

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MSE5013 先进电池材料 Advanced Battery Materials
2.	课程性质 Compulsory/Elective	专业选修课
3.	课程学分/学时 Course Credit/Hours	3/48
4.	授课语言 Teaching Language	英文/English
5.	授课教师 Instructor(s)	卢周广 教授
6.	是否面向本科生开放 Open to undergraduates or not	否
7.	先修要求 Pre-requisites	General Chemistry, General Physics, Fundamentals of Materials Science and Engineering
8.	教学目标 Course Objectives	
	<p>本课程将介绍一次和二次电池的基本类型、基本原理和基本特征，主要包括一次碱性锌锰电池和铝/锌空气电池，二次铅酸电池、镍镉电池、镍氢电池、锂/钠离子电池和锂/钠空气电池，以及新型的热电池和超级电容器等。重点介绍这些电池技术的基本工作原理、主要特点，电池材料的结构和常规制备方法，电池器件的制备及组装方法，及其应用领域；同时介绍这些电池技术国内外的研究和发展现状，主要任务及面临的关键课题，以及未来发展前景。</p> <p>This course covers a wide range of topics including the fundamentals, basic characteristics, and classification of primary and secondary battery materials and devices as well as their basic properties, general preparation and manufacturing methods, and significant applications of energy materials and devices. We will focus on the battery technologies including primary alkaline Zn-Mn batteries and Zn or Al air batteries, rechargeable lead-acid battery, Ni-Cd and nickel metal hydride batteries, lithium/sodium ion batteries, and Li/Na air batteries, as well as the new thermoelectric battery and supercapacitors. This course will also introduce the state-of-art research and development on battery materials and related devices, the major challenges and critical issues facing energy materials, and even some perspectives of development related to new energy materials and devices.</p>	
9.	教学方法 Teaching Methods	
	Lectures plus experimental training, literature review, presentation and discussion. This course is research oriented.	
10.	教学内容 Course Contents	
	Section 1	Introduction to Advanced Battery Materials
	Section 2	Primary alkaline Zn-Mn battery
	Section 3	Primary alkaline Zn-Mn battery
	Section 4	Zn and Al air batteries
	Section 5	Lead-acid battery
	Section 6	Ni-Cd and Ni-MH batteries
	Section 7	Li-ion battery and Na-ion battery
	Section 8	Li and Na air batteries

	Section 9	Supercapacitors
	Section 10	Thermoelectrics
	Section 11	Laboratory
11.	课程考核 Course Assessment	
	15% for quiz, 15% for homework, 30% for lab, 20% for term paper 20% for final presentation.	
12.	教材及其它参考资料 Textbook and Supplementary Readings	
	<p>[1]Advanced Batteries: Materials Science Aspects, Robert A. Huggins, 2008, Springer; [2]Fundamentals of Materials for Energy and Environmental Sustainability, David S. Ginley and David Cahen. 2011, Cambridge University Press.</p> <p>推荐参考资料: [1] 《电池手册》, [美]雷迪 (Reddy T.B.)主编, 汪继强等译, 化学工业出版社, 2013. [2] 《新能源材料 :基础与应用》. 艾德生, 高喆编著. 北京:化学工业出版社, 2010. [3] 《新能源材料》. 雷永泉, 天津大学出版社, 2000 年.</p>	