Preface

The concept of composites is well illustrated by biological materials such as wood, bone, teeth, and hides; these are all composites with complex internal structures that provide mechanical properties well suited to the performance requirements. In general, heterogeneous materials combining the best aspects of dissimilar constituents have been used by nature for millions of years. These could be considered the first composite materials. In modern materials engineering, the term 'composite' has become a broad and important class of engineering materials, typically referring to a matrix material that is reinforced with fibers. For instance, GFRP is a thermosetting polyester matrix containing glass fibers, and this particular composite has the lion's share of today's commercial composite market.

Nowadays, composite materials are found in a wide variety of situations, and they play important supporting roles in economic development and defense applications. Many composites used today are at the cutting edge of materials technology, with performance and costs appropriate to ultra-demanding applications such as spacecraft. Composite materials are undoubtedly a pillar of the materials family, parallel to metallic, polymeric and nonmetallic inorganic materials, in terms of the worldwide demand and production. Composite materials are so fundamental and so critical that their importance is hard to overemphasize.

The main objective of this book is to provide a comprehensive overview of current composite materials that have considerable influence on technical and economic development in China. Many achievements presented in this book result from individual research groups and research and development projects financially supported by Chinese government. Hence, one aim of this book is to bring state-of-the-art knowledge and accomplishments on composite materials together in a single book of two volumes. Of course, this book also provides an understanding of the physical structure–properties relationship of composites for postgraduate students and researchers, scientists and engineers alike. This understanding forms a basis for the application and improvement of the properties, manufacturing processes, characterization and testing, selection methods, and design of products made from composites. This knowledge has evolved from many disciplines and is common to all composite materials.

This book is a part of a large-scale publishing project, *China Materials Engineering Canon*, initiated and supported by the Chinese Mechanical Engineering Society and the Chinese Materials Research Society, co-sponsored by many governmental ministries and national institutions, including the Chinese Academy of Sciences and the Chinese Academy of Engineering. We would like to acknowledge the support and contribution of many colleagues in different universities, institutes, and national research establishments, many of whom are well known in the composite materials community in China. They were kindly agreed to provide their particular expertise for individual chapters. We are also grateful to many other scientists who made their contribution by taking part in the extensive reviewing process, particularly in the translation process from Chinese to English. Finally, we would like to thank the organizer of this book, Chemical Industry Press, for its management.

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http://www.springer.com/978-981-10-5689-5

Composite Materials Engineering, Volume 2
Different Types of Composite Materials
Yi, X.-S.; Du, S.; Zhang, L. (Eds.)
2018, XXIV, 617 p. 296 illus., Hardcover
ISBN: 978-981-10-5689-5