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## Austenite Formation and Pearlite Transformation

刘宗昌 任慧平 王海燕 著


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## 内 容 提 要

本书全面阐述了奥氏体、珠光体的新概念、新理论、新机制，是最新的研究成果和理论，其显著特点是创新性。内容包括：导论，逆共析转变与奥氏体，珠光体的组织结构，过冷奥氏体共析分解机理，珠光体转变动力学，珠光体的力学性能及应用，表面浮凸。

本书适合研究院所、钢铁企业、大专院校从事钢的研究、钢材品种开发及教学的科研人员、技术人员及教学人员阅读参考。

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# 前　言

固态相变理论是金属热处理、铸造、焊接、锻压、轧钢、冶金等金属材料工程的技术理论基础，是材料科学与工程的重要理论支柱之一。本书介绍了奥氏体的形成、过冷奥氏体的共析分解等内容。奥氏体形成和珠光体转变是固态相变的两个分支学科，涉及的问题有相变热力学、动力学、晶体学、组织学、性能学及其应用等。本书在继承以往成熟理论的基础上，阐述了近年来国内外研究发展的新观察、新概念、新技术、新理论。

科学技术哲学指出：科学是以范畴、定理、定律形式反映现实世界多种现象的本质和运动规律的知识体系，是沿着“经验事实→假说→理论”的途径而发展的。概念是科学理论的细胞，可见概念极为重要。但科学概念的形成往往有个过程，初期观察、认识有片面性，则概念欠准确。随着科学研究的深入，通过科学抽象，搞清了事物的本质和内在规律性，则更新概念，促进理论进一步发展。

20世纪上半叶对奥氏体的形成、共析分解进行了大量的研究工作，但某些问题尚未真正搞清，如珠光体的定义、共析分解机理等。本书作者依据对奥氏体、珠光体组织结构的新观察和理论研究，纠正了以往的概念，阐述了新机制，完善了奥氏体形成和珠光体转变理论。

本书主要特点有：

（1）在阐述成熟的传统理论的同时，介绍了近年来国内外研究、发展的新理论，注意理论与实际相结合，推动理论和技术创新。

（2）运用科学技术哲学理论，鲜明地阐述了作者的学术观点，研究提出了相关的新概念、阐述了新理论。

本书阐述的奥氏体形成和共析分解属于固态相变的重要应用理论，可供从事冶金、轧钢、铸造、锻压、焊接、热处理、粉末冶金以及材料开发研究等行业的科研人员、技术人员参考，也可作为金属材料工程等专业教师的教学参考书，可供本科生、研究生等学习阅读。

本书是采用继承与创新相结合的方法，综合介绍国内外的最新研究成果，为培养创新型人才而撰写的理论著作。全书内容由刘宗昌策划，

第1章由任慧平撰写、第2章由刘宗昌撰写、第3~7章由王海燕(博士)、刘宗昌合作撰写,李文学教授审阅。最后由刘宗昌负责全书的总成。王玉峰、计云萍、段宝玉等参加了相关的科研工作。

本书内容几经修改和补充,但仍然难免有疏漏和不完善之处,敬请读者指正。在撰写时参考并引用了一些书刊、论文资料的有关内容,谨此致谢。

作 者
2010年1月

# Preface

Theory of solid state phase transformation is the important technical foundation for materials science and engineering, including metal heat treatment, casting, welding, forging, rolling, metallurgy, and so on. This book involves two branches of solid state phase transformation, i. e. austenite formation and super cooled austenite eutectoid decomposition, which comprise thermodynamics, kinetics, crystallography, microstructure, and performance science. In this book, new observations, new concepts and new theory in recent years was put forward based on the past theory research and development.

From the point of science and technology philosophy, science is the knowledge system developed according as the approach of experience, hypothesis to theory. It reflects a variety phenomena and nature of real world by means of theory and law. Defintion is extremely important for scientific theory; the formation of scientific concepts is often a developing process. With the in-depth of scientific research, the nature of things and the inherent regularity was explained clearly, then the concept was updated, and the theory was promoted to make further develop.

First half of the 20th century, a lot of research work were carried out on the formation and eutectoid decomposition of austenite, however, some issues, such as pearlite definition and eutectoid decomposition mechanism, haven't really clearly yet. In this book, the author corrected previous wrong concept, explained the new mechanism based on the experimental observations and theoretical studies of austenite and pearlite microstructure.

Main features of this book are as follows. Firstly, elaborating the mature traditional theory, and new development as well, integrating theory and practice to promote the theory and technological innovation. Secondly, expounded the academic point of the author's, and put forward the relatively new concept and new theory of eutectoid decomposition by using science, technology, and philosophy theory.

It is all known that austenite formation and eutectoid decomposition are important theory for solid-state phase transformation, which can be provided for scientific and technical personnel who engaged in metallurgy, rolling, casting, forging, welding, heat treatment, powder metallurgy, and other field of materials research and development indus-

tries, and also can be used as reference books for teachers, undergraduate, graduate students in the field of metal material engineering and related professional.

In this book, inheritance and innovation methods were integrated, and the latest research results were constantly improved and updated for the training of innovative talents. The content of the book is planning and assembly by Professor Liu Zongchang. In addtion, Professor Ren Huiping participated in the writing of Chapter 1, Ph. D. Wang Haiyan were responsible for the Chapter 3 to 7, the Chapter 2 were edited by Liu Zongchang, and Professor Li Wenxue reviewed this manuscript as well. Moreover, Wang Yufeng, Ji Yuping, Duan Baoyu had attended our research work.

The contents of this book was revised after several change and improvement, however, there may be still inevitable some omissions and imperfections, we really hoped readers give valuable opinion. In addition, a number of books and papers relating to the contents of this book were cited during edition, we also would like to thank those authors for providing the reference.

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Liu Zongchang

January 1,2010

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