

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	能源材料学实验 Experiments of Energy Materials
2.	授课院系 Originating Department	材料科学与工程系 Department of Materials Science and Engineering
3.	课程编号 Course Code	MSE336
4.	课程学分 Credit Value	1
5.	课程类别 Course Type	专业核心课 Major Core Courses
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	中英双语 bilingual, English and Chinese
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	王海鸥, 材料系, wangho@sustc.edu.cn 叶飞, 材料系, yef3@sustc.edu.cn 李艳艳, 材料系, liyy@sustc.edu.cn Haiou Wang, Department of Materials Science and Engineering, wangho@sustc.edu.cn Fei Ye, Department of Materials Science and Engineering, yef3@sustc.edu.cn Yanyan Li, Department of Materials Science and Engineering, liyy@sustc.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	助教: 刘斌, 材料系, 11748003@mail.sustc.edu.cn 李泯婵, 材料系, 280652801@qq.com TA: Bin Liu, Department of Materials Science and Engineering, 11748003@mail.sustc.edu.cn Minchan Li, Department of Materials Science and Engineering, 280652801@qq.com
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	无 NA

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours			32		32
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	能源材料学 Energy Materials				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NA				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 NA				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

能源材料学实验是材料科学与工程专业及其他材料相关专业的一门核心实验课程。课程包括两个大的综合性实验——锂离子电池正极材料的制备及其性能分析和太阳能电池的组装及性能分析。通过本课程的学习，学生将了解并掌握当前主要新型能源材料的制备技术与表征手段，主要包括锂离子电池材料及太阳能电池材料。通过一系列的实验加强学生对能源材料相关知识的理解，提升其应用所学知识分析、解决问题的能力。

Experiments of Energy Materials is a core experimental course of material science and engineering and other materials related majors. The course includes two comprehensive experiments: Preparation and performance analysis of lithium ion battery anode materials, and assembly and performance analysis of solar cells. Through the study of this course, students will understand and master the preparation techniques and characterization methods of major new energy materials, including lithium ion battery materials and solar cell materials. Through a series of experiments, students can enhance their understanding of the knowledge related to energy materials and improve their ability to apply the knowledge they have learned to analyze and solve problems.

16. 预达学习成果 Learning Outcomes

1. 掌握锂离子电池和太阳能电池的相关知识，了解这两种可再生能源的研究发展方向，激发学生进行科研探索的兴趣。
2. 掌握锂离子正极材料的制备方法，具备分析粉体材料晶体结构的能力。
3. 具备组装锂离子电池、分析测试锂离子电池主要性能的能力，并了解相关设备使用。
4. 掌握太阳能电池器件的组装方法，具备分析测试太阳能电池主要性能指标的能力，并了解相关设备使用。
5. 通过中英双语教学，培养学生的专业英语能力，掌握课程核心词汇，能够阅读英语专业文献。
6. 能够理解并遵守实验安全、环保等相关实验规定，并能与同组实验人员有效交流合作。

1. To understand the basic theories of Li ion batteries and solar cells. To learn the research developments on renewable energy sources. To motivate students' interest in scientific research and exploration.
2. To learn the synthetic methods of cathode materials for Li iron batteries. To master the ability of crystal structure analysis.
3. To learn the methods of Li iron batteries assembling and electrochemical performance tests.
4. To master the solar cells assembling and photoelectric property tests.
5. To cultivate the professional English ability through English teaching. Master the core vocabulary of energy materials and read English professional literature.
6. To understand the rules of lab safety and environmental protection, and be able to cooperate with experiment partner.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

实验一 锂离子电池正极材料钴酸锂的合成 (4 学时)
 实验二 锂离子电池正极材料钴酸锂的表征 (4 学时)
 实验三 扣式锂离子电池正极片的制备 (4 学时)
 实验四 扣式电池的组装 (4 学时)
 实验五 锂电池电化学性能测试 (4 学时)
 实验六 太阳能电池中活性材料层的制备 (4 学时)
 实验七 太阳能电池中 MoO₃ 涂层及银电极的制备 (4 学时)
 实验八 太阳能电池光电性能测试 (4 学时)

Lab 1 Synthesis of Lithium Cobalt Oxide (LiCoO₂) Cathode Materials for Li-ion Batteries (4 hours)
 Lab 2 XRD measurement of Lithium Cobalt Oxide (LiCoO₂) for Li-ion Batteries (4 hours)
 Lab 3 Fabrication of electrodes of coin-cell type lithium ion batteries (4 hours)
 Lab 4 Assembling of coin-cell type lithium ion batteries (4 hours)
 Lab 5 Electrochemical performance characterizations of the lithium ion batteries (4 hours)
 Lab 6 Preparation of the active layer for solar cell (4 hours)
 Lab 7 Preparation of the MoO₃ HELs and Ag anode for solar cell (4 hours)
 Lab 8 Electron-Optical Characterization for solar cell (4 hours)

18. 教材及其它参考资料 Textbook and Supplementary Readings

1. 自编实验教材 Experiment Manual
2. Robert A. Huggins, Advanced Batteries[M], Springer Science Business Media, LLC 2009.
3. David S. Ginley, David Cahen. Fundamentals of Materials for energy and environmental sustainability[M]. Cambridge University Press, 2012.

课程评估 ASSESSMENT				
19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10		
课堂表现 Class Performance		40		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		50		

其它（可根据需要
改写以上评估方
式）
Others (The
above may be
modified as
necessary)

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20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

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