DICTIONARY OF METALS
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Editor
Harold M. Cobb

ASM International®
Materials Park, Ohio 44073-0002
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Preface

The story of metals is undeniably entwined with the history of humanity, as evidenced by the division of the ages by the well-known Stone Age, Bronze Age, Iron Age, and what some have called the Steel Age and the Stainless Steel Age. Metals, more than any other material, have had the greatest influence on the development of civilization from prehistoric times.

Metals were used for horseshoes, tools, knives, cook pots, cups and plates, nails, chains, cannon balls, and coins. That was when metals were made in small enough crucibles so that one or two men could lift them for casting. In the middle of the 19th century, Henry Bessemer showed how to make steel by the ton so that a long piece of metal could be made into a pipe, sheet, wire, or beam, leading eventually to the manufacture of machinery, ships, refineries, power plants, skyscrapers, and airplanes.

Every metal has its own exciting story that tells of its unique properties, the obstacles encountered in producing it, and its advantages and special uses. Metals are all around us and, for the most part, are taken for granted. But what would we do without that tiny amount of silicon in every computer chip produced, or the stainless steel in the utensils on our kitchen tables?

The Dictionary of Metals includes descriptions of metals and terms relating to metals. It also includes a considerable amount of the history, starting with the seven metals of antiquity. Each of the 73 metallic elements has a discussion that includes the discoverer and date, the naming of the metal and its meaning, major applications, and the significance of discovery. Charts show their physical properties. An appendix includes a timeline of important events in the history of metals and metallurgy.

In addition to the basic metals, hundreds of alloys are described, as well as common names such as mild steel, cartridge brass, wrought iron, sterling silver, Muntz metal, Alclad, rare earth metal, metalloids, and killed steel.

Most of the elements in the periodic table of chemical elements are classified as metals. In fact, 73 of the 92 naturally-occurring elements are metals. Metals have been divided into two classes, with ferrous implying all metals and alloys that are principally iron, while the nonferrous consists of all others. This seemingly one-sided division is not so strange when it is realized that about half of all of the alloys are ferrous, of which most are some type of steel. In all, it is estimated that there are at least 25,000 alloys.

Because each metallic element consists of atoms containing different numbers of subatomic particles, it follows that each metal must be different from all the others, having properties that make each metal unique. The properties of
metals are classified as physical and mechanical. The physical properties are the basic characteristics, while the mechanical properties are those that can be determined by deforming or breaking a specimen.

The Dictionary of Metals was compiled in a comprehensive manner, and as such it brings together terms from dozens of authoritative publications, introducing new terms and preserving the old.

I wish to acknowledge the following staff of ASM International for their work on this book: Vicki Burt, Scott Henry, Steve Lampman, and Amy Nolan in the Content Department, and Kelly Sukol and Madrid Tramble in the Production Department. I especially thank my son, Bruce Warren Cobb, and Evelyn Dorothy Roberts for assistance with typing; to my cousin, Anne Cobb Moore for assistance with translation; to Susan Frederick for historical research at the public library in Exton, Pennsylvania; and my wife Joan Inman Cobb for proofreading, construction and many suggestions.

This book includes both original work and carefully selected terms from the ASM Materials Engineering Dictionary, the ASM Handbook series, and other references as listed in the Bibliography. Terms are supplemented by illustrations and tables, and Technical Notes provide concise overviews of the properties, compositions, and applications of selected metals, and direct readers to more detailed information.

The book will be of primary interest to engineers, metallurgists, chemists, professors of Materials Engineering, technicians, librarians, and historians. For these and other interested audiences, in addition to meeting the obvious need of having metallurgical definitions at one’s fingertips, it was written with the intent of being an engaging volume that actually can be read as a book.

Harold M. Cobb
About the Author

Harold M. Cobb graduated from Yale University in 1943 with a degree in metallurgical engineering. He has had a long and varied metallurgical career that began with 22 years at companies that produced aircraft gas turbines, propeller blades, helicopters, and fuel elements for nuclear submarines.

He then was on the staff of the American Society for Testing and Materials (ASTM) for 18 years as Group Manager of the Metals Division, where he was an ex-officio member of 12 metals committees. He was a member of ISO Committee TC 17 on Steel and Secretary of Subcommittee 12 on Steel Sheet for 15 years.

In 1970, Cobb was a principal developer of the Unified Numbering System (UNS) for metals and alloys. He developed the individual numbering systems for three categories: Miscellaneous Steels, the K series; Cast Steels, the J series; and Steels Specified by Mechanical Properties, the D series. He also became the number assigner for the D and K series of steels and is still responsible for that activity.

For many years he has been an editorial consultant for the ASTM/SAE publication Metals and Alloys in the Unified Numbering System (UNS). Cobb created and now maintains the Index of Common Names and Trade Names of that book, an index that has grown to approximately 20,000 entries.

He has edited 24 books on metals, and in 2010 authored History of Stainless Steel. He has authored several dozen articles, including “Development of the Unified Numbering System for Metals,” “The Naming and Numbering of Stainless Steels,” and “What’s in a Name?” He has worked at various times as an editorial consultant for ASM International, ASTM, the Association for Iron & Steel Technology, the Society of Automotive Engineers, and the Specialty Steel Industry of North America.

Cobb also is a guest editor for Stainless Steel World, a Dutch magazine, creating a monthly feature story under the byline “Cobb’s Corner.”

He holds a patent on a process for manufacturing fuel elements for nuclear submarines. He is a Life Member of ASM International, and a member of ASTM and Committee A-1 on Steel, Stainless Steel, and Related Alloys. Cobb and his wife reside in Kennett Square, Pennsylvania.