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（3rd Edition）

科技英语交流
（第3版）

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外语教学指导与学术研究系列丛书

科技英语交流

（第 3 版）

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内 容 简 介

本教程旨在帮助学习者提高科技英语论文写作与交流的能力。第一部分以国际顶级期刊科技英语论文为素材，详细分析了科技英语论文的结构要素和语言特点，还介绍了论文修改技巧和投稿策略。第二部分用范例展示了英语演讲技巧、国际会议论文宣读与问答技巧以及论文海报制作技巧。

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前言（第3版）

PREFACE (Third Edition)

《科技英语交流》于2015年由北京理工大学出版社出版发行后，受到广大读者的欢迎和推崇，于2018年被评为北京理工大学“十三五”规划教材，第2版在2020年被评为北京理工大学研究生精品教材。

为帮助学习者提高科技英语交流能力，教材编委依据二语习得理论以及十几年的科技英语论文写作的教学和研究经历，在2021年《科技英语交流（第3版）》一书中做了如下修订：

首先，全体编委根据每章的核心内容设计了思考题，并附有参考答案（学堂在线“科技英语交流”慕课），旨在帮助学习者了解每章的核心内容。章节思考题可由学习者独立完成，也可用作课前或课后小组讨论题；无论独立完成还是小组讨论，章节思考题都能促进学习者在使用英语的同时学习掌握章节核心内容；小组讨论还有助于学习者取长补短、培养合作意识。

其次，邹敏撰写了第14章科技英语交流问答技巧，并修改了第5章研究方法；张莱湘修改了第11章国际会议。

此外，编委们认真检查了第2版教材，修改了教材中的个别语言错误。王玉雯和赵蓉审核了第3版全稿，赵蓉统一了教材的编写格式。

基于《科技英语交流》教材设计的慕课于2019年12月在学堂在线上线，“科技英语交流”慕课于2020年被评为北京理工大学研究生精品视频课程。该慕课共有10个单元，配有教学视频、课程PPT、单元练习和答案，并将增加两个单元；该慕课可免费学习，网址为：https：//www. xuetangx. com/course/bitP05021001988/4189567。

王玉雯

2021年7月12日

前言（第2版）

PREFACE (Second Edition)

《科技英语交流》2015年在北京理工大学出版社出版发行后，受到了广大读者的欢迎和推崇，并被评为北京理工大学校级“十三五”（2018年）规划教材。

为创造混合式教学途径，本书编委在2018年《科技英语交流（第2版）》中增加了如下内容：

首先，为帮助学习者提高科技英语论文写作效果，我们依据二语习得理论设计了《科技英语交流》写作微课，精心提炼核心内容，撰写了9个单元的微课课件，请美籍教师Brooke Holliday为微课课件录音，陈天予编辑了部分录音文件。该微课课件丰富了科技英语论文写作的教学模式，学习者既能在阅读中学习科技英语论文写作技巧，还能运用听觉加强科技英语论文写作技能。录音文件及文字可通过扫描书中的二维码获得。

李恒组织编写了9个单元的微课课件，其中，北京理工大学王玉雯编写了第1单元和第4单元，李恒编写了第5单元和第12单元，赵蓉编写了第6单元和第7单元，马文艳编写了第2单元，柳君丽编写了第3单元，高波编写了第8单元。李恒审核了课件录音。

其次，王玉雯阅读全册，修改了个别的语言错误，并组织编者编写了教学课件PPT（如果需要，可在北京理工大学出版社网站免费下载，网址：www. bitpress. com. cn）。其中，北京理工大学王玉雯编写了第1章、第4章和第11章，李恒编写了第5章和第12章，赵蓉编写了第6章和第7章，马文艳编写了第2章，柳君丽编写了第3章，高波编写了第8章，许子艳编写了第10章，吕行编写了第13章，中国科学院大学郑群教授编写了第9章。

本书得到了北京理工大学研究生院2017年多模态科技英语交流的研究课题（李恒负责）和2018年北京理工大学研究生明星课程建设（硕士公共英语，王玉雯负责）的资助，在此，我们表示衷心的感谢！

王玉雯

PREFACE

前言

科技英语交流能力决定了科研人员能否成功地在国际期刊上发表他们的研究成果，能否有效地与同行进行交流。而国内外许多研究表明，中国学习者的主要问题是不了解英语科技论文的语言特征，缺乏语篇衔接知识和技能，难以驾驭科技英语词汇的运用。

为此，我们经过六年的教学和科研探索，编写了《科技英语交流》一书，旨在帮助研究生和科研人员提高科技英语交流能力。该书分为两部分，第一部分为科技英语论文写作和投稿，共十章。第一章至第八章分别描述了科技英语论文的写作特点、论文标题、摘要、引言、方法、结果、讨论和结论的写作，从宏观和微观结构层面陈述科技英语论文写作各个部分的构成要素和写作技巧，详细分析科技英语顶级期刊论文的写作结构要素和语言特征，以帮助学习者熟悉并掌握科技英语论文写作的基本要素和技巧。第九章为论文修改方法，第十章为论文投稿技巧。第二部分（第十一章至第十三章）为国际会议英语交流。

在撰写该书期间，我们得到了澳大利亚阿德莱德大学玛格丽特·卡吉尔教授的帮助和指导。她帮我们审阅了初稿，提出了详细的修改建议。中国科学院苏州纳米技术与纳米仿生研究所王锦副研究员提供了大量的参考素材，并提出了编写建议。在此一并致谢。

《科技英语交流》一书作为“学术英语交流能力培养模式的研究”课题成果之一，由中国学位与研究生教育学会批准立项（B1-2013Y03-005），2015 年 8 月通过专家评审，已结题。课题组成员 2013 年开始着手编写《科技英语交流》，2014 年 10 月完成初稿，经多次反复修改才得以问世。该课程 2010 年被评为北京理工大学研究生重点骨干课程建设，2015 年被列为北京理工大学研究生教学团队建设内容之一。

本书作者都是一线英语教师，其中北京理工大学王玉雯负责第一章和第四章，马文艳负责第二章，柳君丽负责第三章，赵蓉负责第六章和第七章，高波负责第八章，许子艳负责第十章，李恒负责第十二

章，吕行负责第十三章；中国科学院大学郑群负责第九章；华北电力大学张帆负责第五章；北京工业大学张俊梅负责第十一章；中国科学院苏州纳米技术与纳米仿生研究所王锦撰写了科技英语翻译的启示；北京航空航天大学博士研究生张毓撰写了第一章的衔接手段。

本书适合有志于在国际期刊上发表科技论文的科研人员和在校研究生。科技英语交流在北京理工大学的教学学时为54，需要教学课件的老师可联系 wyw@ bit. edu. cn。

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CONTENTS

Chapter 1

Features of Scientific Writing

Scientific writing has different definitions. For example, Day and Gastel (2007: 3) have defined scientific writing as to denote the reporting of original research in journals, through scientific papers in standard format (IMRaD, a short form for Introduction, Methods, Results and Discussion).

We begin by providing an overview of some important features of scientific writing such as clarity, contribution, documentation and language use, and then we offer tips for effective writing.

1.1 Clarity

The first feature of scientific writing is *clarity* (清晰) involved in its macro organization and micro organization. The macro organization refers to external organization such as chapters, sections, and paragraphs in the *dissertation* (学位论文) and IMRaD or AIMRaD (a short form for Abstracts, Introduction, Methods, Results and Discussion) in a journal paper whereas the micro organization indicates that scientific writing might organize information by employing general-specific and problem-solution patterns. The micro organization also involves the connection between paragraphs or between sentences.

1) IMRaD or AIMRaD

The IMRaD or AIMRaD can be a macro organization in a research paper. The logic of IMRaD can be defined in the following questions (Day and Gastel, 2007:10):

(1) What question (problem) was studied?

(2) How was the problem studied?

（3）What were the findings?

（4）What do these findings mean?

AIMRaD refers to a *format*（格式）with abstracts, introduction, methods, results and discussion in a journal paper. However, as a scientific writer, you should recognize that, "within a common core structure, there are variations from field to field and from journal to journal: always check the specific requirements of your *target journal*（投稿期刊）"（Cargill and O'Connor, 2013:11）before writing the research work.

2）The general-specific pattern

The *general-specific*（总述—分述）pattern is quite popular and is a micro organization in scientific writing. The general-specific texts move from broad statements to narrower ones. However, they often widen out again in the final sentence（Swales and Feak, 2012:33）. Swales and Feak（ibid 同上）also suggest that this pattern text usually begins with one of the following elements:

（1）A short or extended definition,

（2）A contrastive or comparative definition, or

（3）A generalization or purpose statement.

The following paragraph is an example of the general-specific text taken from the journal *Macromolecules*（高分子）written by Carter *et al.*（2005: 4595）. This paragraph begins with a generalization statement and then more specific information is provided.

E. g. 1: *Branched polymers owe much of their utility to the presence of a large number of chain ends per molecule and their chain architecture. The latter can have a profound effect on materials properties, such as rheology and solubility. On the other hand, the large number of chain ends can be used to add useful chemical functionality, which may differ from similar functionality added along the main chain. These polymers can be produced in chain growth polymerization by using branching monomers, which act as both monomers and transfer agents or as monomers and initiators. Both of these functions are combined in approaches that use addition-fragmentation as the branch forming reaction, and of these, the reversible addition-fragmentation chain transfer (RAFT) methodology introduced by Thang et al. also offers the opportunity to modify the end groups. This method has proved to be a useful technique for the synthesis of*

reactive polymers and polymers with well-defined architectures...

The above paragraph is also a good case of *cohesion* (衔接), in which sentences are closely related by employing "the latter," "these," and "this" or by repeating the key words "chain ends."

Another pattern is the problem-solution pattern, which will be introduced in the next sub-section.

3) The problem-solution pattern

The problem-solution pattern was first proposed by Hoey in 1983. This pattern usually has four parts as follows:

(1) Description of a situation,

(2) Identification of a problem,

(3) Description of a solution,

(4) Evaluation of the solution.

To better understand this pattern, we need to take a look at E. g. 2 below and identify the situation, the problem, the solution and the evaluation of the solution.

E. g. 2: *This paper considers pairwise formations between unmanned aerial vehicles (UAVs) where an agent gains a fuel benefit by flying in the wake of another (i. e., a reduction in aerodynamic drag). The objective of each UAV is to travel from source to target locations while consuming the least amount of fuel. UAVs are able to reach their destination alone, however, joining in formation can potentially improve their fuel economy. When agents are noncooperative, the potential benefits of flying in formation bring up the issue of fairly distributing the leader task. The goal of this paper is to find optimal cooperation-inducing leader allocations that minimize UAV fuel consumption and provide individual agents with algorithms to compute them. Such benefit-driven cooperation mechanisms are a necessary building block to realize the potential benefits of collaboration in groups of noncooperative agents bargaining over the possibility of teaming up. (problem being investigated) The results of this paper can be applied to scenarios involving bargaining and auctions, task allocation in teams, and transferable utility games.* (Richert and Cortés, 2013:3189)

E. g. 2 is a good problem-solution pattern, quite popular in introducing the background, research problem, solution to the problem and significance of the solution. To be more specific, the first three sentences described the research situation

while the fourth sentence introduced the problem. The fifth sentence presented a solution to the problem. The last sentence revealed the application of the solution, which was the evaluation of the solution.

4）Cohesion

Cohesion is the main medium to organize the sentences into text, which shows the relationship between parts in a text beyond the control of a sentence structure (Zhang, 2000). "Cohesion occurs where the interpretation of some element in the discourse is dependent on that of another" (Halliday and Hasan, 2001: 4). Cohesion can be constructed through cohesive devices. As for the taxonomy of cohesive devices, Halliday and Hasan (2001) proposed grammatical cohesion and lexical cohesion. The grammatical cohesion can be further categorized as *reference* (照应), *substitution* (替代), *ellipsis* (省略) and *conjunction* (连接). It should be noted that substitution and ellipsis are seldom used in academic writing. Lexical cohesion consists of lexical *reiteration* (复现) and *collocation* (搭配). Table 1.1 and Table 1.2 provide the categories of cohesive devices and examples, which are frequently used in writing.

Table 1.1 Categories of Grammatical Cohesion

Grammatical Cohesion		Examples
Reference 照应	*Personal reference* 人称照应	I, you, we, he, she, it, they, etc.
	Demonstrative reference 指示照应	this, these, that, those, here, there, the
	Comparative reference 比较照应	same, similar, other, different, else, better, etc.
Substitution 替代	*Nominal* 名词性	one, ones
	Verbal	do
	Clausal	so, not

continued

Grammatical Cohesion	Examples	
Ellipsis	Nominal	
	Verbal	
	Clausal	
Conjunction	*Additive* 递进	and, and also, moreover, furthermore, besides, etc.
	Adversative 转折	however, nevertheless, despite, but, yet, though, although, etc.
	Causal 因果	because, so, therefore, then, hence, for this reason, consequently, as a result, etc.
	Temporal 时空	first, secondly, finally, at last, in short, in a summary, in a word, briefly

Table 1.2 Categories of lexical cohesion

• Lexical cohesion	
• Reiteration	• Repetition (same word)
	• Synonym
	• *Superordinate* 上义词
	• General word
• Collocation	

To better understand the uses of cohesive devices in scientific paper writing, we presented findings in Zhang's research in chemical journal abstracts written by native English authors and Chinese authors, which was conducted in 2013. The results showed that the reference devices accounted for a larger percentage than the conjunction devices of the overall use of grammatical cohesive devices in both *corpora* (语料库). The overall occurrence of grammatical cohesive devices adopted in Chinese authors' abstracts was lower than that in native authors'. A significant difference existed in the use of grammatical cohesive devices between two groups. In terms of the distribution of