

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	晶体生长与表征导论 Introduction to Crystal Growth and Characterization
2.	课程性质 Compulsory/Elective	专业选修课 Subject-Elective
3.	课程学分/学时 Course Credit/Hours	3 学分 Credits /48 学时 Hours
4.	授课语言 Teaching Language	中英双语 Bilingual
5.	授课教师 Instructor(s)	邬家臻助理教授 Assistant Prof. Jiazhen Wu
6.	是否面向本科生开放 Open to undergraduates or not	是 Yes
7.	先修要求 Pre-requisites	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 推荐本科生先修 MSE230《晶体学》和 MSE342《晶体化学》。
8.	教学目标 Course Objectives	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 1. 掌握晶体生长的基本原理: 包括相平衡, 成核, 原子扩散等; Understand the basic principles of crystal growth, including nucleation, atomic diffusion, phase equilibrium, etc. 2. 掌握晶体生长的常用方法: 如液相法, 固相法, 气相法等; Know well the common methods for crystal growth, such as, from liquid solutions, solid-state reaction routes, vapor phases, etc. 3. 掌握晶体结构的基本表征方法及原理; Master the basic crystal structure characterization methods and principles 4. 掌握晶体元素成分基础分析方法及原理; Master the basic element analysis methods and principles 5. 了解晶体生长在实际科学研究中的应用, 并为实际的科研工作提供指导。 Understand the role of crystal growth in actual research work 注: 本科生没有区分 no difference for undergraduates
9.	教学方法 Teaching Methods	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.) 1. 课堂授课上坚持由浅入深, 由简单模型到复杂体系, 由书本知识到实际应用。 The lecture will be given from the easy to the difficult, from simple models to complicated systems, and from text books to actual applications. 2. 课后延伸阅读和文献调研, 激发学生更广泛深入地学习课堂上不能传授的知识。 Books and literatures will be recommended to students for helping them to learn more than what is given in the lecture. 3. 课后作业 Assignment will be given for testing how the lecture is understood. 注: 本科生没有区分 no difference for undergraduates
10.	教学内容 Course Contents	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)
	Section 1	第一讲: 晶体材料简介 Chapter 1: Introduction to Crystalline Materials
	Section 2	第二讲: 晶体生长基础 (一): 相图 Chapter 2: Basics of Crystal Growth

	(1): Phase Diagrams
Section 3	第三讲：晶体生长基础（二）：成核现象 Chapter 3: Basics of Crystal Growth (2): Nucleation phenomena
Section 4	第四讲：晶体生长基础（三）：动力学过程 Chapter 4: Basics of Crystal Growth (3): Kinetic Processes
Section 5	第五讲：晶体生长方法简介（一）：固相法 Chapter 5: Introduction to Crystal Growth Techniques (1): Growth from Solid-State Reaction Routes
Section 6	第六讲：晶体生长方法简介（二）：气相法 Chapter 6: Introduction to Crystal Growth Techniques (2): Growth from Vapor Phases
Section 7	第七讲：晶体生长方法简介（三）：溶液法和助溶剂法 Chapter 7: Introduction to Crystal Growth Techniques (3): Growth from Liquid Solutions and the Flux Methods
Section 8	第八讲：晶体生长方法简介（四）：熔融法 Chapter 8: Introduction to Crystal Growth Techniques (4): Growth from the Melts.
Section 9	第九讲： 晶体中的缺陷 Chapter 9: Defects
Section 10	第十讲： 金属间化合物和合金 Chapter 10: Intermetallics and Alloy
Section 11	第十一讲： 准晶和非晶 Chapter 11: Quasi-Crystals and Amorphous Materials
Section 12	第十二讲：晶体结构分析基础 Chapter 12: Fundamentals of Crystal Structure Analysis
Section 13	第十三讲：元素分析技术 Chapter 13: Element Analysis Techniques
11. 课程考核 Course Assessment	
	<p>(①考核形式 Form of examination; ②.分数构成 grading policy; ③如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <p>成绩评估方法 (Course assessment methods): 1. 出席情况 (10%) Attendance (10%) 2. 平时作业和表现 (含文献调研与相关报告) (30%) Assignment and performance (30%) 3. 期中考试 (20%) Mid-term examination (20%) 4. 期末考试 (40%) Final examination (40%)</p> <p>注: 本科生没有区分 no difference for undergraduates</p>
12. 教材及其它参考资料 Textbook and Supplementary Readings	
	<ol style="list-style-type: none"> 1. 《Crystal Growth for beginners: fundamentals of nucleation, Crystal Growth, and Epitaxy》 by Ivan Markov; 2. 《Modern Crystallography 3 Crystal Growth》 by Alexander A. Chernov; 3. 《Kinetic Process: Crystal Growth, Diffusion, and Phase Transitions in Materials》, by K. A. Jackson 4. 《Introduction to Solid State Physics》, by C. Kittel