

最新改版

INMS

无机非金属材料专业

Inorganic Non-metallic Material Speciality English Reading Course

英语阅读教程 (第2版)

ERC

魏万德 © 主编



武汉理工大学出版社
WUTP Wuhan University of Technology Press

内容简介

本书是为无机非金属材料专业英语阅读课程编写的教材。全书共分10章，主要介绍无机非金属材料专业英语阅读的基本知识和基本技能。本书可作为无机非金属材料专业英语阅读课程的教学用书，也可供从事无机非金属材料专业英语阅读工作的工程技术人员参考。

无机非金属材料专业英语阅读教程

Inorganic Non-metallic Material Speciality English Reading Course

(第2版)

主 编 魏万德

副主编 肖先明

武汉理工大学出版社

· 武 汉 ·

内 容 简 介

本书采用单元教学形式,全书共编有十六个单元,每单元都编有三篇阅读材料,分两个部分。本书在内容上着重介绍水泥、玻璃、陶瓷,同时兼顾耐火材料、搪瓷。考虑到各学科之间的相互渗透,以及为拓宽学生的知识面,书中还插入了复合材料、涂料及塑料等方面的内容。本次修订增加了无机非金属材料制作的环保、节能与减排工艺和要求;纳米材料、自洁净玻璃以及高性能航空材料的制备;复合陶瓷的制备工艺和流程等内容。书后面还附有练习答案,供学习者参考。

本书可供高等院校无机非金属材料科学与工程专业学生学习专业英语,亦可供广大从事材料专业工作,并具有一定英语基础的工程技术人员及自学者学习参考。

图书在版编目(CIP)数据

无机非金属材料专业英语阅读教程/魏万德主编.—2版.—武汉:武汉理工大学出版社, 2009.8

ISBN 978-7-5629-2970-3

I. 无…

II. 魏…

III. 非金属材料-英语-阅读教学-高等学校-教材

IV. H319.4

中国版本图书馆 CIP 数据核字(2009)第 130530 号

出版发行:武汉理工大学出版社

武汉市武昌珞狮路 122 号 邮编:430070

<http://www.techbook.com.cn> 理工图书网

E-mail:wutpbook@sohu.com

huangchun@whut.edu.cn

经 销 者:各地新华书店

印 刷 者:安陆市鼎鑫印务有限责任公司

开 本:787×1092 1/16

印 张:18

字 数:596 千字

版 次:1997 年 8 月第 1 版 2009 年 8 月第 2 版

印 次:2009 年 8 月第 8 次印刷

印 数:22001—25000 册

定 价:29.00 元

凡购本书,如有缺页、倒页、脱页等印装质量问题,请向出版社发行部调换。

本社购书热线电话:(027)87397097 87394412

前 言

(第2版)

《无机非金属材料专业英语阅读教程》第1版1997年8月出版发行,成为当时无机非金属材料领域专业英语阅读教材的开山之作。十多年来,该教材一再重印,为广大读者提供了学习和工作研究的良好平台,深得读者的厚爱。

世纪更替,人类在科学技术的探究方面所取得的成果日新月异,材料科学的研究领域已成为我国在21世纪国家重点支持的科学研究制高点之一。当年曾经阅读本教材的一批批读者,如今大多已在各自的专业研究领域开花结果,点缀着各自灿烂的人生,吸引着更多的后来者勇攀高峰。本书将一如既往地后来者架起英语学习和材料科学研究的桥梁,指引阅读者通向材料科学研究的辉煌殿堂。根据读者反馈的意见以及十多年来材料科学研究的新进展,本书编者对原来的教材内容作了重新取舍和编排,力图带领读者窥探新世纪无机非金属材料研究领域的最新进展。教材内容的更新主要体现在以下几个方面:

1. 无机非金属材料制作的环保、节能与减排工艺和要求。
2. 无机非金属材料研究的最新进展,如纳米材料、自洁净玻璃以及高性能航空材料的制备等。
3. 复合陶瓷的制备工艺和流程等方面的文献更新。
4. 计算机技术在材料科学研究领域的应用的相关文献。
5. 水泥工艺的变革等方面的文献更新。

本次改版篇幅超过30%,将第1版中第2章、第4章、第5章、第6章、第15章进行了更换,其余章节修改了原文中的不妥之处,并更换了部分内容,如第11章、第12章、第14章、第16章。

本书所选的文献均源于国内外无机非金属材料专业研究期刊,题材较为宽广,文章难易程度适中,对难点部分依照原教材体例作了注解,帮助学习者扫清阅读障碍。教材的教学安排和教学练习参考答案也都作了相应更新。

本书的改版工作仍然由原书的主编魏万德教授主持。由于工作的变动以及教学的要求等方面的原因,原书的四位副主编不再参与本书改版的工作,由肖先明担任本书副主编。肖先明,樊晓丽,杨卿,李明菲,聂珂等老师参加教材的具体改版工作。武汉理工大学出版社相关工作人员为本书的改版付出了辛勤劳动,谨此表示衷心感谢。对于教材的改版,编者作出了极大的努力,也进行了反复的修改,我们仍然怀着虔诚的心境欢迎读者的批评指正。

主 编

2008年8月

前 言

(第1版)

本书是为高等院校无机非金属材料科学与工程专业学生学习专业英语而编写的,亦可供广大从事材料专业工作,并具有一定英语基础的工程技术人员及自学者学习参考。

本书采用单元教学形式,全书共编有十六个单元,每单元都编有三篇阅读材料,分两个部分:

1. 课文部分——在课文之前编写有 Brief Introduction,以浅显易懂的语言简要介绍课文内容,对学习课文可作一定的准备;课文后面编有本单元中出现的较为重要的词汇的 Word Study,目的是让学习者了解这些词汇在专业英语上和基础英语上的意义差别,从而加以区分达到熟练运用;课文后面一般编有三个固定练习题,第一题阅读理解练习检查学习者对课文学习的效果,第二题翻译练习检查学习者对 Word Study 学习的效果,第三题翻译练习属本单元出现的重要长句,训练学习者的翻译能力。

2. 阅读材料部分——此部分属泛读部分,Passage I 阅读材料可在教师的指导下,学生进行阅读能力的训练;Passage II 阅读材料属学习者自学部分,一般是对前两篇阅读材料的内容加以补充。

本书在内容上着重介绍水泥、玻璃、陶瓷,同时兼顾耐火材料、搪瓷。考虑到各学科之间的相互渗透,以及为拓宽学生的知识面,书中还插入了复合材料、涂料及塑料等方面的内容。第1单元是对整个材料科学的概述;第2、3、4单元是关于水泥性质、种类、生产等方面的介绍;第5、6、7、8、9单元介绍玻璃的自然性质、结构、制造及污染控制及电脑在玻璃制造中的应用;第10、11、12、13单元介绍陶瓷的性质、化学组成、发展史等等;第14单元介绍耐火材料及搪瓷;第15单元介绍复合材料及涂料;第16单元介绍塑料。本书后面还附有练习答案,供学习者参考。

本书所选用的文章均为最新科技文章,题材广泛,在一定程度上代表了无机非金属材料科学与技术发展的现状。文章难易程度适中,对难点部分作有注解,帮助学习者排除阅读障碍,更顺利地进行学习。

武汉工业大学外籍专家 Dennis B. Hagen 和 Jenet Hagen 给本书提出了许多宝贵的建议,吴汉金、王洪书、扬衡等同志为本书做了一定的工作,谨此表示衷心的感谢。因为本书编写、出版时间短,存在不完善及错漏之处,敬请各位专家及读者批评指正,来信请寄武汉工业大学出版社(邮编 430070)黄春收转。

主 编

1997年8月

CONTENTS

Unit One	(1)
Text: Historical Development of Materials and Technology	(1)
Reading Passage	(8)
Properties of Materials	(8)
Cements and Glasses	(14)
Unit Two	(17)
Text: Portland Cement and its Types	(17)
Reading Passage	(25)
Composite Cements: General Considerations	(25)
History of Cement	(30)
Unit Three	(33)
Text: Manufacture of Portland Cement	(33)
Reading Passage	(39)
Raw Materials for the Manufacture of Portland Cements	(39)
Burning	(45)
Unit Four	(48)
Text: Setting and Hardening	(48)
Reading Passage	(55)
The Hydration of Portland Cement	(55)
Low-energy Cements	(60)
Unit Five	(64)
Text: Concrete, Reinforced Concrete, and Prestressed Concrete	(64)
Reading Passage	(72)
High Performance Concrete	(72)
Durability of Concrete	(79)
Unit Six	(82)
Text: Ceramming: Changing Glass to Glass-Ceramics	(82)

Reading Passage	(89)
Types of Ceramic Glasses	(89)
Ion Exchange in Glass Processing	(95)
Unit Seven	(99)
Text: Pollution Control in Glass — Making	(99)
Reading Passages	(105)
Energy Conservation Technologies and Recycling	(105)
Glass Quality	(109)
Unit Eight	(111)
Text: History of Glass Making	(111)
Reading Passage	(118)
Architectural Glass	(118)
Glass Products	(122)
Unit Nine	(125)
Text: Application of Microcomputers to Glass Problems	(125)
Reading Passage	(131)
Batch Calculations	(131)
Distributed Computer Systems	(137)
Unit Ten	(140)
Text: Ceramics	(140)
Reading Passage	(151)
Ceramics: An Overview	(151)
Ceramic Kiln	(157)
Unit Eleven	(161)
Text: Ceramic Raw Materials	(161)
Reading Passage	(167)
Basic Raw Materials	(167)
Structure of Ceramics and Ceramic Phase Diagrams	(171)
Unit Twelve	(174)
Text: Developments in Ceramics	(174)
Reading Passage	(183)

Advanced Ceramics	(183)
Novel Ceramic Processing Routes	(188)
Unit Thirteen	(193)
Text: The History of Chinese Ceramics	(193)
Reading Passage	(203)
Nature of Ceramics	(203)
Bone China	(207)
Unit Fourteen	(209)
Text: Refractories	(209)
Reading Passage	(216)
Manufacture and Properties of Refractories	(216)
Refractory Metals	(220)
Unit Fifteen	(224)
Text: Bio-Composite: Present Tread and Challenges For The Future	(224)
Reading Passage	(232)
Polymeric Composite	(232)
Non-wood bio-composites	(236)
Unit Sixteen	(240)
Text: Fundamental Properties of Plastics	(240)
Reading Passage	(250)
Biodegradation of Agricultural Plastic waste	(250)
Thermosetting Materials	(256)
Appendix Key to Exercises	(260)

目 录

第一单元	(1)
课文:材料与工艺的历史发展	(1)
阅读材料	(8)
材料的性质	(8)
水泥与玻璃	(14)
第二单元	(17)
课文:波特兰水泥及其种类	(17)
阅读材料	(25)
复合水泥概述	(25)
水泥的历史	(30)
第三单元	(33)
课文:波特兰水泥的制造	(33)
阅读材料	(39)
制造波特兰水泥的原料	(39)
煅烧	(45)
第四单元	(48)
凝结和硬化	(48)
阅读材料	(55)
硅酸盐水泥的水化	(55)
低能耗水泥	(60)
第五单元	(64)
课文:混凝土,钢筋混凝土和预应力混凝土	(64)
阅读材料	(72)
高性能混凝土	(72)
混凝土的耐久性	(79)
第六单元	(82)
课文:陶瓷化:从玻璃到微晶玻璃的转变	(82)
阅读材料	(89)
微晶玻璃的种类	(89)

玻璃加工中的离子交换	(95)
第七单元	(99)
课文:玻璃生产中的污染控制	(99)
阅读材料	(105)
(1) 节能技术与碎玻璃的回收利用	(105)
(2) 玻璃的质量	(109)
第八单元	(111)
课文:玻璃制造史	(111)
阅读材料	(118)
(1) 建筑玻璃	(118)
(2) 玻璃制品	(122)
第九单元	(125)
课文:微机在玻璃生产中的应用	(125)
阅读材料	(131)
(1) 配料计算	(131)
(2) 分布式计算机自处理系统	(137)
第十单元	(140)
课文:陶瓷	(140)
阅读材料	(151)
(1) 传统陶瓷概述	(151)
(2) 陶瓷窑炉	(157)
第十一单元	(161)
课文:陶瓷原料	(161)
阅读材料	(167)
(1) (制造陶瓷的)基本材料	(167)
(2) 陶瓷结构与陶瓷相位图表	(171)
第十二单元	(174)
课文:陶瓷的发展	(174)
阅读材料	(183)
(1) 先进功能陶瓷	(183)
(2) 最新陶瓷加工工艺流程	(188)

第十三单元	(193)
课文:中国陶瓷史	(193)
阅读材料	(203)
陶瓷着色剂	(203)
骨灰瓷	(207)
第十四单元	(209)
课文:耐火材料	(209)
阅读材料	(216)
耐火材料的制造及其性质	(216)
耐火金属	(220)
第十五单元	(224)
课文:生物复合物:趋势与挑战	(224)
阅读材料	(232)
聚合物复合材料	(232)
非木质生物复合物	(236)
第十六单元	(240)
课文:塑料的基本性质	(240)
阅读材料	(250)
农用薄膜废料的生物降解	(250)
热固性材料	(256)
附录:练习答案	(260)

Unit One

Brief Introduction

The common engineering materials include metals, cementing materials, concrete building stones, clay products, insulating materials, timber. Some of them are described here from the stand-point of occurrence, manufacture, properties, methods of testing, and uses.

The development of materials with improved properties is a vital phase of engineering. Progress in engineering construction has been dependent on the availability of materials of suitable physical properties in large quantities; for example, the development of the modern automobile was critically dependent on availability of high-quality alloy steels, and the all-metal airplane was made possible by the development of light weight high-strength alloys.

Text

Historical Development of Materials and Technology

It can be said that "The history of materials is the history of man". Of course, the reverse can be stated: "The history of man is the history of materials". It is said that "New materials are a prerequisite for new technologies". Again the reverse is true. Furthermore, it is true that technology influences man and vice versa⁽¹⁾. From this viewpoint the question of pre-eminence among the three partners, man, materials, and technology, is an intellectual game: a controversy of the chicken and the egg type⁽²⁾.

The earth's population has been continuously multiplying since early man first appeared about two million years B. C. The population grew by a factor of 100 in about 500,000 years, from 100,000 to 10 million, and this was reached about 4000 B. C. Despite natural catastrophes, plagues and decimating wars, by 1820 the population had grown again by a factor of 100 to 1 billion people, this time in less than 6000 years. Today there are about 5 billion people and the doubling rate is only about 33 years. Accordingly, it is possible that in not quite 200 years' time there will already be 100 billion (10^9) people on Earth.

The conditions for the flourishing of the species *Homo sapiens* have improved over time such that man has made the Earth his subject⁽³⁾. Through his materials and their uses in technical devices and processes, man has made favourable living conditions

which he modifies continually and to which he in turn continuously adapts.

Materials are one of our oldest cultural assets. Historical eras are named after the materials that dominated at that time: the Stone Age, the Bronze Age and the Iron Age possibly the end of which we are living through at this time. New materials such as polymers, semiconductors and superconductors, advanced alloys and ceramics, the amorphous metals, and increasingly the composite materials, are appearing on the scene and providing an impetus for technological developments, often with far-reaching consequences⁽⁴⁾.

One can expect the discovery of more materials in future. Every chemical compound and every alloy is a material that could potentially revolutionize our lives to the extent that the first stone tools revolutionized the life of early man⁽⁵⁾. Thus the name for the new era should be chosen carefully and perhaps is best left to the future; a position too close could distort the perspective.

Materials are turned into tools, devices, machines, houses and streets. Revolutionary technological developments have, as in the case of materials, followed in quick succession in modern times⁽⁶⁾. Thus important developments, such as printing, radar, radio, telephone, satellites, rockets etc., greatly enhance man's favourable living conditions.

Obviously, it is not only materials and technology that have contributed to today's high standard of living, but also discoveries in medicine, agriculture, chemistry and pharmacy. All these areas have contributed to, as well as profited from, technological progress and thus play a significant role in the interactions of the disciplines⁽⁷⁾.

It has taken a long time for developments to reach their current rate. The question arises whether the steeply increasing population curve and increasing pace of technological innovations, some of which have a great influence on society, really represent true progress. Indeed, does not a growing demand for materials imply the "looting" of our planet of nonrenewable resources? Will there come a day when we are no longer in control of our own technology and the human spirit no longer matches progress? These are questions of our times, the answers to which must come from the natural and engineering sciences, especially from their interdisciplinary branch materials science, as well as the social sciences.

The relation between man and technology holds a prominent, often emotionally charged position, within the inter-relationship of man, materials and technology. Ever since the Industrial Revolution, or even centuries before that, there have been intense controversies, unfortunately all too often linked with violence. In this context materials

were entirely ignored, even though they have frequently triggered off technological progress in the past and present, and will continue to do so in the future. Materials are mostly a means to an end and were thus considered inferior. In fact materials are taken for granted: they are self-evident to most people.

It would be appropriate to discuss the train of thought Georgius Agricola (1556) expressed in one of his books. He wrote: "If mankind ceased to use metals, all the possibilities to guard and preserve health, as well as to lead a life corresponding to our cultural values would be taken away. For, if the metals would not exist, people would lead the most detestable and most miserable life among wild animals. people would return to eating acorns and berries, they would pull out roots or herbs and eat them, they would dig caves with their fingernails and lay there at night and would roam the woods and fields during the day just as it is custom with wild animals. Since such conduct is entirely unworthy to human reason, is there anyone so foolish and stubborn not to admit that metals are necessary for sustenance and clothing, and that they serve to protect the human life?"

Even after more than 400 years this statement is relevant. Everything said about metals can be generalized to all materials. Agricola addressed the social aspects of materials: problems of public health and culture as well as general questions of standards of living. Agricola made the connection between materials technology and society, in the context of his time. As the mayor of Chemnitz, earning a living as a town physician, he was the leading expert on the contemporary mining industry and metallurgy.

New Words and Expressions

reverse 相对, 相反

prerequisite 首要的, 必备的, 先决条件

pre-eminence 超群, 优秀, 卓越

controversy 长期的争论, 论战

catastrophe 大灾害, 灾祸

plague 瘟疫, 祸患

decimating 杀死大部分的, 毁灭大部分的

asset 财产, 资产, 有价值的性质或技能

era 纪元, 时代

polymer 聚合物, 高聚物

semiconductor 半导体

superconductor 超导体

alloy 合金

ceramic 陶瓷

amorphous 无定形的

impetus 刺激, 动力, 原动力

far-reaching 影响深远的

distort 歪曲, 曲解

enhance 增加, 增强

pharmacy 制药业

innovation 革新

loot 抢劫, 掠夺

nonrenewable 不能再生的

interdisciplinary 涉及多种学的, 跨学科的

prominent 卓越的,著名的
trigger 扳柄,扳机;引发,引起
inferior 次等的,劣等的
corresponding to 与……相当,符合……
detestable 可恨的,可厌恶的

acorn 橡子
roam 闲逛,无目的地漫游
sustenance 食物,饮料,营养
contemporary 同时的,同时代的
metallurgy 冶金术,冶金学

Notes

1. Furthermore, it is true that technology influences man and vice versa.

另外,技术的确影响着人类,反之亦然。

vice versa 相反,反之亦然 e. g.

An excess of investment over saving means rising prices, and vice versa.

投资超过储蓄就意味着价格上升,反之亦然。

2. From this view point the question of pre-eminence among the three partners, man, materials, and technology, is an intellectual game: a controversy of the chicken and the egg type.

从这一观点可见,人类、材料和技术三者之间谁先谁后的问题是一个智力游戏,是一个像鸡和蛋之类的引起争论的问题。(即到底是先有鸡然后有蛋,还是先有蛋然后有鸡这一类问题,人类、材料和技术三者谁为先,谁为后,就像鸡和蛋何者为先一样,所以说这一问题是一个智力游戏。)

3. The conditions for the flourishing of the species *Homo sapiens* have improved over time such that man has made the Earth his subject.

近代人类繁衍兴旺的条件大大地改善了,以至于人类使得地球受其支配。

Homo sapiens 近代人类

4. New materials such as polymers, semiconductors ... often with far-reaching consequences.

像聚合物、半导体、超导体、合金、新型陶瓷、非晶态金属以及越来越多的复合材料,这类新材料纷纷出现,给技术进步提供了原动力,其影响常常是深远的。

5. Every chemical compound and every alloy is a material that could potentially revolutionize our lives to the extent that the first stone tools revolutionized the life of early man.

每一种化合物和合金都可能会使我们生活发生革命性的变化,达到第一批石器引起早期人类生活革命那种程度。

to the extent that 在这里 that 后面引导的是同位语从句

to an extent 在……种程度上(或范围里) e. g.

1) To some extent, I can understand their attitude.

2) To an extent, perhaps the last remark was true.

to the extent that 还有“随着”之意 e. g.

Its importance can't but grow to the extent that knowledge improves.

随着知识的增长,知识的重要性也随之增长

6. Materials are turned into tools, devices, machines, houses and streets. Revolutionary technological developments have, as in the case of materials, followed in quick succession in modern times.

材料转化成为工具、装置、机器、房屋和街道。革命性的技术进步,像材料发展的情况一样,要现代,迅速地接二连三地出现。

in the case of 对于……情况;在……方面;关于,对于 e. g.

1) In the case of light similar effects are present though we shall see some essential differences.

对于光也有类似的效应,虽然我们会看到一些本质的差别。

2) In the case of non-magnetic substances there is only one integral equation.

在非磁性物质的情况下,只有一个积分方程。

7. All these areas have contributed to, as well as profited from, technological progress and thus play a significant role in the interactions of the disciplines.

所有这些领域都有助于同时地得益于技术进步,因此在各学科互相作用中起着重要作用。

Exercise I. Comprehension questions

1. "A controversy of the chicken and egg type", here, implies that _____.

a. the question of pre-eminence among the three partners, man, materials, and technology is so controversial that we can't get the proper answer

b. man produced materials as the chicken laid eggs

c. the history of materials is the history of man, and vice versa

d. there exists a question about the chicken and the egg

2. About 4000 B. C. the earth's population might be _____.

a. 100,000 b. 10 million c. 1 billion d. 5 billion

3. Which of the following best explains that "materials are one of our oldest cultural assets"?

a. Materials influence man and vice versa

b. Historical eras are named after the materials that dominated at the time; the Stone Age, the Copper and Bronze Age, etc

c. Through materials, man has made favourable living conditions

d. With the development of materials, the earth's population has been multiplying

4. The author believes that materials science and social sciences, especially, can answer the question _____.

- a. whether the steeply increasing population curve and the increasing pace of technological innovations really represent true progress
 - b. whether a growing demand for material implies the “looting of our planet of non-renewable resources”
 - c. whether there will be a day when we are no longer in control of our own technology
 - d. all of the above
5. Georgius Agricola's statements imply that _____.
- a. without materials, mankind would lead the most detestable and most miserable life among wild animals
 - b. the earth's population does have a relevance to the development of materials
 - c. the high standard of living owe much to the development of materials science
 - d. materials set human being apart from wild animals

Word Study

1. discipline

1) branch of knowledge; subject of instruction

学科, 领域, 科目, 课程

Archaeoastronomy depends for its discoveries on experts in many disciplines.

考古天文学上的发现有赖于许多学科的专家。

2) 原则, 准则, 法则

He produced a more general theory and founded the discipline of regional analysis.

他提出了一个更为一般性的理论, 并且确立了区域分析的原则。

3) 纪律, 纪律性

The first two parts to the price discipline argument seem roughly to fit the facts.

物价纪律论点的前面两点看来大致上是符合事实的。

2. stress

1) 压力, 心情紧张

The development of coronary atherosclerosis reduces the capacity of vascular bed adapt to hypoxic stress.

动脉硬化发展降低了血管床适应血氧压力的能力。

2) 应力, [生理] 应激

The higher the stress the fewer will be the cycles before failure can be expected.

应力越高, 在可以预料的破坏之前循环次数就越少。

3) [物] 强度, 内应力