

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	PHY5031/微纳结构加工 Introduction to Microelectronic Fabrication
2.	课程性质 Compulsory/Elective	专业选修课 Elective Course
3.	课程学分/学时 Course Credit/Hours	2/48
4.	授课语言 Teaching Language	中文 Chinese
5.	授课教师 Instructor(s)	何洪涛 Hongtao He
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.) 大学物理 B(下) General Physics B(II) PHY105B 化学原理 B General Chemistry B CH101B
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.) 从理论及实验两方面介绍与微纳结构加工相关的基本工艺流程, 包括紫外/电子束光刻工艺、湿/干腐蚀工艺、热处理工艺、薄膜生长技术、器件封装工艺等。预期学生在学完该课程后将能使用这些工艺根据实际的科研需求独立设计并制备微纳器件。 This course aims to introduce the basic processes of microelectronic fabrication, including UV/e-beam lithography, wet/dry etching, thermal processing, thin film deposition, and device packaging. After completing this course, students are expected to be able to apply these techniques to design and fabricate micro/nano devices for the purpose of their scientific research.
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.) 理论课和实验课相结合。 Theoretical lectures in combination with experiment teaching.
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	第一章 微纳结构加工介绍 第一周 课程及微纳结构加工介绍 Chapter 1. An introduction to microelectronic fabrication Week1: Introduction to the course and microelectronic fabrication

Section 2	第二章 光刻 第二周 光刻间；基片清洗；光刻 第三周 光刻胶原理 第四及五周 Stepper 及电子束光刻 Chapter 2. Lithography: Week2:Clean room; Wafer cleaning; Baking; Photolithography Week3: Chemistry of photoresist Week4 & 5: Stepper & e-beam lithography technology
Section 3	第三章 刻蚀 第七周 湿法刻蚀及各种腐蚀液 第八及九周 直流辉光放电；等离子体刻蚀；离子铣等 Chapter 3. Etching Week7: Wet etching & various etchant Week8 & 9: DC glow discharge; Plasma etching; Ion milling; RF discharge
Section 4	第四章 热处理 第十周 氧化 第十一周 扩散；离子注入及退火 Chapter 4. Thermal processing: Week10:Oxidization and oxidization systems Week11:Diffusion; Ion implantation and annealing
Section 5	第五章 薄膜沉积 第十二周 真空及泵；热蒸发及电子束蒸发 第十三周 溅射；磁控溅射 第十四周化学气相沉积 第十五周 生长模式；外延生长；分子束外延等 Chapter 5. Thin film deposition Week12: Vacuum and pump: Thermal and e-beam evaporation Week13:Sputtering; Magnetron sputtering Week14:Chemical vapour deposition (CVD); APCVD/LPCVD/PECVD Week15:Growth modes; Epitaxial growth: MBE,PLD, and MOCVD
Section 6	第六章 封装 第十六周 焊线及器件封装 Chapter 6. Packaging Week16:Wire bonding & Device packaging
11. 课程考核 Course Assessment	
<p>(⊙考核形式 Form of examination; ⊙.分数构成 grading policy; ⊕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>从课堂表现 30%、平时作业 20% 及期末报告 50% 三方面考核学生。 Class Performance 30% + Assignments 20% + Final Presentation 50%。</p>	
12. 教材及其它参考资料 Textbook and Supplementary Readings	
<p>“The science and engineering of microelectronic fabrication”, Stephen A. Campbell “Introduction to microelectronic fabrication”, Richard C. Jaeger 《微纳加工科学原理》，唐天同 & 王兆宏</p>	