通用学术英语

E[illegible]LISH FOR
GE[illegible]RAL ACADEMIC PURPOSES

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总主编 张敬源
主 编 张敬源 曹红晖

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前　言

“互联网+教育”时代，我国教育信息化进程迅猛发展。着力推进信息技术与外语教育教学深度融合，致力于以学为本的课程体系重塑、课程内容改革，实施基于课堂和在线课程的线上线下混合式教学，推进以学生为中心的教与学方式变革已经成为当前大学教育教学改革的趋势和共识。

《通用学术英语》系列教材在“互联网+教育”时代应运而生，是一套纸质教程、在线课程与课堂教学同步设计、整体研发的新形态一体化教材。本套教材共三册，第一、二册依据《大学英语教学指南》，致力于培养我国大学生用英语进行各学科专业学习的最基本的、通用的核心学术英语能力。第三册是对前两册涵盖技能的整合应用，致力于帮助学生有效阅读和写作与专业相关的英语科技论文，主要使用对象为硕士、博士研究生和本科阶段高年级有需求的学生。

本书为系列教材第三册，力图体现以下特色：

1. 读写融合，内容新实

本教材将英语科技文献阅读与学术论文写作紧密联系起来。我们认为，英语科技论文撰写源于科技文献阅读。没有科技文献阅读能力的提高，就没有学生科技论文写作能力的提高，二者相辅相成，不可割裂。为此，本教材结合我国学生英语学习的实际情况，系统解析英语科技文献各部分的有效阅读，并以此为基础和参照，有针对性地训练学生的英语科技论文写作能力。本教材还对英语科技文献的总体语言特点、国际学术会议口头报告、国际学术会议海报制作、国际学术交流信函撰写等作了全面深入的介绍。本教材示例多选自不同学科重要国际期刊、学术语料库及学术网站。所有材料除标注专业相关词汇外，基本未做任何改动，以保证选材原汁原味、真实可靠。

2. 精讲精练，任务驱动

本教材将英语科技论文阅读与写作的理论、方法和实践紧密结合，精讲解、重方法、多实践，突出针对性和实效性。为此，本教材并未在知识介绍方面过多着墨，而是注重运用实例，

详细解析英语科技论文的有效阅读与写作，并对此进行针对性实践训练。本教材依照研究论文的组成部分和结构顺序编排。每单元分文献阅读和论文写作两个模块，各有一个微讲座（mini-lecture）引领，精要介绍本模块的功能目的及核心要点。接着通过典型实例，分析该论文部分所含信息、排列结构、语言特点、学习策略、常用句型、常见错误、学习贴士（study tips）等。然后通过一系列精心设计的任务进行针对性实践训练。任务设计与微讲座、实例分析、学习策略等相呼应，紧扣学习目标。任务形式丰富多样，既有限制性任务，也有开放性任务；既有学习型任务，也有自我检测型任务。确保学生对规则了然于胸，并通过实践训练将规则内化于心。引导学生学以致用，以用促学，循序渐进地培养学生的英语学术文献阅读与论文写作能力。

3. 一体设计，混合教学

本教材采用纸质教程、在线课程与课堂教学三位一体同步设计、整体研发，支持线上线下混合教学。一体化研发的设计思路是以英语学术论文有效阅读与写作能力培养为目标，以教学设计为主导，把教材的精华从不同角度、以不同形式、通过不同资源类型呈现给师生。以纸质教程为主线和纽带，联结在线课程学习与课堂教学，三者交叉互补、相互配合。在线课程资源在高等教育出版社iSmart在线课程平台开发建设（电脑端和移动端并行发布），为学生创设支持自主学习与协作学习的在线学习社区（online learning community），主要呈现微课视频、记录学生在线自主学习和协作学习轨迹及数据，辅助英语学术文献阅读和学习。基于在线相关知识的获取与学习，师生在课堂面授环节可根据实际教学需求灵活选用纸质教程中各单元模块的开放性任务，促进学生应用和内化所学技能与知识。

本教材由北京科技大学张敬源教授任总主编，北京科技大学外国语学院中外教师团队合作编写，教学材料经过了教学实践检验、补充和完善。北京科技大学教授、英国剑桥大学Mark Buck博士审阅了书稿，并提出了宝贵的意见和建议。教材中选用的主要阅读材料均已标注出处，但受篇幅所限，阅读材料文内引用文献无法一一标注出处，特此说明并致谢。高等教育出版社外语出版事业部的领导和编辑在本教材的策划编写、版式设计、题图设计、插图选配等方面做了大量工作，付出了辛勤的劳动。本教材编写还得到了北京科技大学研究生院教材专项基

金资助，谨此一并致谢。

《通用学术英语》是“互联网+教育”时代我们在以学为本的课程体系重塑和课程内容改革方面做出的一次尝试与探索，不当和疏漏之处难免，敬请使用者批评指正。

编　者

2017年5月

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UNIT 1

INTRODUCTION TO ACADEMIC WRITING

Learning Objectives

READING

- Differentiating academic writing from general writing
- Identifying the characteristics and overall structure of academic papers
- Understanding the features of scientific language

WRITING

- Analyzing, writing and evaluating scientific language
- Learning the skills for scientific language writing
- Understanding the general procedure of academic writing

1 A READING What Is Academic Writing?

Mini-lecture

What Is Academic Writing?

When you start university courses, you may encounter many academic texts in a variety of forms, for example, essays, published books, journal articles, research proposals, conference papers and other presentations. Especially if you want to pursue further education or an academic career, you may be asked to read and write different types of academic texts. Learning about academic writing will therefore help you advance your future education and research.

Academic writing usually refers to a particular style of expression that researchers use to convey information and ideas in their areas of expertise. It is employed in a wide range of disciplines and its overall purpose is to give a clear and concise presentation of a subject in a particular academic field after a thorough investigation, analysis and discussion of certain research questions, targeted at a critical and informed audience.

Compared with general writing for non-academic and non-technical purposes, academic writing has its own characteristics. It is more formal and logically organized and its tone is deliberately objective and impersonal. It is also often more difficult to understand due to the complexity of many academic topics and the challenging nature of much academic vocabulary.

Referencing and citing are other characteristics of academic writing. Since the writer usually develops or diverges from previous research, he is expected to acknowledge that research by citing other sources. These sources should be properly attributed and documented following accepted styles.

Normally, academic writing needs to follow its own structure and conventions about language use. The overall structure consists of **introduction**, **body** and **conclusion**. The body part is further divided into clear and logically sequenced sections. In terms of language, it is expected that scientific language will be adopted and that the grammar will be faultless. The main language features of such writing include **formality**, **complexity**, **precision and accuracy**. All of these will be elaborated in this unit.

This module covers:

- Differentiating academic writing from general writing
- Identifying the characteristics and overall structure of academic papers
- Understanding the features of scientific language

Samples and Analysis

As mentioned above, academic writing generally conforms to a particular structure and employs scientific language expressions. Being familiar with the structure and features of academic language can increase reading efficiency.

Structure of Academic Papers

Academic texts are a united whole, with each section serving a different function. The *Introduction* usually includes background information, an overview of the field and the purpose of the research. The *Conclusion* serves as the summary of what has been said and demonstrates that the research purpose is achieved. The *Body* contains the development of the research and is often divided into several parts, each dealing with a specific aspect. The details of the structure of academic writing vary depending on the text types and the requirements of specific journals. In most journal articles in natural science disciplines, the Body contains the *Materials and Methods*, the *Results* and the *Discussion*. Logic and clear organization help readers better understand the text and locate what they need through headings and subheadings. A brief introduction of the structure of this kind of journal article is presented as follows.

Title	Introduction to the topic addressed
Abstract	Summary of the whole article
Keywords	Tags which can be used in searches
Introduction	Background, importance and purpose of the study, overview of existing knowledge
Materials and Methods	Design and procedure of the study
Results	Observation of the facts and data
Discussion	Interpretation of the results
Conclusion	Restatement of the main results, link between research findings and the field
Acknowledgements	Statement of the author's gratitude
References	Sources used throughout the article
Appendix (if any)	Additional supporting information about figures, tables or raw materials

Observe the following sample illustrating the structure of a scientific paper, and think about the following questions:

- How is a scientific paper usually organized?
- What are the main headings and subheadings?
- What information do the introduction and the conclusion usually deliver?
- For most journal articles in natural science disciplines, what does the main body part consist of?

TEXT 1

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www.actamat-journals.com

A quantitative analysis of the influence of carbides size distributions on wear behaviour of high-speed steel in dry rolling/sliding contact

Title

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Abstract

The wear resistance of steels arises largely through the incorporation of a significant volume fraction of hard second-phase particles, usually carbides. While there is considerable understanding of the effect of chemical composition on carbide fraction and size distribution, the understanding of the effect of carbide size distribution on wear resistance, for constant composition, is poor. In the current work, wear tests on high-speed steels of the same chemical composition but different carbide distributions induced by different manufacturing routes are considered. For the investigated range of carbide size distributions wear rates can differ by 40%, indicating that the manufacturing route of the steel plays a major roll on its wear performance. We demonstrate that cumulative frequency plots of carbide sizes can be used to quantitatively predict changes in wear rate for materials of constant chemical composition but different carbide distributions, provided the critical thickness of the wear debris is measured.

Abstract

Keywords: Wear; Carbides; Microstructure; Oxidation; Spray forming

1. Introduction

High-speed steels are complex multi-component alloys systems that are used in high-temperature applications (e.g. rolls in hot mills, cutting tools in high-speed cutting) because they can retain high hardness at elevated temperatures [1]. The microstructure of these steels consists of block (primary) carbides in a matrix of tempered martensite and fine secondary carbides [2]. The microstructure is formed primarily during solidification, with only limited modification subsequently possible through hot working. Consequently, the main variables that control the final microstructure are: (i) the alloy composition; (ii) the solidification rate [1]; and (iii) hot working conditions [3] (if applicable). Although minor changes can be induced by heat treatment, the solidification rate is the dominant factor in determining the final carbide size distribution and is therefore a key parameter. However, the solidification rates that can be achieved are clearly constrained by the processing route and the size of the final product, so that quite different carbide size distributions will be observed, e.g. large products such as hot mill work rolls compared with small products derived by powder processing technologies.

Although the roll of carbides in dry sliding wear has been considered by previous workers [4–10], most investigations are undertaken through a change in chemical composition, which usually leads to a change in both volume fraction and carbide size distribution, and it is almost impossible to separate the effect of the two variables. A reduction in carbide size reduces the probability of carbide fracture and therefore can, under specific contact conditions, reduce wear rate. For example, recent work at Sheffield [10–13] compared conventionally cast and spray-formed 18% Cr white iron, and showed that carbide fracture occurred in the coarse carbides in the conventionally cast material but was avoided in the spray-formed material, which contained much finer carbides. A

Introduction

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reduction in carbide size for a constant volume fraction of carbide not only alters the probability of carbide fracture, but also reduces the mean distance between carbides, thereby reducing matrix exposure to contact damage. However, as the carbide size is reduced, the possibility of the carbides providing load support and therefore protecting the matrix from plastic deformation decreases. To date there is no quantitative description of the effect of carbide size on wear for a constant volume fraction.

The effect of carbide size has been addressed in a qualitative way by Varadavoulias, who proposed a model that is applicable to conditions when mild oxidational wear prevails [6]. This model considers only the mean carbide size in relation to the oxide layer thickness of compacted oxide islands characteristic for mild oxidational wear [14]. The theory of mild oxidational wear is well developed. According to Scott and Wood [15], there are three main processes involved in the formation of oxide compacts: (i) particle fragmentation and rearrangement, (ii) plastic flow and (iii) stress-assisted diffusion, or diffusional creep. Scott and Wood therefore defined the thickness of the oxide compact relevant to the wear process as the distance into the oxide compact with which plastic flow of the oxide can occur under the continued normal and tangential stresses [15]. With this definition, the oxide thickness is often given to be in the range of 1–2 μm [16], but direct measurements of the thickness of these islands are hard to come by [17] and are often calculated [16].

More recently, Varadavoulias [6] has described a different mechanism of the formation of oxide sheets and its limited thickness, defined as the critical thickness. Varadavoulias extended the earlier theories by considering the role of microstructure of the steel substrate more explicitly in the mild oxidation wear process for wear-resistant steels that have a high fraction of carbides. It is assumed that oxide is formed at the oxide–metal interface and advances to the detriment of the metallic substrate. Oxide grows through the metal and around the carbides in the metal, provided the carbides themselves are not oxidised. These carbides will then become embedded in the compacted oxide layer if the oxide is thicker than the car-

sured in a well-defined manner. We examine wear mechanism and wear rates under dry rolling/sliding wear conditions in a model system consisting of three high-speed steels of approximately constant alloy composition (corresponding to AISI M3:2) but different carbide size distributions. The differences in size and spatial distribution were induced by different processing routes: spray forming (SF); spray forming and subsequent forging (SF&F); and powder metallurgy (PM). Previous work [10] has shown that SF can be used as a powerful method of reducing carbide size compared with conventional casting methods. The accurate measurement of carbide size distributions in high-speed steel is important but challenging since carbide size distributions are highly heterogeneous and span a wide size range [19]. We demonstrate that low-voltage (5 keV) secondary electron images can be used to generate sufficient contrast to differentiate between carbide types and the matrix, and therefore provide accurate quantitative image analysis of all carbide phases as well as the required spatial resolution in order to detect small carbides. These carbide size distributions are related quantitatively to the critical oxide thickness, as measured from the worn surface. It is shown that a simple relationship can be developed between wear rate, critical oxide thickness and carbide size distribution.

2. Materials and procedures

Heading

2.1. Materials

Sub-heading

In order to investigate the influence of second-phase size distributions on the wear behaviour at room and elevated temperature, three high-speed steels with similar chemical compositions (see Table 1) were produced by three different processing routes: SF, SF&F and PM.

Test discs were machined from all three materials in the annealed state and subsequently heat-treated in several batches. Each batch contained discs of all three materials. Austenitization treatment was performed at a temperature of 1180 °C in a protective atmosphere (86% nitrogen, 1.8% hydrogen, 2.0% carbon monoxide and 10.6% carbon diox-

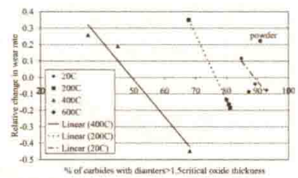

Fig. 12. K^T_{rel} (see text for definition) as a function of the number of carbides above 1.5ξ.

$$K^T_{rel} = \frac{K^T_i - \sum_1^3 K^T_i}{\sum_1^3 K^T_i} \tag{2}$$

versus the percentage of carbides with diameters larger than 1.5ξ in Fig. 12. It can be seen that the magnitude of the change in K^T_{rel} is larger when the percentage of carbides that provide protection spans a larger range. This means that we can predict how the cumulative frequency plot should look in order to obtain a minimum wear rate at a given test temperature or for a material that should perform well in a wider temperature range. On the basis of the optimum carbide size distribution for given tribological conditions, the best processing route can be selected. For the test conditions in the current study, the SF&F M3:2 provided the best performance when the whole temperature range 20–600 °C is considered.

5. Conclusions

We have shown that the wear mechanism in dry rolling sliding wear tests of M3:2 high-speed steel against M2 high-speed steel is dominated by mild oxidational wear in the temperature range of 20–400 °C. Our results have confirmed that the carbide size distribution is a major controlling factor in the mild oxidational wear of high-speed steel based materials. The carbide size distribution must be determined quantitatively and related to the critical thickness for detachment of the compacted oxide layer. In our work, the carbide size distribution was uniquely determined by careful selection of the accelerating voltage in the SEM, which provided high contrast between the relevant phases and the necessary spatial resolution required for quantitative second-phase analysis. We showed that the use of cumulative frequency plots in combination with the direct measurement of critical oxide thickness using stereoimages allows a prediction of relative change in wear rate between materials of same chemical composition but different second-phase distributions at different temperatures in a quantitative way. This provides a basis for microstructural design for optimum wear resistance for a given set of tribological conditions. In the current study, we have shown that spray formed and subsequently forged M3:2 provided the best performance when considering one material to cover the entire temperature range 20–600 °C.

Conclusion

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References

[1] Boccalini M, Goldenstein H. Solidification of high-speed steels. Int Mater Rev 2001;46(2):92–114.
[2] Karagoz S, Andren H-O. Secondary hardening in high speed steels. Z Metallkd 1992;83:386–94.
[3] Rodenburg C, Krzyzanowski M, Beynon JH, Rainforth WM. Hot workability of spray-formed AISI M3:2 high-speed steel. Mater Sci Eng A 2004;386:420–7.
[4] El-Rakayby AM, Mills B. The roll of primary carbides in the wear of high-speed steels. Wear 1986;112:327–40.
[5] Durand JM, Jeandin M. Influence of manganese sulphide (MnS) addition on the wear behavior of M3/2 high-speed steel. Tribol Lett 1996;2:247–61.
[6] Vardavoulias M. The role of hard second phases in mild oxidational wear mechanism of high-speed steel based materials. Wear 1994;173:105–14.
[7] Vardavoulias M, Jeandin M, Grillon F. Effects of tempering on the sliding-wear behaviour of a sintered high-speed steel. A quantitative image analysis approach. Scripta Metall Mater 1993;29(3):359–64.
[8] Ghomashchi MR. Microstructural observation of M50 and T1 high-speed steels during sliding wear. Surf Eng 1994;10(3):225–9.
[9] Molinari A, Pellizzari M, Biggi A, Corbo G, Tremea A. Tribological behaviour of spincast high-speed steels for hot finished rolls: effect of carbides on friction, wear and toughness. In: Proceedings of rolls, April 2003, Birmingham, UK.
[10] Hanlon DN, Rainforth WM. The rolling sliding wear response of conventionally processed and spray formed high-speed steel at ambient and elevated temperature. Wear 2003;255:956–66.
[11] Hanlon DN, Rainforth WM, Sellars CM. J Mater Sci 1999;34(10):2291.
[12] Hanlon DN, Rainforth WM, Sellars CM, Price R, Gisborne HT. J Mater Sci 1998;33:3233.
[13] Hanlon D, Rainforth WM, Sellars CM. Wear 1997;203–204:220.
[14] Sullivan JL, Athwal SS. Mild wear of a low alloy steel at temperatures up to 500 °C. Tribol Int 1978;16(3):123–31.
[15] Scott FH, Wood GC. The influence of oxides on the friction and wear of alloys. Tribol Int 1978;11(4):211–5.
[16] Quinn TF, Rowson DM, Sullivan JL. Application of the oxidational theory of mild wear to the sliding wear of low alloy steel. Wear 1980;65:1–20.
[17] Hong H, Hochman RF, Quinn TFJ. A new approach to the oxidational theory of wear. Tribol Trans 1988;31(1):71–5.
[18] Rainforth WM, Leonard AJ, Perrin C, Bedolla-Jacuide A, Wang Y, Jones H, et al. High Resolution observation of friction-induced oxide and its interaction with the worn surface. Tribol Int 2002;35:713–48.
[19] Karagoz S, Fischmeister H. Quantitative metallography of high speed steels by SEM. Steel Res 1987;58(1):46–51.
[20] Kapoor A. A re-evaluation of the life to rupture of ductile metals by plastic strain. Fatigue Fract Eng Mater 1994;17(2):201–19.
[21] Dogan ON, Laird G, Hawk JA. Abrasion resistance of the columnar zone in high Cr white cast irons. Wear 1995;181–183:342–9.

References

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Features of Scientific Language

In academic writing, it is expected that scientific language will be adopted with *formality*, *complexity*, *precision* and *accuracy*. These four features are explained as follows.

Formality	• Avoid the use of colloquial expression or slang. • Avoid the use of contractions such as "don't" or "haven't." • Avoid the use of the pronouns "I" or "you."
Complexity	• There are many technical terms, nominalizations and lexical variations. • The sentence structure is often complex, with more subordinate and embedded clauses.
Precision	• All the data, such as tables, dates or figures, are precisely reported. This demonstrates the scientificity and authenticity of the study. It also enables other scholars to replicate the research.
Accuracy	• The grammar should be faultless. • Specialist terminology and expressions in the field of the research are accurately used.

Read the following sample extracted from a scientific paper, and think about the following questions:

➢ What are the main features of scientific language?

➢ Besides the four main features, what other features represent scientific language?

➢ What word classes and tenses appear more frequently in a scientific paper?

TEXT 2

Fabrication of silicon nanowire devices for ultrasensitive, label-free, real-time detection of biological and chemical species

Detection and quantification of biological and chemical species are central to many areas of healthcare and the life sciences, ranging from diagnosing disease to discovery and screening of new drug **molecules**. **Semiconductor** nanowires **configured** as electronic devices have emerged as a general platform for ultra-sensitive direct electrical detection of biological and chemical species. Here we describe a detailed **protocol** for realizing nanowire electronic **sensors**. First, the growth of uniform, single crystal silicon nanowires, and subsequent isolation of the nanowires as stable suspensions are outlined. Second, fabrication of addressable

Formality
There is no use of first person pronouns, contractions or colloquial expressions. The vocabulary is also chosen very carefully, e.g., *configured*, *protocol*.

Glossary

silicon nanowire 硅纳米线

molecule (n.) 分子

semiconductor (n.) 半导体

sensor (n.) 传感器

protein (n.)
蛋白质

nucleic acid (n.)
核酸

virus (n.)
病毒

nanowire device arrays is described. Third, covalent modification of the nanowire device surfaces with receptors is described. Fourth, an example modification and measurements of the electrical response from devices are detailed. The silicon nanowire (SiNW) devices have demonstrated applications for label-free, ultrasensitive and highly-selective real-time detection of a wide range of biological and chemical species, including **proteins**, **nucleic acids**, small **molecules** and **viruses**.

INTRODUCTION

Nanowire sensor devices

field-effect transistor (FET)
场效晶体管

single-stranded DNA
单链 DNA

The fundamental principle for **detection** with semiconductor nanowires[1–3] is their **configuration** as **field-effect transistors (FETs)**[4,5], where FETs exhibit a conductivity change in response to variations in the electric field or potential at the surface[2,6,7].

Complexity
Nominalizations: "detection," "configuration," etc.

...

Applications and limitations

A number of protein detection methods exist today, and can be divided into two categories: label detection and label-free detection.

...

Nucleic acids

SiNW field-effect devices have been used for the detection of single-stranded DNA, where recognition of the DNA target molecule was carried out using complementary single-stranded sequences of peptide nucleic acids (PNAs)[11].

Complexity
Sentence structure: It contains a subordinate clause, and this subordinate clause contains an embedded clause.

...

PROCEDURE

Nanowire synthesis and isolation●TIMING 1–2 h

sequence (n.)
序列

peptide nucleic acid (PNA)
肽核酸

oxygen plasma
氧等离子体

hydrophilic (adj.)
亲水的

poly-L-lysine (n.)
多聚左旋赖氨酸

1| Clean the silicon dioxide (SiO2) surface of a **1×2 cm^2** piece of silicon wafer (the growth chip) with **oxygen plasma**: **100 W** and **50 sccm** (standard cubic centimeters per minute; 1 sccm = 1.7×10^{-8} m^3 s^{-1}) O_2 for 200 s. This plasma treatment removes organic residues and makes the surface **hydrophilic**.

Precision
All the data in this section, "1×2 cm^2," "100 W," "50 sccm," "0.1%," etc., are precise.

2| Place the chip on a flat and clean surface (it is not necessary to place inside container). Cover the clean surface of the growth chip with a **0.1% poly-L-lysine** (~200 ml), and allow the solution to stand for 2 min.

...

PSA (prostate-specific antigen) 前列腺特异性抗原

signal-to-noise 信噪比

protein binding 蛋白结合

surface passivation 表面钝化

ANTICIPATED RESULTS

...

These data show that direct label-free detection of **PSA** is achieved with **signal-to-noise** >3 for concentrations down to 90 fg ml^{-1} or ~2.5 fM.

...

These multiplexing experiments demonstrate that the electronic signals measured using SiNW sensor chips can be readily attributed to selective **protein binding**; show that the **surface passivation** chemistry effectively prevents nonspecific protein binding; and also provide a robust means for discriminating against **false-positive signals** arising from either electronic noise or nonspecific binding.

Accuracy
Terms such as "protein binding" and "false-positive signals" are accurately used.

SOURCE: Patolsky, F., Zheng, G., & Lieber, C. M. (2006). Fabrication of silicon nanowire devices for ultrasensitive, label-free, real-time detetion of biological and chemical species. *Nature Protocol*, 1, 1711–1724.

Reading Strategies

Efficient Reading of Academic Texts

How to read an academic text efficiently? Sometimes you need to locate and extract relevant information from academic texts as efficiently and economically as possible. Sometimes you need to read very slowly to gain a detailed understanding. The way you read will depend on your purpose. The following offers a **three-step** strategy for the efficient reading of academic essays.

1 Before reading

(1) Think about your *purposes* in reading the text:

To explore current issues?

To gain a general idea and background information?

To gain detailed understanding of the content?

To find answers to specific questions?

To gather information/evidence to support your arguments?

Your purpose will influence the way you read, e.g., scanning or close reading.

(2) Look at the title, headings, any sub-headings, tables, figures or pictures.

Use these to predict what the text will be about.

(3) Think about what you already know on this topic.

(4) Write down what you would like to find out from the text.

You could write down questions you would like to find answers to.

(5) Make a note of words and phrases related to the topic that you may find in the text.

2 During reading

(1) Scan the text: read the first and last paragraphs and the beginning and final sentences of the other paragraphs.

After that, do you have a general idea of the structure of the text and what the different parts are about?

(2) Identify your purpose in reading.

If you are looking for specific information, read the part where you think the information will be.

If you want a general idea of the whole text, read the whole text.

In both cases ignore the words or sections you don't immediately understand.

(3) Write down one or two sentences about:

What you think the main ideas are.

What your first impression of the text is. Do you find it interesting, informative, well-argued, boring, illogical, or inaccurate?

(4) Read again but in a careful and intensive way, marking any new words that are important for your understanding.

Check the main idea and revise what you wrote if necessary.

Find out what the subsidiary ideas are.

How do they relate to the main idea?

Put all the ideas together in linear notes, or as a mind map.

2-1 Vocabulary

With regard to the new words which you think are important:

If an approximate meaning is enough, try to guess the meaning based on the context and word form.

If the exact meaning is needed, use a dictionary.

2-2 Difficult sentences

Divide every difficult sentence into segments based on connectives or markers.

Understand the meaning of the connectives.

Underline the reference words and find out what they refer to.

Identify complex noun phrases and expand them using verbs and/or relative clauses so that they are easy to understand.

Find out the subjects, verbs and objects in each clause, and, if necessary, paraphrase the whole complex sentence into simple sentences to reveal the meaning.

3 After Reading

(1) Make a list of the new words which you think will be useful for you in the future.

For each word, you should include: definitions, parts of speech, related phrases and