

Preface

Alloy steels are an extremely active field of research. Each year, included in the Science Citation Index, more than 3,000 research papers are published on the alloy steels topic, written by more than 9,000 authors, from more than 2,000 organisations in more than 80 countries.

A quick search in Google Books will show no shortage of books on steels. There are already a number of books discussing steels and steel-based microstructures, for example:

- (1) Steels: Microstructure and Properties, Harry Bhadeshia and Robert Honeycombe
- (2) Steels: Metallurgy and Applications, D. Llewellyn and R. C. Hudd
- (3) The Book of Steel, G. Beranger, G. Henry, and G. Sanz (Editors)
- (4) Advanced Steels: The Recent Scenario in Steel Science and Technology, Yuqing Weng, Han Dong, and Yong Gan (Editors)
- (5) ASM Specialty Handbook: Carbon and Alloy Steels, J. R. Davis (Editor).

So what is unique about this new book?

The author has been a Professor of Materials Science in the School of Planning, Architecture and Civil Engineering, since 2004. Previous to that, he was a Lecturer and then Reader in Construction Materials, since 1995.

Since 2000, indexed in the Science Citation Index and Conference Proceedings Citation Index-Science, he has published more than 15 papers in each of the following subject areas: materials science; metallurgy and metallurgical engineering; physics; science and technology; chemistry; engineering. A list of some of these papers relevant to this book is given separately at the end of this preface. It shows evidence of the significant experience in a wide range of steel-based topics.

His unique, wide research experience brings a unique feature of the book *Steels: From Materials Science to Structural Engineering*. None of the existing steels books covers this spectrum of topics.

This book is intended to be a research monograph, cumulating the experience of 25 years' research by the author. It includes the more recent results, since 2000, but also covers the relevant, recent work by other researchers around the world. The content of the book has a strong focus on fire-engineering, heat-resistant and fire-resistant steels. The book also includes manufacturing and microstructure

engineering-related subjects. These become more and more important for extending the performance in critical applications.

The research papers are the backbone of this book, but the underlining structure of the book is based on the types of alloy steels and the areas of steel applications in structural engineering. The idea is to bring together years of personal experience so the book will provide an interesting compendium of such knowledge. In addition, other researchers' work is reviewed and the major results presented and discussed.

The author is a world authority in the steel research field:

- Among the some 1,200 research papers on maraging steels published since 1970 in the Science Citation Index, two of the top ten most cited papers were written by Sha. The journal impact factors are assembled based on Science Citation Index data.
- The two refereed journals that alloy steels papers are most published in are *Materials Science and Engineering A* and *Surface and Coatings Technology*. Sha has published 15 papers in the former and 9 in the latter. Since 2007, Sha has refereed, on invitation, 28 manuscripts for *Materials Science and Engineering A*, and 54 manuscripts for *Surface and Coatings Technology*, being a member of both Editorial Boards.

Computer-based modelling is a fast growing field in materials science as well as structural engineering, demonstrated by the large recent literature. Combining modelling and experimental studies into one book is one idea behind this book, which, I think, is its strength and selling point.

The author of this book is in a unique position, in his combined expertise in steels research and model development. Though modelling is only a part of it, this book will fill a gap of the book literature in the application of modelling techniques in steels, both hot topics in contemporary materials studies, whilst at the same time a document on the latest research in this area. A large chunk of this latest research will be from the author himself, based on his world leading position in this area, but, as stated before, the book will also cover important relevant research by others. A lot of the structural engineering modelling is about the fire resistance of structural steelwork, one of the two most important issues for constructional steels, the other being corrosion.

The book is primarily intended for researchers studying steels. These include postgraduate students and researchers and lecturers and steel experts. The materials expert, however, will be able to learn modelling and apply this increasingly important technique in their steel materials research and development. As the statistics given earlier has shown, the research base in steel and its application areas is huge, so we hope that this book will have a big impact.

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