free methods have been found to fabricate well-ordered mesoporous PANI electrodes with typical nanometer-size (less than 50 nm). Therefore, the preparation of capacitor electrode materials with an ordered porous structure and nanometer-size *would appear to be of great interest*[10].

In this communication we report the growth of ordered whiskerlike polyaniline on the surface of mesoporous carbon by a novel synthesis process. The nanometer-sized PANI thorns and thus formed "V-type" nanopores yield a high electrochemical capacitance performance. Why such a structured electrode material shows the best capacitance performance can be summarized as follows (Fig. 1): First, the nanopores provide numerous "V-type" channels inside the active material, which facilitate the fast penetration of the electrolyte.

In other words, these channels ensure that enough ions contact the surface of the active material *within a short period of time*[11]. Second, the diffusion length L of ions within the electrode during the charge–discharge process can be estimated as $(Dt)^{1/2}$, where D and t are the diffusion coefficient and time, respectively. The value of t decreases rapidly at a high charge–discharge current density. Therefore the nanometer-size, reducing the diffusion length (L), will ensure the high utilization of electrode materials. Third, the high conductivity of active material and support greatly reduces the energy loss Eloss and power loss Ploss due to IR loss (where I and R are charge–discharge current and resistance, respectively) at a high charge–discharge current density. The specific capacitance of the PANI/mesoporous carbon composite is as high as 900 F g^{-1} at a charge–discharge current density of 0.5 Ag^{-1} (or 1221 F g^{-1} for PANI based on the pure PANI in the composite). This value is even higher than that of amorphous hydrated RuO2 (840 F g^{-1}). *To the best of our knowledge*[12], this value is also the highest reported for PANI (very recently a specific capacitance of 724 F g^{-1} was reported for PANI nanowires[17]). Furthermore, the capacitance retention of this composite is higher than 85% when the charge–discharge current density increases from 0.5 Ag^{-1} to 5 Ag^{-1}, indicating its high power performance.

Our strategy can be briefly described using Figure 2. The detailed preparation process can be found in the Experimental section. *The preparation process mainly involves:*[13] 1) immersing mesoporous carbon in 20% ethanol solution (containing aniline and H_2SO_4) while stirring under vacuum for 1 h; 2) *adding an equal volume of 20% ethanol solution (which does not contain aniline or H_2SO_4) to the above-mentioned solution quickly, and with intensive stirring*[14]; 3) adding ammonium persulfate drop by drop to the solution mentioned in step 2 while stirring at 0 °C. The first step of the preparation process can introduce guest precursors (20% ethanol solution containing some aniline and H_2SO_4) to mesoporous carbon (Fig. 2, after process a). During the second step of the preparation process, after an equal volume of 20% ethanol solution has been added to the solution mentioned in first step quickly with intensive stirring, the concentration of aniline or H_2SO_4 *outside the mesopores*[15] is reduced quickly. However, the concentration decrease of solution inside the mesopores is *not as quick as it is outside*[16]. The reason is that the narrow and long mesopores (the average diameter of these channels is 3–4 nm and their length is about 1μm) limit the diffusion process. Furthermore, intensive stirring does not affect the solution inside these mesopores. Accordingly, a concentration gradient is produced between the solution inside the mesopores and the solution *outside the mesopores*[15] (Fig. 2, after process b). When ammonium persulfate is added to this solution, PANI precipitates will first be formed close to the external surfaces of mesoporous carbon, where the concentration of aniline or H_2SO_4 is higher (Fig. 2, after process c). These initial precipitates provide nucleation centers that result in the extending growth of PANI (Fig. 2, after process d).

The morphologies and microstructures of the support (mesoporous carbon) and the PANI/mesoporous carbon composite have been examined by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Figure 3 shows typical SEM and TEM images of prepared mesoporous carbon and PANI/mesoporous carbon composite. SEM observation indicates that the prepared mesoporous carbon is made of agglomerated small grains typically 0.5–1 μm in size (Fig. 3A). The TEM images of the mesoporous carbon shown in Figure 3B and C feature highly ordered carbon nanowires viewed from the [001] and [100] directions; these wires are in the same perfect hexagonally mesostructured arrays as the channels of their mother mold SBA-15. Comparing Figure 3A and D indicates that a salient morphology change takes place on the external surface of mesoporous carbon, which is due to the freshly deposited PANI on its surface. As shown in Figure 3E and F, TEM images of PANI/mesoporous carbon composite reveal that a great many PANI thorns cover the external surface of the mesoporous carbon, forming a whiskerlike phase. A higher-magnification TEM image (see Fig. 3F) further illustrates that the whiskerlike structure is composed of a significant number of PANI thorns extending from the exterior of the mesoporous carbon into the interparticle open space, forming a loosely packed microstructure. The PANI thorns are about 10–20 nm in diameter and 80–100 nm in length. The specific surface areas of mesoporous carbon and PANI/mesoporous carbon are 1300 m^2 g^{-1} and 35 m^2 g^{-1}, respectively. The decrease of specific surface area is mainly attributed to the mesopores of the support (mesoporous carbon) being filled by PANI whiskers. (The pore distributions of mesoporous carbon and PANI/mesoporous carbon composite are compared in the Supporting Information.)

IR spectra of mesoporous carbon and PANI/mesoporous carbon composite are shown in Figure 4. Characteristic peaks at 3500 cm^{-1} and 1096 cm^{-1} are observed in the IR spectrum of mesoporous carbon (Fig. 4, spectrum a). These peaks can be ascribed to –OH (3500 cm^{-1}) and C–C–O (1096 cm^{-1}), respectively. As shown in Figure 4, spectrum b, the characteristic peaks at 1559 cm^{-1} and 1488 cm^{-1} correspond to the quinoid ring and the benzene ring, respectively. The bands in the range 1200–1400 cm^{-1} are the C–N stretching band of an aromatic amine. *The characteristic band of a polyaniline base*[17] is the N_Q_N stretching band at 1133 cm^{-1}. The bands at 1027 cm^{-1} can be ascribed to $-SO_3$. This result indicates that the polyaniline was prepared in our experiment.

In order to evaluate the electrochemical characteristics of this kind of composite material, cyclic voltammetry (CV) tests and charge tests were employed to characterize the electrochemical capacitance performance of PANI/mesoporous carbon composite. Its electrochemical capacitance performance is summarized in Figure 5. The shape of the CV curves (within the potential window from –0.2 to 0.85 V vs. a saturated calomel electrode (SCE) at scan rates of 10, 20, and 50 mVs^{-1}) shown in Figure 5A indicates that the capacitance characteristic of the PANI phase is distinct from that of the electric doublelayer capacitance, which would produce a CV curve close to the ideal rectangular shape. The two couples of redox peaks (C_1/A_1 and C_2/A_2) observed in Figure 5A result in the redox capacitance. *With an increasing scan rate, the redox current clearly increases*[18], indicating its good rate ability. The peak currents at C_1 are 0.024 A (at scan rate 10 mVs^{-1}), 0.041 A (at scan rate 20 mVs^{-1}), and 0.085 A (at scan rate 50 mVs^{-1}). It should also be noted that with an increase of scan rate, a positive shift of oxidation peaks (C_1 and C_2) and a negative shift of reduction peaks (A_1 and A_2) are observed, which is mainly due to the resistance of the electrode. (The impedance test is given in the Supporting Information.) Peaks C_1/A_1 are attributed to the redox transition of PANI between a semiconducting state (leucoemeraldine form) and a conducting state (polaronic emeraldine form). Peaks C_2/A_2 are due to the emeraldine–pernigraniline transformation. [20] Figure 5B shows the charge–discharge curves of the PANI/mesoporous composite at different current densities (current/(the mass of carbon/PANI composite within the electrode)) within a potential window (–0.2 to 0.7 V vs. SCE). Their specific capacitance can be calculated according to Equation 1,[21]

$$C_m = \frac{C}{m} = \frac{I \times t}{\Delta V \times m}$$

where C_m is specific capacitance [F g^{-1}], I is the charge–discharge current; DV is 0.9 V, and m is the mass of active material within the electrode. The discharge capacitance of the PANI/mesoporous carbon composite at a current density of 0.5 Ag^{-1} is 900 F g^{-1}. It should be noted that the supporting mesoporous carbon itself has a certain double-layer capacitance (150 F g^{-1}). After the capacitance provided by the mesoporous carbon itself has been deducted (the weight percentage of mesoporous carbon within this composite is 30 wt %), the specific capacitance of the whiskerlike PANI phase within this composite is as high as 1221 F g^{-1}. *To the best of our knowledge, the value is the highest reported for PANI. This result demonstrates that the ordered whiskerlike structure can increase the utilization of PANI greatly. That is because this loosely packed whiskerlike structure can enable the electrochemical accessibility of electrolytes through the PANI phase, which is fundamental for materials showing the characteristics of supercapacitors.*[19] Furthermore, the nanometer-size reduces the distance within the PANI phase over which the electrolyte must transport ions. The specific capacitances of the PANI/mesoporous carbon composite as a function of different current densities are shown in Figure 5C. As shown in Figure 5C, curve a, the discharge capacitance of the composite decreases with increasing charge–discharge current densities. The discharge capacitance of the composite is 900 F g–1 at a discharge current of 0.5 Ag^{-1}. *This value is reduced to 768 F g^{-1} at a discharge current density of 5 Ag^{-1}.*[20] The capacitance retention is about 85 % with growth of current densities from 0.5 Ag^{-1} to 5 Ag^{-1}. This result suggests that this kind of composite material has a good rate capability, which is very important for the electrode materials of a supercapacitor to provide high power density. *Similarly, with an increasing current density*[21], the charge capacitance of the composite reduces from 940 F g^{-1}(0.5 Ag^{-1}) to 770 F g^{-1} (5 Ag^{-1}). The electrochemical stability of the composite materials was examined in 1M H_2SO_4 aqueous electrolyte by charge–discharge cycling at a current density of 5 Ag^{-1}. As shown in Figure 5D, dark data points, the discharge capacitance loss after 3000 consecutive cycles was negligible, at about 5%. This result indicates that materials of this kind have long-term electrochemical stability. Furthermore, during the cycling process, the coulombic efficiency (charge capacitance/discharge capacitance) remains at 100% (Fig. 5D, light data points).

In summary, the ordered whiskerlike growth of PANI on the surface of mesoporous carbon was subtly realized through the unique nanostructure of the support (mesoporous carbon) and an appropriate synthesis process. Loosely packed nanometer-scale PANI whiskers create electrochemical accessibility for electrolyte ions and reduce the distance within the PANI bulk *over which ions must be transported during the charging or discharging process*[22]. *These characteristics are fundamental* [23]for electrode materials of supercapacitors showing *a high specific capacitance and a high-rate charge–discharge ability*[24]. Furthermore, carbon materials have been widely used as a support for electrochemical catalyzers, battery electrode materials, and supercapacitor electrode materials. For this reason, it can be assumed that this method can be applied in other fields.

Experimental

Preparation of Mesoporous Carbon: The mesoporous carbon was similar to the CMK-3 reported by Jun [22], and plate-like SBA-15 (reported by Yu [23]) was used as the template.

The process can be described as follows: SBA-15 (1 g) was added to a solution obtained by dissolving sucrose (1.25 g) and H_2SO_4 (0.14 g) in H_2O (5 g). After being stirred under a vacuum of 0.1 MPa for 20 min, the mixture was placed in a drying oven for 6 h at 100 °C and another 6 h at 160 °C. The carbonization was completed by pyrolysis at 900 °C under N_2 flow. Finally the carbon/silica composite obtained after pyrolysis was washed with 5 wt% hydrofluoric acid at room temperature to remove the silica template.

Preparation of the PANI/Mesoporous Carbon Composite: 1) Mesoporous carbon (1 g) was immersed in ethanol solution (200 ml, 20 %, containing 2.8 g aniline (Aldrich) and 20 g H_2SO_4) while being stirred under vacuum for 1 h. 2) Ethanol solution (200 ml, 20%) was added *to the above- mentioned solution quickly and with intensive stirring*[25]. 3) Ammonium persulfate solution (the mass ratio of aniline/ammonium persulfate is 1:2.3) was added drop by drop to the solution mentioned in step 2 which was stirred at 0 °C for 5 h. The black–green product of the reaction was filtered and washed repeatedly with distilled water and alcohol. The resulting polymer was dried under vacuum at 50 °C for 24 h. The 70 wt% of mass load of PANI in the composites was evaluated by calculating the weight difference of mesoporous carbon.

The as-prepared samples were characterized by SEM (Philip XL30), TEM (Jeol JEM-2010), and IR spectra (Nicolet FT-IR 360 spectrometer).

Preparation of the PANI/Mesoporous Carbon Composite Electrode: The mixture containing 85 wt%PANI/mesoporous carbon composite, 10 wt% acetylene black, and 5 wt% polytetrafluoroethylene (PTFE) was well mixed, and then pressed onto a stainless–steel grid (1.2 × 107 Pa) that served as a current collector (area was 0.5 cm^2). The mass load of the prepared electrode was 5 mg cm^{-2}. The electrochemical performances of the prepared electrodes were characterized by cyclic voltammetry (CV) and charge–discharge tests. The used electrolyte was 1M H_2SO_4 solution. The experiments were carried out using a three-electrode cell, in which platinum and the saturated calomel electrode (SCE, 0.242 V vs. the normal hydrogen electrode (NHE)) are used as counter and reference electrodes. The experiments were performed using a Solartron Instrument Model 1287 electrochemical interface controlled by a computer. [25]

4.3 Corrected points

1. Improper use of "the".

Because nanoscopic substances are a general concept, the authors of the paper are not referring to a specific nanoscopic substance.

2. The sentence as written is not grammatically correct.

The article "the" should be removed according to the usage of the phrase "in bulk", which means in large size or mass.

3. Ambiguous expression.

In the phrase *"With nanostructured electrode materials"*, *"material" is plural,* but in the next part of the sentence *"the distance within the material"* material is singular and with a definite article "the"! Does the material refer to the same thing? It is a contradiction. There is nothing wrong with the phrase "*With nanostructured electrode materials*"(there are many kinds of nanostructured electrode materials), so can we change the second matereial to plura form? No! "within the materials ..."might make people think that the ions are transported from one material to another or something. So if we change it like this: the distance of material over which..., the sentence is clearer.

4. "Hence" here is not properly used, though grammatically it is correct.

First let's find out the subtle distinction between the two words by reference to *A DICTIONARY OF ANSWERS TO COMMON QUESTIONS IN ENGLISH.* Explanation given for "hence": fml, for this reason, from this origin. While for "therefore": as a result of this or that; for this or that reason. So we can see that "therefore" focuses on effect, and "thus" emphasize connection between two steps of a process, emphasis more on the previous part of a sentence.

5. Improper phrase.

"For example" is used when you want to give evidence or evidences of something that is/are typical of the group of things that it is/they are a member/members. "i.e." is the abbreviation for id est (Latin for "that is") and used esp. in writing before a piece of information that makes the meaning of something clearer or shows its true meaning. [23] eg

(1) This house is not to his taste, i.e. he does not like it[44]

(2) today's parents have many problems, what do you do, for example, if you find your child taking drugs? [45]

So here "i.e.", which is used to explains the word "energy-storage devices"(only include batteries, not include other things) is preferable to "for example".

6. Grammatical mistakes.

"Much research" is not correct grammar, because "much" is an adjective which is mainly used in a question sentence or a negative sentence, or a clause sentence[44], for example,

(1) Do you take much interest in it?

(2) He hasn't so much free time as people think

(3) If there is much rain the ground will be flooded.

"A lot of" is a good adjective phrase that modifies "research" correctly. "As well as" here is preferable to "and". "As well as" connects the two gerund phrase, "and" connect two nouns. By using "as well as" and "and" respectively, the sentence structure is rather clear.

7. Wordy.

"As" here serves no purpose and it is not required. Because "consider" can be used as "consider something (to be) something" eg

(1) This could hardly be considered a satisfactory solution

(2) I do not conside r Mrs. Mooore my friend.[44]

8. improper use of the phrase "on the other hand"

"on the other hand, as for template-free method", in this case, the authors of the paper do not want to compare two opposing opinions or two ways of thinking about the same thing, and also does not want to mention the two opposing groups in an argument, so "on the other hand" is not good, not to mention the fact of without "on the one hand". If we say "but when it comes to template-free methods," the meaning becomes perfectly clear and the sentence also fluent.

9. Mistake of number of "size".

If we say "with typical size 30–60 nm", it is not perfectly clear that the sizes of those nanowires of PANI vary from 30 nm to 60 nm, namely, the size of each nanowire can be different from others and it may also be understood that the size of each nanowire were all the same (either 30nm, or 40 nm, or 50 nm...). So "size" should be plural and grammatically the phrase should be "with typical sizes of 30-60 nm" or "with typical sizes varying from 30 to 60 nm" instead of "with typical sizes 30-60 nm".

10. EXCELLENT use of subjunctive mood in this sentence.

The situation is that the preparation of capacitor electrode materials with an ordered porous structure and nanometer-size has not been proven to be "of great interest". What the authors are saying is just based on their own ideas, not the real situation. "appear" here makes the sentence sound more appropriate. And the phrase "be of interest" means "attractive", which is less formal than the phrase.

11. Clarity point: in the phrase "in a short time", "in" as a preposition can have many meanings related to "time":

(1) during part or all of a period of time: we are going to Italy;

(2) needing or using no more time than: can you finish the job in two weeks;

(3) before or at the end of a period of time: we will all be dead in a hundred years so there's no point worrying about it. For clarity we'd better specify "within a short period of time", which means "inside or not beyond a short period of time".

12. Excellent use of the phrase "to the best of our knowledge".

"As far as we know" means the same thing but it is not good for a scientific paper because it is used more in our daily conversation.

13. Incorrect removal of a colon

Here the authors are going to introduce a few experimental steps, so it would be better to use a colon, which makes the sentence structure clearer and grammatically correct.

14. Unclear expression.

Grammatical rules: for compound words which are composed of an adverb and a past participle, a hyphen should be used between the words. For example: a hard-bitten man, a well-matched couple. Here "above" of course is an adverb and "mentioned" is a past participle So a hyphen is required. Just like the compound word coming up "as-prepared samples". And there is another place which needs to be paid attention to, that is , "quickly with intensive stirring" does not indicate that adding an equal volume of 20% ethanol solution to the above-mentioned solution quickly, it MIGHT be understood that with intensive stirring quickly. To make it clearer that adding an equal volume of 20% ethanol solution to the above-mentioned solution quickly, and at the same time stirring intensively, we should use a comma after the word "quickly" and use a conjunction "and" before "with intensive stirring".

15. Grammar mistakes

Grammar point: "outside" here, like the word "inside" is a preposition, not a noun (neither an adverb), so "of" is unnecessary. And "in first step" should be "in the first step", because logically first step is mentioned above.

16. The removal of "it is"

The removal of "it is" is not preferable for a scientific paper because it might cause misunderstanding and makes the meaning of the sentence vague. The second "as" is a conjunction. It should connect a sentence or a condition here. This sentence is a comparison of "the concentration decrease of solution" between "inside" and "outside" so the pronoun "it", which stand for "the concentration decrease of solution", should not be omitted. In the mean time, outside here is a adverb, so it should not follow the conjunction "as" immediately in a formal article.

17. Wrong grammar.

Before a noun which refers to a general situation, for a countable singular noun, an indefinite article should be used; while for an plural noun or an uncountable noun, no article should be used. If the noun refers to a specific kind of things, we may use the definite article or indefinite article or plural form of the noun. In this case, polyaniline base is a countable noun and refers to a general situation, so it takes the indefinite article.

18. Two errors in this sentence.

Because "rate" is a countable noun, if increasing is an adjective then "an" should be added before increasing. If "increasing" is a gerund then, we should not use "a", but who or what is the logical subject of the gerund "increasing"? of course it should not be the subject of the sentence "the redox current". So "with increasing scan rate" cannot be a preposition composite structure here. Another point: if "clearly" comes before "increases", the sentence sounds like more emphasizing "clearly", which is the key point of the sentence, and the sentence becomes more fluent and natural.

19. This part has four "this"!

Which make the sentence sound not very good, though there is nothing wrong with the grammar. We could choose "the" instead of "this" to refer to the value mentioned just in the previous sentence. The "this" in the phrase "This is because" is not well used, because we usually use "that" instead of "this" to refer to what we have just mentioned and use "this" to tell others we are going to talk about something important. By changing the sentences like this, we could see that these sentences seem more fluent.

20. Wrong tense selection.

In the discussion part of a paper we use the present tense. So here in this sentence it is not a good sentence that "reduced" serves as the past form of intransitive verb, it might be the past participle of "reduce" with the link verb omitted? It cannot be that way, either. Because without a link verb, it is not a sentence at all! We may change the sentence like: (1) this value is 786 Fg^{-1}; (2) this value is reduced to 786 Fg^{-1}. which way is better? The second one! Because it includes a comparison as well as the exact value, it is more informative!

21. Wrong use of indefinite article

Add "an" before the noun phrase "increasing current density" for reasons already discussed earlier (see note 18)

22. Wrong grammar.

Grammar point: for an attributive clause with a "verb+preposition" structure as transitive verb, the preposition should NEVER be removed, because the grammatical function of "which" or "that" is to serve as the object of the preposition. e.g.

(1) The tool with which he is working is called a wrench[46].;

(2) The documents for which they were searching have been recovered[47].

So in this sentence, "that" serves no purpose and it does not function as anything at all in the subclause (it is not a correct subclause at all). According to the intended meaning of the sentence, that should stand for the preceding word "distance", so we should use "over which" in place of just "that" which means that ions must be transported over the distance.

23. Vague expression

This "which" is vague and hardly understandable because it is so long and complicated a sentence which includes two attributive clauses, especially the second clause stands for the whole previous part of the sentence. If we end the previous sentence with a full stop and start a new sentence with "these characteristics/features", I think it would be much better understandable and clearer.

24. Mistakes in number of nouns

Here we are discussing the general property of ability and specific capacitance. If we use plural form of the two words, abilities and specific capacitances refer to many different kinds of abilities and specific capacitances, which is not the case.

25. Wrong spelling of a compound word.

See earlier comments at 14

第五章　一些规范化问题在科技英语论文中值得关注

5.1 引言

在科技英语论文中的许多错误都是可以通过不断总结加以避免的。这些错误有的是由于语法错误导致的，有的则是不熟悉特定的语言结构而导致的，有的是由于错误地理解了英语某些短语或结构的含义而发生的。由于母语为非英语的人在学习英语的时候，很难形成英语思维，因此，在使用英语写作和英汉互译时就会犯语法错误或有关汉语思维在英语中加以套用的错误。这在学习和使用英语很好的人当中也时有发生。用英语在写文章时，意思表达连贯，语言运用得体，但仍然出现了一些表达不到位，冠词及分词使用不当、标点符号、时态及语态方面的问题。尽管这些错误都是小问题，但确实影响了文章的整体质量。要提高英语翻译能力，尤其要提高科技英语写作能力，要注意英语中的许多表达习惯，要留心于许多语言方面的细节要求和科技英语写作当中的一些规范化的问题，小到标点符号（如连字符、逗号、分号等的正确使用），大到时态、语态、语气的选择及文章句子结构都要兼顾到。只有这样，才能写出错误少表达清楚流畅的好文章，使自己的科技成果发挥最大的效用。为了避免容易出现的词法、句法及有关表达规范化方面的问题。对此笔者总结多年来作为《技术与教育》杂志的英文译审积累下来的材料，整理如下一些在科技英语翻译与写作方面应该注意的一些问题，希望能起到抛砖引玉的作用。

5.2 分析与结论

5.2.1 冠词 a 的位置

1. how useful a tool　　多么有用的工具。
2. however good a motor　无论多么好的电动机。
3. so new a machine tool　如此新的机床。
4. too useful a tool　　非常有用的工具。
5. Why do metals come to play so great a part in man's activities?
为什么金属在人类的活动中起那么大的作用？
6. So important an experiment should be made with great care.
一个如此重要的试验必须特别小心去做。

7. Mercury freezes if it is cooled to too low a temperature (below about - 40 ℉), 如果水银被冷却到太低的温度（约低于华氏- 40 ℃ ），它就冻结。

因此，从上述例子中，可得出他们都符合：副词 so + adjective + a + noun 的结构，其中冠词 a 放在形容词之后是英语的习惯用法。翻译时冠词 a 一般可不译出。这种结构与 such a + djective + noun 的结构的区别在于前者更强调 adjective, 而后者表达的重

点在 such 这个词上，重在指眼前的这件事物上，其形容词的色彩退至其次。

5. 2. 2 more than a 与 more than one

1. The part weights more than a kilogram.

这个零件有一千克多重。（即一千克零若干千克）

2. The part weights more than one kilogram.

这个零件不止一千克重。（即两千克，三千克等）

3. The work took us more than an hour to finish.

我们花了一个多小时完成这项工作（即一个小时零若干分钟）

4. The work took us more than one hour to finish.

我们花了不止一个小时完成这项工作。（即两、三个小时）

5. 2. 3 part of ...与 a part of ...

1. When coal burns, part of it is left as ash.

煤燃烧时，一部分留下成为灰。

2. When some energy is used in overcoming friction and accelerating a body, a part of the used energy is changed to heat in the process.

当若干能量用来克服摩擦并加速一个物体时，一小部分用了的能在过程中变成热。

因此，很显然，a part of...强调的是“一小部分”。在英语中还有一些类似的例子如：remanant, remainder 两词，前者一般是指剩下的一小部分，而后者则没有这方面的特征。

5. 2. 4 由倍数换算成分数时

Reduce 3.5 times 汉语中不说 1 / 3.5，所以换算成整数即 1×2 / 3.5×2=2 / 7, 因此译为:“减少到七分之二; 减少了七分之五”。

5. 2. 5 有关每隔……时间的表达法

1. He has typed that article on every other (second) line.

他把那篇论文每隔一行地打出来。

2. We shall lubricate our machine every four days(every fourth day).

我们将给我们的机器每隔三天(或四天;或每第四天)加一次润滑油。

3. He receives an injection every four days (every fourth day)

他每第四天(或四天,每隔三天)注射一次.

因此，按照汉语习惯,“每隔几天”最通俗易懂，而每第四天和每四天，有时令人费解。英语出现 every three weeks = every third week 时我们不要译为每第三周，而要译为每隔两周。在英语中 every + 序数词 + 单数名词与 every + 基数词 + 复数名词这两种表达是等效的。

5.2.6 other than

1. I have used every other tool than this one in our workshop.

除这件工具外，我用过车间里其他的每件工具。

2. I have used every other tool besides this one in our workshop.

除这件工具外，我还用过车间里其他的每一件工具。

注意 than 与 besides 的区别，前者不包括 this one，而后者包括 this one 在内。在英语中，other than 有时可以分开，表达较为复杂的含义，属于高效率介词短语。如：with other metals than iron, copper, notably lead, mercury.对于除铁、铜之外的其它金属，尤其是铅和汞……。

5.2.7 five square feet 与 five feet square 的区别[48]

1. The area of this plank is 6 square inches.

这块板的面积是六平方英寸。

2. The area of this plank is 5 feet square.

这块板的面积是五英尺见方 (或 25 平方英尺)。

在英语中有些词序差异会导致表达含义上的根本不同。另外 a river navigable 与 a navigable river 及 an involved problem 与 a problem involved 也是不一样的。

5.2.8 to commence this work 和 to commence with this work 的区别

to commence this work=to begin this work　　开始这项工作

to commence with this work=to do this work before doing any other　先从这项工作开始做。

5.2.9 prepare 与 prepare for 的区别

这是 prepare 作及物动词与不及物动词 + 介词两种用法的区别。总的区别是 prepare 作及物动词后面直接跟动词 prepare 的对象，而 prepare for 后面跟的是较为抽象的对象，即是不能被"prepare"的抽象名词。如：prepare the room for a party 布置好房间准备开宴会[49]。再如下面例句：

1. He is preparing for tomorrow's speech.

他在准备明天的演讲（他不可能正在做演讲，只能是为……明天的演讲做准备）。

2. He is preparing his speech notes

他在准备明天的演讲稿（演讲稿是他正在做的事情）。

3. He is searching his drawer.

他正在翻抽屉（抽屉是他翻的对象）。

4. He is seaching for his camera.

他正在翻相机（相机不是他翻的对象，而是要找的目标，因此要用 for）。

其它还有好多的动词都具有这种 vi 与 vt 两种词性，其用法用心去体会，一定能够搞清其中的奥妙。

5.2.10 substitute 和 replace 的用法差异

replace: to take the place of something or put something or someone in the place of something or someone else.

substitiute: put or use sth /sb to act for or serve as sth or sb else.

1. The factory replaced most of its workers with robots.

这家工厂用机器人取代了大部分工人。

2. You could substitute soybean oil for butter in this recipe.

在这组配方中你可以用豆油代替黄油。

这两个词的名词形式的用法为：

the substitution of ... for ...

the replacement of ... by / with ...

3. The substitution of rolling friction for sliding friction results in a very considerable reduction in friction.

以滚动摩擦代替滑动摩擦能导致摩擦力大大减少。

4. History develops by the replacement of the old by the new.

历史的发展是以新事物代替旧事物。

5.2.11 全部否定与部分否定

5.2.11.1 部分否定

1. Everyone cannot do this test.

并非人人都能做这个试验。(或：不是每个人都能做这个试验.)

2. Both the instruments are not precision ones.

这两件仪器并不完全是精密仪器。

3. All metals do not conduct electricity equally well.

并非所有的金属都能同样好的导电。

4. Both of them are not useful.

它们两个不是都有用。(或：并非它们两个都有用)

这种句子结构特点：every...not = not every　并不是每 ...都...

both...not = not both　并不是两...都...

all...not = not...all　并不是所有的...都...

5.2.11.2 全部否定

1. None of these light metals are suitable for the making of airplane parts.

所有这些金属都不适合制造飞机零件。

2. Neither of them is useful.

它们两个都无用。

3. No machine here is produced in our factory.

这里的机器都不是我们厂生产的。

5.2.12 From ...on up / down

From 4 ℃ on down, instead of contracting, water expands.

从摄氏四度往下，水膨胀而不收缩。

From 4 ℃ on up　从摄氏四度往上。

5.2.13 **such as** 的用法

1. Soft materials, such as cloth, do not carry sounds as well as wood, iron and other solids.

柔软的材料，例如布，不如木材，铁和其它固体传导声音那样好。

2. Ultrasonic sounds are such as are inaudible to the human ear.

超声的声音是人类耳朵听不到的那种声音。

3. This book is not such as we expect.

这本书不是我们所希望的书。

在上述例句 1 中，such as 是我们熟知的用法“例如”，使用时注意一般前后各有一个逗号。而在例句 2 和例句 3 中均是 such 作为主词（先行词），而 as 是关系代词引导定语从句。

5.2.14 advance 与 advancement[50]

1. The advance of science has been very great during the last fifty years.

近五十年来科学有了很大的进步。

2. Many a Chinese worker has contributed much to the advancement of science of late years.

近年来不少中国工人在发展科学方面做出了很大贡献。

注意：advance 有两个相对应的名词，相当于及物动词的是 advancement.和不及物动词的是 advance

3. The combination of theory with practice is the guiding policy for the advancement of China's science and technology.

理论联系实际是促进中国科学技术的指导方针。

4. China's industrial advance has been remarkable.

中国的工业进展是很惊人的。

5.2.15 - able, - ible 表示主动含义

众所周知，以 - able, - ible 两词缀结尾的名词具有被动意味。但也有除外：

1. the alloy is suitable for making the skin of an ultrasonic plane.

这种合金适宜与制造超音速飞机的外壳。

2. Aluminum has many good qualities, such as high conductivity of heat and electricity, strong resistance to corrosion, favorable physical and chemical properties...

铝具有很多优良特性，例如高度的导热性和导电性，强烈的防腐蚀性，良好的物理性能和化学性能……

类似的词有：Durable 耐久的，comfortable 舒适的，forcible 强制的，agreeable 适宜的……

5.2.16 Would+原形动词

常常用来表示行为按照规律应当产生的结果.

Hence the atomic weight would be $32 \times 2 = 64$.

原子量应当是 64。

5.2.17 be proved 与 prove 之差别

1. His measurements have been proved accurate.

他的计量已被证明是准确的。

2 .His measurements proved accurate.

他的计量原来是准确的。

5.2.18 between 在三者之间的用法

如：1 There is a definite relationship between the potential difference that makes a current flow, the rate at which the electricity flows and the resistance of the object or objects through which the current passes.

使电流流动的电位差，电流流动的速率和电流经过物体所受到的阻力这三者彼此间存在着一定的关系。

再如短语：the friendly relation between the people of all countries 各国人民之间的友好关系；The difference between gases, solids and liquids 气体、固体和液体之间的差别。

5.2.19 **due 与 owing**

5.2.19.1 "due to +名词"放在名词之后说明名词作定语

The acceleration due to gravity is about 980 cm / sec 2, or 32.16 fe / sec 2.

由于引力产生的加速度大约为 980 厘米/秒 2 或 32.16 尺 / 秒 2。

5.2.19.2 "due to +名词"用作状语

A part of the energy is wasted in machines due to friction.

由于摩擦，一小部分能量消耗在机器里

5.2.19.3 "due to +名词"用作表语

1. Pressure in a liquid is due to its weight.

液体的压力是由于液体的重量产生的。

2. Changes in society are chiefly due to the development of the internal contradiction in society.

社会的变化，主要是由于社会内部矛盾的发展。

5.2.19.4 "owing to +名词"只能用作状语

High carbon steel owing to its high strength and hardness may be used for tools and working parts of machines.

高碳钢由于强度和硬度都高，可用来制刀具和机器的工作部件。

5.2.20 **on、after、in 后接动名词的区别**

1. on + 动名词(或动作名词)，表示某种动作刚开始后，马上就出现另一动作，前后两个动作紧紧相连，可译为："一……就……"。

Photographic plates become darkened on exposure to X - rays.

照相底片一曝露在 X - 射线下就变黑。

2. after+动名词，表示某动作发生后，另一动作跟随发生，但两个动作之间有时可能有间隔。

After performing this experiment, they began another one.

完成这个实验后，他们开始做另一个。

3. in + 动名词，表示"在……过程中，与……同时"。

Wood gives much smoke in burning.

木头在燃烧时(过程中)放出很多烟。

5.2.21 **in case of... / in the case of...**

1. in case of...紧急时，如 in case of any difficulty 如有困难；in case of danger 如有危险。例如：

Break the circuit first in case of fire.

如遇火警，首先切断电路。

2. in the case of...可译为“就……而言”如：

In the case of physical change, no new substance is formed.

就物理变化来说，没有新的物质产生。又如：

In the case of liquids, the chemist takes an interest in density, odour, color and the temperature at which the liquid melts.

就液体来说，化学工作者感到兴趣的是密度、气味、颜色和它的溶解温度。

3. 类似的例子还有很多如 in issue（在争论中）和 in the issure（最终），in mass（全部地，整个地）和 in themass（大体上，总体上）等。

5. 2. 22 to 与 by

1. Cost was reduced to 30 per cent.

成本减少到百分之三十(减少了百分之七十)。

2. Cost was reduced by 30 per cent.

成本减少了百分之三十（只有原来的百分之七十)。

5. 2. 23 to 与 with

1. Connect this wire to the machine.

将这根线接到这台机器上（只能用 to)。

2. Connect this wire with / to that one

将这根线与那根线连接起来。

5. 2. 24 to possess / to have

To possess 比 to have 语气重些，并且前者只用于好的方面，后者既可用于好的方面，也可用于不好的方面。例如：

A ball flying through the air is possessed of kinetic energy.

在空中飞过的球具有动能。

5. 2. 25 cannot be too...

1. We cannot be too careful in doing experiments.

我们做实验(怎么小心也不过分)应尽量小心。

2. One can never be too careful in one's work.

我们的工作越过细越好。

3. We cannot praise Lei Feng too much.

我们无论怎样称赞雷锋都不过分。

5. 2. 26 the wrong end up，upside down 和 inside out

1. Hold the test-tube the wrong end up.

口朝下拿着试管。

2. Turn the case upside down.

把盒子颠倒一下。

3. Turn the tool bag inside out.

把那工具袋里外翻个。

5.2.27 with / without + 逻辑主语 + 分词

有些语言学家把这种介词分词独立结构称为 prepositional absolute participle construction[47]。这种结构代替整个一个分句，使句子更为简洁明了。

1. The density of air varies directly as pressure, with temperature being constant

在温度恒定时，空气的密度与压力成正比。在这个句子中 with 短语作条件状语。

2. An object may be hot without the motion in it being visible.

一个物体, 即使其内部运动不可见, 仍可能是热的。without 短语作让步状语。

5.2.28 since 与 as

As 用来表示原因时, 在语气上不如 because 重, 只说明一般因果关系。

Since 表示的原因是对方已知的，无须加以说明，故一般把它译为“既然”。所以全句的重心当然落在主句上了。例如：

1. As water vapor is extremely light, it often rises high in the sky.

由于水蒸汽极轻, 它时常在天空里上升的很高。

2. Since light travels faster than sound, we see lightning before we hear the thunder.

因为光比声传播得快，所以我们在听到雷声之前先看到闪电。

5.2.29 no(t)less / more than ...

1. They have designed not less than six kinds of lathes.

他们设计了至少六种车床(也许不止六种)。

2. We have designed no less than ten kinds of lathes.

我们设计的车床有十种之多（表示数量之多，而数量是确定的)。

3 She committed no fewer than 91 errors[49].

他所犯的错误竟有 9 1 个之多。

4. There are not more than six lathes in the workshop before liberation.

解放前这个车间的车床不超过六台(也许还达不到六台)。

5. There are no more than five lathes in the workshop before liberation.

解放前这个车间里只有五台车床。(表示数量之少，而数量是确定的)

5.2.30 比例与类比的表达法

1. As water is to fish, so is air to man

空气之于人, 犹水之与鱼。

2. Air is to man as water is to fish.

空气之于人, 犹水之于鱼。

3. What A is to B, that is C to D.

A 比 B 等于 C 比 D。

4. A is to B what C is to D.

A 比 B 等于 C 比 D。

5.2.31 英语标点符号问题

英语标点应该紧接着最后一个字母或符号[51]。有的出版社要求在表示短暂停顿的标点如逗号、分号、冒号等后面要空一格。在表示完全停顿的标点如句号、问号、惊

叹号后面要空两格。但现在大多只要求在标点后空一格。

破折号“—”，数字范围号“-”和连字符“-”前后均不空格；括弧外面前后均空格，里面前后均不空[47]。

英语标点符号中没有“《》”、“、”和“~”。英语中书名一般用斜体表示，对应汉语中的顿号，英语中用逗号。表示数字范围则用半字线“-”[52]。

例：*Reader 's Digest* 《读者文摘》；in 1996 - 1999 在 1996 ~ 1999 年（或用 From ... to...表示），而不用 in 1996 ~ 1999。

5.2.32 注意选词

在运用英语进行写作时，许多情况下由于选词不当导致表达不清楚或表达歧义，从而引起别人误解。如英语中 article，composition，essay，paper，thesis，dissertation 及 treatise 皆为“论文、文章”，但“article”主要指在报纸或杂志上刊登的文章，如 a leading article(社论)。“composition”可以是学生作文，也可以是艺术家的作品。如“essay”指一般的短文。“paper”是指学术会议上宣读或学术杂志上登载的文章，“thesis”和“dissertation”为学位论文，但前者多指硕士学位、后者多指博士学位论文。“treatise”指一般的论文或专著[22]。

笔者建议：关于英语中近字词的区别，科技工作者在进行科技英语论文写作时，多多借助全英词典（即英英词典），体会其中的英语释义和原汁原味的例句，一定会解开近义词的迷团，选到适当的词。

5.2.33 复合词在标题中的用法[51]

在国内出版的许多科技杂志上，我们见过许多犯这样错误的例子。这里所指的复合词是指两个词中间使用一个连接符号联接在一起的词。这种词在标题中出现时，连接符号所连接的两个词的第一个字母都要大写。

An Intelligent Aided Decision - Making System of Choosing Control Plans for Unstable Slope.

A Reply to ‘A Discussion About Complete Stress - Strain Curves of Rocks Under Uniaxial Loading.

如果上述两例中的 Decision - Making 及 Stress - Strain 后边的 making 与 strain 不大写就属不正确用法。

5.2.34 英文中有关数字的用法

在英语中两项数字相连时，其中一个用文字，另一个用数字；具体用哪种，要按照哪一种方式简短，用哪种的原则。例如：

36 fifty - watt amplifiers 或 thirty six 50 watt amplifiers.

36 个 50W 的放大器[52]

具有统计意义的数字，如试验结果、物理量的大小、物体的尺寸、事物的限度、统计数字以及从图表中引用的数据等，总是使用阿拉伯数字。例如：

380 ℃，5500 hpa，a diameter of 3 cm，scores of 17 to 13 and 42 to 3，with a maximum of 36，(Fig 2a)，and a minimum of 6 [52] 等。

在英文中，是不能用阿拉伯数字开始一个句子的。如：

3000 square kilometers of the best farmland are lost each year in developed countries.

对于这种情况，阿拉伯数字 3000 是不能使用的。如果不改变句子结构，把数字从句首移开，就必须将阿拉伯数字 3000 改为英文数字 three thousand。

第六章 科技英语论文中有关数字翻译法的研究

6.1 引言

由于英汉两语在表述或对比倍数方面存在着语言与思维差异，因此，在英汉互译或科技英语论文中倍数问题处理不当情况相当普遍，所以有必要研究有关科技英语中常见的倍数及其它数字关系表达方法。

6.2 分析与结论

6.2.1 倍数增加的翻译方法

1. “...n times + 比较级 + than...”表示净增加的倍数，可照译为 n 倍。

Light waves are 2,000 to 10,000 times longer than X-ray waves.

普通光的波长较之 X 射线的波长长 2000 — 10000 倍。

2. “...n times + as ...as...”表示“是……的 n 倍”，也可译为“n－1 倍”

The atomic weight of oxygen is 16 times as heavy as that of hydrogen.

氧的原子量是氢的 16 倍。（或译为氧的原子量比氢的大 15 倍）

3. “...n times +名词或 that...”表示”为……的 n 倍”，也可译为“n 倍于……”

The arch dam is economical in narrow canyons where the top chord length is about two to three times the height of the dam.

对于坝顶弦长约为坝高的二至三倍的峡谷。

4. “表示增加意义的动词 +n times”表示”增加了 n-1 倍”

In 1980 the output value of this city's light industry multiplied 6 times as against 1967.

1980 年与 1967 年相比，该市的轻工业总产值增长了五倍。

5. “表示增加意义的动词 +by a factor of n”表示“增加到 n 倍”，应译为“增加了 n - 1 倍”。

The output of diesel oil for farm use has been increased by a factor of five these years.

这几年，农用柴油的产量增加了四倍。

6. “表示增加意义的动词 +by n times”表示净增的数，可照译为“增加 n 倍”。

The abrasive hardness of this material was increased by twice.

这种材料的耐磨硬度提高了两倍。

7. as many again 的意思是“两倍”

We have had five tractors, but we shall need as many again.

我们已经有了五辆拖拉机,可是我们还需要十辆。

8. “...as much (many, fast...) again as”表示法中，若在第一个 as 之前加 half, 则可

译为“一倍半于……”或“比……多（多，快）50%”。

如：Wheel A is half as fast again as wheel B.

A 轮的速度是 B 轮的一倍半[46]。

9. “…比较级 + by a factor of n …”表示增加以后达到的倍数，可译为“比……长（高，宽……）n－1 倍”或“是……n 倍”。

One night on the moon is longer than that on the earth by a factor of 14.

月球上的一个黑夜比地球上的一个黑夜长 13 倍。（或译为：月球上的一个黑夜是地球上一个黑夜的 14 倍。）

The weight of any object on the earth is heavier than that of any object on the moon by a factor of about 6.

地球上的物体重量比月球上的物体重量约重五倍。(或译为：地球上的物体重量大约是月球上物体重量的六倍。)

11.用动词 double 表示增加一倍，可译为“等于……的两倍”。

The engineer said that the thrust blocks have to be doubled because of abrupt widening of the valley near the top of the dam.

这位工程师说，由于河谷在坝顶附近突然扩大，推力墩需扩大一倍。

12.动词 treble 表示增加两倍，可译为“增加到三倍”。

The production of machine tools has been trebled in our factory.

我厂的机床产量已经提高到原来的三倍。

13.用动词 quadruple 表示增加三倍，可译为“增加到四倍”。

We have quadrupled the output of synthetic materials.

我们已将合成材料的产量增加到四倍。

6.2.2 倍数减少的翻译方法

1.“减少了 n 倍”的表示法

The plastic container is five times lighter than that glass one.

这个塑料容器比那个玻璃容器轻 5/6。（或译为：这个塑料容器的重量是那个玻璃容器的 1/6。）

2. …a n times (n – fold) + reduction

The length of the plastic pipe is a three times reduction over that of the metal one.

这根塑料管的长度比那根金属管的长度缩短了 2/3。

3. 表示减少意义的动词 + by a factor of n

The loss of electricity was reduced by a factor of two.

电的损耗减少了 1/2.

4. 减少一半的表示法

Break …in half (into halves)	把……分成两半
decrease one-half	减去一半
one-half less	少一半
not half	少于一半地

be less than half　　比一半还少

halve...　　将……减半

shorten...two times　　缩短一半

6.2.3 百分数的翻译方法

1. “…n% + 比较级 + than …”表示净增减的数，数字 n 可照译

Buttress dams usually require from 30 to 40 percent less concrete than a concrete gravity dam.

支墩坝所需要的混凝土通常比重力坝少 30～40%。

2. “…n% + 比较级 + 名词”表示净减量，数字 n 照译

The new-type machine wasted 10 percent less energy supplied.

这台新型机器少损耗所供给能量的 10%。

3. “表示增减意义的词 + by　n%”表示净增减，数字 n 照译

The friction between the moving parts of the machine is reduced by more than 14%.

这台机器的可动部件之间的摩擦力减少 14% 以上。

4. “a　n% + increase”表示净增，数字 n 照译

There　is a 15%　increase of students as compared with last year.

学生数比去年增加了 15%。

5. “n% + (that of) +名词（代词）”表示增减，包括底数在内

The production cost is about 80 percent that of last year

生产成本大约是去年的 80%。

6. “表示减少的动词 +to + n%”表示减少后剩余的数量，数字 n 可照译。

The new technology reduces sulphur content from around 0.024%　down to 0.006% at a chemical efficiency of 75%.

新工艺将硫的含量从 0.024% 左右降低到 0.006%，化学效率为 75%　。

6.2.4 数量增减的翻译方法

1. “as... + many(high, long, low...) +as + n”表示“多（高、长、低......）达……”之意。

The element uranium contains as many as 92 protons and 146 neutrons.

元素铀含质子多达 92 个，中子多达 146 个。

2. “…by　n +名词 +比较级 +than…”表示净增减，数字 n 照译

This rod is by two meters longer than the one against the wall.

这根杆比靠墙的那根长两米。

该句中的 by 可省去，句子意思不变。

3. 表示增减意义的动词 + to + n” 表示“增加到 n”或“减少到 n”

Gas welding machines have been increased to 100. 气焊机已增加到 100 台。

4. “too + 形容词”表示“过于”

You have given him five too many (few).　你多（少）给了他五个。

6.2.5 不确定数字的翻译方法

1. 以复数形式表示的不确定数字。

如：Scores of （好）几十（不低于 40）；By scores 不少，很多；In scores 很多，大批；By hundres 数以百计地。

2. 由 or more, more than, over 或 above 所组成的不确定数字

A mile or more 一英里多；more than one hundred，over one hundred，above one hundred 一百多，一百以上。

3. 由 long 组成的不确定数字

a long mile 一英里多，two long days 两天多等。

4. 由 odd 组成的不确定数字

Fifty odd 五十几

Eighteen thousand and/or odd miles 18000 多英里

5.由 less, less than, under 或 below 组成的不确定数字。

a mile or less 不到一英里；less than forty / under forty / below forty 不到四十，四十以下

6. 由 some，about 及 approximately 等组成的不确定数字

The distance sound travels in sea per second are approximately 4800 feet.

声音在海里的传播速度每秒约为 4800 英尺。

结论和展望

本文的主要结论：

科技英语论文写作与翻译问题说到家涉及到的就是两个方面：即英语语言表达和相关专业科技知识。如何借助英语语言共享他人已取得的科技成果，如何将自己的科技成果用英语准确、清晰、完整地表达出来是个系统工程，这往往需要作者许多方面的知识与能力的积累。本文以化学领域的科技英语论文为例，系统地阐述了化学科技英语论文翻译与写作方面的问题。

首先，你要对于化学科技英语论文的语言特点（即词法、句法、表达习惯、翻译的一般原则与方法）有一个整体认识，对于写作过程中的涉及到的一些环节如文章摘要、文章结构更要做到充分的把握。其次，对于化学科技英语论文而言，为了交流的目的，就必须做到对于各种科技概念和过程的表述规范，如标点符号、各种数字关系表达和写法等方面的问题使用不当造成文理不顺，使人费解的情况屡见不鲜。第三，你要熟悉化学领域内的各种化学物质、化学过程等方面的专有名词的英语规范表达。第四，对于英语语言本身的运用不当更是多见。如：在英语当中由于时态、语态、语气使用不当，或由于介词、冠词、连词等虚词使用不当造成误解和歧义的情况大有存在。对于英语实词的使用则更见功夫。科技文章的文体，如前所述相对正规，对于实词的选择则更能体现出文章的正规性来，更能体现出科技文章的严谨来。所以对于英语语言当中的实词的确切色彩和含义更是不可忽视的问题。本文在第五章当中也特地举了两个这样的例子，以起到抛砖引玉的作用。本文就是想从这些方面由大到小、由概括到具体来谈谈在科技英语论文写作过程中所能涉及的到这些方方面面，以期能够在化学科技论文方面给大家一个较为宏观的认识，同时也希望通过所结合的实例分析和某些常见的规范化问题能给读者一个具体化的认识。以期帮助科技英语论文写作者提高科技英语论文尤其是化学科技英语论文的翻译和写作水平。

本篇论文从如下几个方面加以研究：

1. 科技英语写作与翻译一般要求与原则；

2. 科技英语论文的一般特点，从词汇和句法两个方面来分析总结；

3. 科技英语论文摘要写作要求、注意事项、及例文分析（例文也都是已在国内外

发表了的化学化工科技英语论文)。

4. 已发表的化学英语论文典型错误分析;

5. 化学及科技英语论文中有关细节问题综述。

今后工作展望:

在笔者从事科技英语翻译工作及审校工作的实践经验基本之上,同时结合多年来阅读了许多有关英语译著方面的文章的心得笔记,对科技英语翻译过程中应当遵循一些原则作些研究,其中不完善之外还待日后有机会再加以补充和研究。有不正确之处,请各位专家及同行们指正。

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在硕士期间公开发表论文及著作情况

文章名称	发表刊物（出版社）	刊发时间	刊物级别	第几作者
光降解法制备聚苯胺纳米棒的研究[J]	东北师大学报：自然科学版	2006，38（2）：67-71	核心刊物	第二作者
化学化工专业英语[M]	化学工业出版社	2003.2	国家级	参编 lesson3-6,lesson8-11 附录 3，合计约 10.5 万字
硅分子筛在精细化学中的应用[J]	东北师大学报	2002.10	核心刊物	第一作者
新型金属材料及新型无机材料[J]	东北师大学报	2002.10	核心刊物	第二作者
《"If"的另类条件名》	《大学英语》学术版	2006.3	国家级	第一作者
《小议英语中"隐性否定"》	《大学英语》学术版	2005.5	国家级	独撰

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