WUTP 现代陶瓷教科丛书

# Selected Readings of Ceramic English

# 陶瓷英语文献选读

朱竹芳 主编

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## 【内容简介】

《陶瓷英语文献选读》一书共45课。所选材料内容涉及陶瓷生产的方方面面，主要包括陶瓷的基本概念、一般常识，陶瓷的生产工艺，包括成型、烧成、装饰；同时也收集了一些与陶瓷生产相关的耐火材料、节能降耗等方面的文章，以及在陶瓷工业中应用计算机和数字控制技术的文章。此外，还选用了陶瓷材料在健康、环保等方面应用的文章。作为一种独特的世界通用艺术语言的陶艺方面的文献，本书收录了较多的篇幅。本书最后几篇是对陶瓷营销方面的论述。

本书每课由正文、词汇表和注释组成；书末附有总词汇表(收录该书中出现的常用陶瓷英语词汇，便于查阅)。

本书可作为高等院校陶瓷学科及相关专业学生的英语文献选读教材，也可作为英语专业学生及陶瓷英语爱好者了解陶瓷专业知识的读物。

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# 《现代陶瓷教科丛书》编审委员会

# 总　序

在漫长的文明进程中，中国制瓷业的发展，不仅促进了中国古代手工业的繁荣，而且还促进了世界制瓷业的生成。它的产生、发展和繁荣，在带给我们美仑美焕陶瓷的同时，也为中国文化和经济史写下灿烂的篇章，这已是世所公认的事实。

在英文中，CHINA 既是“中国”的意思，也是瓷器的意思。虽说瓷器与国同名，但其正规的、系统的教育却起步很晚。直到 19 世纪末的“百日维新”后，一些陶瓷产区才开始了新型的陶瓷教育事业，如 1906 年创办的湖南醴陵陶瓷学堂、1909 年在江西饶州创办的中国陶业学堂等。由于受西方科技思想的影响，这些学堂注重数、理、化等基础课程和陶瓷技艺课程的教学，教师一般都是学识丰富、技艺精良及资历较深的教员、技师和工程师，其中不少接受过西方正规专业教育；毕业学生主要担负着陶瓷工业试验和技术改良工作，教材大多由留日、留美的学者或教员自行编写。新中国成立后，陶瓷工业得到了迅速发展，对陶瓷人才的需求日益迫切，以往师徒世代相传技艺和凭经验管理企业的传统做法难于满足。1958 年 6 月一个为中国陶瓷工业培养和输送专门技术、设计人才的景德镇陶瓷学院应运而生。这是一所为我国系统培养陶瓷专门技术、艺术设计人才的惟一高等学府，它已经建设成为一所以陶瓷为特色，集工学、艺术、文学、经济等体系完整、实力雄厚的多科性的工科大学。特别是在陶瓷教育、科技领域等先后出版了一批具有较大影响的专业教材，为陶瓷科技、教育事业做出了积极贡献。

《现代陶瓷教科丛书》是景德镇陶瓷学院为满足新世纪陶瓷发展需要，汇集一大批在陶瓷学术界卓有成就的专家、学者经过二年多辛勤努力编撰而成的。它是目前国内一套不仅涵盖了陶瓷工艺、窑炉和陶瓷机械，还涵盖了建筑卫生陶瓷和陶瓷科技英语等多学科，较为完整的陶瓷类教育丛书。它的问世，有助于中国陶瓷产业的发展，为陶瓷科技与教育提供了理论和实践的参考。期望这套丛书，在促进陶瓷科技转化为生产力，为培育和造就更多陶瓷高级专门人才起到有力的推动作用。为此衷心地感谢景德镇陶瓷学院领导的指导支持和参与编写这套丛书的专家、学者们的热忱奉献，也缅怀为陶瓷科技、教育、产业做出巨大贡献的先人们，是他们留下的极为宝贵的知识遗产，为本丛书的编撰奠定了坚实的基础。与此同时，我们也感谢武汉理工大学出版社对这套丛书给予的大力支持，并对他们的敬业精神深表敬意。由于编写时间仓促，书中难免存在一些不足和错误，欢迎广大读者提出宝贵意见，以使这套丛书更趋完善。

《现代陶瓷教科丛书》编审委员会主任　周健儿

2004 年 8 月

# 前　言

陶瓷是人类最早利用自然资源制成的手工业品。由陶到瓷的进步是中国古代劳动人民对世界文明的伟大贡献之一。陶瓷的功能已从最初的生活用具和随葬品发展到用于各种现代工业和现代高新技术的各个领域。形成了日用陶瓷、建筑卫生陶瓷、化工陶瓷、电瓷、结构陶瓷和功能陶瓷等不同体系的陶瓷。随着社会的发展和科技的进步，陶瓷在人们的日常生活和科学技术中的应用将越来越广泛。为适应新时期陶瓷领域信息交流和教学的需要，我们从国外的陶瓷书刊杂志中选择了部分文章编成此书。书中大部分文章选自近1～2年国外陶瓷学术期刊，文章内容涉及陶瓷史、陶瓷工艺、陶瓷装饰、陶瓷艺术、陶瓷营销，高新技术（如数字技术）在陶瓷生产上的应用，以及陶瓷材料在高新技术上的应用。

从事陶瓷工作的科技人员，阅读本书可以了解到陶瓷英语的绝大部分专业英语词汇；英语专业人员可以通过本书了解到陶瓷专业的基本知识。

考虑到本书主要是作为“专门用途英语”的教材及篇幅的原因，原文中的插图及文章作者的有关信息未加以收录。

由于编者水平所限，书中错误和不妥之处在所难免，欢迎读者不吝赐教。

编者

2004.2.8

# Contents

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# 1. Ceramics

The word "ceramic" is of Greek origin, having been derived from the word "keramos" which in Greek means "burnt stuff". The term is of ancient origin, the Greeks used it to describe any material prepared by the use of fire. They did not limit its application to fired clayware but included, logically enough, the metals produced by the action of fire on their ores. The ancients did not make any great distinction between the metals and non-metals but as time went on the metals, because of their distinguishing characteristics, were differentiated from the non-metallic or earthy materials. It is interesting to note that glass was long regarded as a metal by glassmakers and the term has survived until the present time, the glassworkers commonly referring to the molten glass as " the metal".

Later, as the term came to be applied to the non-metallic, it became synonymous with fired clayware. The word "keramos" and its meaning spread throughout Western Europe and we now find its equivalent in the common European languages. The Italian and Spanish "ceramica", the French "ceramique", the German "keramic", and the English "ceramics" all have equivalent meanings. Until the late nineteenth century, ceramics was used only to designate clayware. Glass was believed to be closely allied to the metals and the very close connection between glass and the other ceramic products was unknown because the chemistry of the silicates had not yet been developed.

With the advance of general scientific knowledge during the last century, silicate chemistry developed to a point where the similarity between glass, fired clay products and glazes was very evident. Along with this advance in silicate science several new industries were developed. The principal ones are the refractory, enamel, cement and abrasive industries. While it is true that certain refractories, enamels, cement and abrasives have been in use for many centuries, the modern industries which manufactures these products are based almost entirely on the advance of silicate or ceramic chemistry.

By 1900 the interrelation of the industries based upon silicate technology was quite generally established. From that time to the present the bonds tying these industries into the ceramic group have been continually strengthened. The tie-up of the various branches of the ceramic industry has been fostered more by the scientists, technologists and engineers than by the executives, workers or general public. This is probably due to the fact that the technical men realize more strongly the benefits to be gained by cooperation within the whole ceramic fild.

The American Ceramic Society, founded in 1898, is an organization devoted to the promotion of common knowledge pertaining to all branches of the industry. This society now has eight divisions, each representing an important division of the ceramic industry. Many states have ceramic industry associations that embrace all branches of the industry within that particular state. In spite of these organizations there is a surprising lack of understanding of the meaning of the word "ceramics" in its modern usage.

In the broadest sense ceramics covers all of the inorganic non-metallic materials prepared by the use of heat. One of the most distinguishing characteristics of ceramic materials is their property of being indestructible by the action of heat. They may be modified physically by a high temperature treatment but their basic properties remain the same. Another property of ceramic materials is their great resistance to water, the water solutions of acids, alkalis and corrosive salts, and corrosive gases, such as oxygen. These two characteristics give the ceramic materials their greatest uses. These uses are for construction purposes, for refractories and for food containers and holders.

In its modern sense the ceramic industry may be said to encompass the following branches: whiteware or pottery, heavy clay products, refractories, abrasives, glass, enamels and cement. It must be emphasized that in reality this industry is a group of many smaller industries, which consider themselves to be distinct and completely separate from the other ceramic industries, and that they are only grouped above as branches for purposes of convenience. In spite of the wide variation in the processes used, and the materials employed in these industries they are all treating silicates or closely allied oxide materials by the use of heat for the purpose of producing useful products. With the scientific and technological advance that is taking place in these industries at an increasing rate, it is logical to predict that they will become more closely allied as silicate technology advances.

## Ⅰ. NEW WORDS AND EXPRESSIONS

| | | |
|---|---|---|
| 1. ceramics | n. | 陶瓷制品,陶瓷学,制陶术 |
| 2. Greek | n. | 希腊人,希腊语,难懂的事,希腊的 |
| 3. derive | v. | 派生,派生出,导出,取得 |
| 4. clayware | n. | 粘土制品 |
| 5. silicate | n. | 硅酸盐 |
| 6. refractory | n. adj. | 耐熔物质,耐火材料,耐火的,耐熔的 |
| 7. enamel | n. | 瓷,珐琅 |
| 8. cement | n. | 水泥 |
| 9. abrasive | n. | 研磨料 |
| 10. executive | n. | 行政部门,行政官 |
| 11. tie-up | | 束紧缚牢 |
| 12. holder | n. | 托(夹)的东西(如架柄等) |

## Ⅱ. NOTES

1. refer to... as... 称……为……。
2. The American Ceramic Society 美国陶瓷协会,美国窑业协会。
3. pertaining to (文学用语)与……有关;属于……。

# 2. Chingtechen Ware and the Underglaze-color Porcelain in Liling

Archaeologists have found that while large number of kilns were built in north China during the Sung dynasty in south China, particularly in Kiangsi, Anhwei, Kwangsi and Fukien, a porcelain known as ying-ching ware—a development of celadon—began to be produced. The most exquisite were made at Chingtechen in Kiangsi province. The body of this type of porcelain is thin but hard, and its pale-green glaze cleverly transmuted by the reduced firing of ferrous oxide, is as lustrous as jade. Unique to this type of porcelain are the carved designs, filled with translucent glaze, with the body which itself is of such fine texture that the outline of one's fingers can be see through it against the light. The development of ying ching opened a new page n the history of porcelain of making in China.

In the Yuan dynasty the ingenious artisans of Chungtechen constantly improved their skills. In addition to ying ching porcelain, they created numerous type of porcelain with underglaze color: "underglaze red", "blue and white with underglaze red", "pure red" and "pure blue". Cobalt blue (from cobalt oxide) was obtained from low-fired lead glazes as early ad the Warring States period and used in the making of lapis lazuli beads and during the Tang dynasty, in producing three-color glaze ware. "Blue and white" and "pure blue" could be obtained only when feldspathic rock was used as the material for glazes, and firing was done at a much higher temperature. This presented great difficulties and the overcoming of them was a mark of great technical progress.

A sapphire blue wine cup with plum blossom decoration in gold was unearthed at the same time as that jar. The thin body of the cup and its fine glaze decorated with a spray of gold plum blossoms make it an object of rare beauty.

Gold decoration was used on pottery and porcelain quote early in China. Painted gold designs appear in the white and three-color glazed wares of the Tang dynasty as well as on the Ting wares of the Sung dynasty. Some of the gold designs in the blue or black glazed ware of the Yuan dynasty were not painted but gilded, this was a new development in the decoration of Chinese porcelain.

During the Ming and Ching dynasties technique in the making of Chinese pottery and porcelain improved steadily. The refinement of the body and glaze, the beauty of the shapes, and the variation of colors and decoration all excelled those of previous centuries. In recent years archaeologists have discovered quite a number of pieces of Ming and Ching pottery and porcelain which further illustrated this progress.

Although the technique of decorating porcelain with color beneath the glaze has been known since the Tang dynasty, production of it on a large scale began only after the liberation in 1949.

In ordinary porcelain the decoration is painted on after the article has been glazed. Then the ar-

ticle is fired a second time. On underglaze-color porcelain, on the other hand, the substance producing the color is applied to the article before it is fired. The article is then covered with a thin layer of glaze and fired. The colors in the finished product glow through the glaze with a freshness and iridescence far superior to those of ordinary porcelain decoration. These colors, too, will not fade or wear off and there is no possibility of lead poisoning.

Because it was very difficult to find substances which give the desired color at the high temperatures needs for firing porcelain, through the centuries not much progress was made with the underglaze method. Underglaze colors must withstand a temperature of about 1300℃. Overglaze decoration faces a re-firing temperature of only 700℃. Color decoration was used beneath the translucent celadon glaze in the Tang dynasty. On this basis porcelain with varicolored underglaze decoration was developed in China. Early in the twentieth century potters at Liling in Hunan province discovered that cobalt oxide could pro ıce a blue-green underglaze color. Later they found other chemical compounds that would give color under high temperatures and thus obtained underglaze green and sepi-adj. Using gold, they were also able to obtain red. At the Panama International Exhibition held in San Francisco in 1915 a porcelain vase with a delicate flowering branch design in underglaze blue and white won a gold medal. By 1930, however, production of underglaze-color porcelain, which demanded a great deal of capital as well as high quality workmanship, had stopped in Liling. By the eve of liberation, not one of Liling's potteries remained in business, all forced to close down by the dumping of large quantities of cheap foreign chinaware on the domestic market.

Liling's potteries began producing underglaze-color porcelain in 1956. Its potters made many experiments seeking formulas that would produce more colors.

China's metallurgical industries developed more and more oxides of rare metals become available for this purpose. From compounds of rare metals they were able to get a bright yellow, deep black color which recreates the shaded black of Chinese ink painting. After much hard work and nearly 5000 experiments they have increased the basic colors from the pre-liberation five to fifteen and these can be combined to create a total of 100 colors. This wide range has made for richer and more varied underglaze decoration.

## I. NEW WORDS AND EXPRESSION

| | | |
|---|---|---|
| 1. archaeologist | n. | 考古学家 |
| 2. celadon | n. | 青瓷 |
| 3. exquisite | adj. | 优美的,高雅的,精巧的 |
| 4. body | n. | 陶瓷坯体,瓷胎,坯料,泥料 |
| 5. transmute | v. | 使变形,变质 |
| 6. reduced firing | | 还原烧成 |
| 7. lustrous | adj. | 有光泽的,有光彩的 |
| 8. jade | n. adj. | 玉,绿玉色玉制的,绿玉色的 |
| 9. texture | n. | 结构,质地 |
| 10. artisan | n. | 手艺人,工匠,手工业工人 |

| | | |
|---|---|---|
| 11. ingenious | adj. | 精巧的 |
| 12. blue and white | | 青花 |
| 13. cobalt | n. | 钴,钴类颜料 |
| 14. lapis lazuli | | 天青色 |
| 15. sapphire-blue | n. | 宝石蓝 |
| 16. plum | n. | 梅 |
| 17. blossom | n. | 花(多指果树的花) |
| 18. decoration | n. | 装饰,彩饰 |
| 19. spray | n. | 小树枝,小花枝 |
| 20. glow | vi. | 鲜艳夺目,呈现红橙黄一类颜色 |
| 21. iridescence | n. | 彩虹色 |
| 22. poison | vt. n. | 使中毒,毒药,毒物 |
| 23. overglaze | n. | 釉上彩 |
| 24. modal | n. | 奖章,勋章,纪念章 |
| 25. varicolored | adj. | 五颜六色的,杂色的 |
| 26. sepia | n. | 深棕色 |
| 27. workmanship | n. | 手艺,工艺 |
| 28. domestic | adj. | 家里的,家庭的,本国的,国产的 |
| 29. formula | n. | 配方 |
| 30. metallurgical | adj. | 冶金(学)的 |
| 31. shade | vi. | (色彩等)渐变 |

## Ⅱ. NOTES

1. Chingtechen　景德镇。
2. in addition to...　除……之外。
3. San Francisco　圣弗兰西斯科(即旧金山)。
4. underglaze color　釉下彩。
5. Panama　巴拿马。

# 3. White-wares

The term "white-wares" is used to designate those products made of clay and mixtures of clay and other white-burning silicate raw materials. In general it includes porcelains, china, semi-porcelain, fine stoneware and white earthenware.

White-wares may be divided into two major types according to the characteristics of the body after the products have been fired. These types are vitreous white-wares and semi-vitreous white-wares. A vitreous body is one which has been fired to a point where it is impervious throughout and does not require a glaze to prevent water absorption. A semi-vitreous body is one which has been fired until it is strong enough for use but not impervious to water. Semi-vitreous bodies have absorption ranging from 4 to 15 per cent depending upon the degree of firing. Products made from this type of body must be glazed on the surface to render them impervious to water. For most purposes semi-vitreous products are considered inferior to vitrified ones and they are easier and cheaper to produce.

Table 1 classifies white-ware products according to the nature of their bodies.

**Table 1**

Classification of White-wares

Vitreous Products

Porcelain table ware

China table ware

Hotel and restaurant china ware

Vitreous sanitary ware

Vitreous floor tile

Electrical porcelain insulators

Semi-vitreous Products

Semi-vitreous porcelain table ware

Semi-vitreous china table ware

Wall tile

Semi-vitreous electrical fixtures

Fine earthenware

Special White-ware Products

Refractory porcelain (usually vitrified)

Chemical porcelain (vitrified)

Technical Products (vitrification depending in use)

Most white-wares are glazed except those used for special purposes where a glaze is not desirable. In the case of tableware and sanitary ware the glaze is necessary for cleanliness. A glazed surface is impervious to water and prevents absorption of organic matter into the body. It also presents a very

smooth surface which can be easily cleaned. Even though a body is thoroughly vitrified its surface is rough and difficult to wash. Electrical porcelain insulators, wall tile and other fixtures are glazed for appearance. Colored glazes are common in these products.

The principal white-ware raw materials are white burning clays, both kaolins and ball clays, which usually make up about one half of the raw body. The other major raw materials are feldspar and potter's flint ($SiO_2$). In addition to these four materials many other raw materials are used to a lesser extent. The most important of these are whiting, dolomite, magnesia, talc, calcium fluoride, zinc oxide, barium oxide and ground frits. Most of these minor constituents are used as auxiliary fluxes to aid the feldspar in vitrifying the body during firing. For the production of white bodies the principal requirement of all raw materials is that they be free from iron oxide as an impurity. This oxide gives the ware a brown color when fired. Another requirement is that all of the raw materials must be very finely ground.

In making white-wares the first step is to thoroughly mix the proper proportion of the raw materials. This is usually accomplished by the wet method, that is, the raw materials are dumped into a large tank of water and stirred until they are completely mixed. The resulting suspension of raw materials is then filtered to remove the excess water. This leaves the body in a moist, plastic condition. While in this condition it may be formed into ware of various shapes by plastic molding processes. Another method of forming clayware is by the slip-casting method in which the raw materials are prepared in the form of a thick suspension in water and this suspension poured into plaster of Paris molds of the desired shape. The plaster mold absorbs water from the suspension leaving a coating of stiff plastic clay on the wall of the mold. After a time, the remaining fluid suspension, or slip as it is called, is poured from the mold leaving the stiff clay adhering to the walls of the mold. This later shrinks from the mold and may be easily removed. The casting process is widely used for special shapes, particularly in the sanitary ware and electrical porcelain industries.

After forming, the ware is dried and fired until the body has reached the proper degree of vitrification. The glaze may be applied either before the firing, in which case it is melted at the same time the body is fired, or it may be applied after the body has been fired. If so, another firing is required to melt the glaze onto the surface of the ware. Glazing is essentially the process of melting a glass on the surface of the ware. In most instances the glaze is first prepared by melting the glaze materials to form a glass. This glass is then powdered, suspended in water and the resulting suspension is sprayed on the ware or the ware is dipped into it. When the glaze is fired the small glassy particles of the powder remelt and fuse together forming a continuous layer of glass over the surface.

In the entire white-ware industry there is a general trend away from the traditional clay bodies and in the direction of bodies made of special raw materials. Probably the greatest change of this sort has been the use of talc in such products as tile and electrical porcelain. This material produced a body having properties quite different from the older bodies used for the same products. The use of high-aluminum minerals in refractory porcelains is another development along this line. Real technological development is just beginning in the white-ware industry and the possibilities of technical advance appear to be very great.