

上海交通大学研究生专业课程信息收集表

Information Form for SJTU Graduate Profession Courses

课程基本信息 Basic Information				
*课程名称 Course Name	(中文 Chinese) 多主元新型金属材料--块体金属玻璃与高熵合金			
	(英文 English) Multi-Principal Element Metallic Materials--Bulk Metallic Glasses & High-Entropy Alloys			
*学分 Credits	2	*学时 Teaching Hours	32	
*开课学期 Semester	秋季学期 Fall	*是否跨学期 Cross-semester?	否 No	跨 Spanning over 一个学期 Semesters (含夏季学期)。
*课程类型 Course Type	专业选修课 Program Elective Course	*课程分类 Course Type	全日制课程 For full-time students	
*课程性质 Course Category	专业课 Specialized Course	课程层次 Targeting Students	硕博共用 All graduates	
*授课语言 Instruction Language	中文 Chinese	主要授课方式 Teaching Method	课堂教学 In class teaching	
*成绩类型 Grade	等第制 Letter grading	主要考核方式 Exam Method	论文 Essay	
*开课院系 School	材料科学与工程学院 School of Materials Science and Engineering			
所属学科 Subject	材料科学与工程 Materials Science and Engineering			
负责教师 Person in charge	姓名 Name	工号 ID	单位 School	联系方式 E-mail
	李金富 LI Jinifu		材料科学与工程学院 School of Materials Science and Engineering	jfli@sjtu.edu.cn
课程扩展信息 Extended Information				
*课程简介 (中文) Course Description	<p>(分段概述课程定位、教学目标、主要教学内容、先修课程等；不少于 200 字。)</p> <p>块体金属玻璃和高熵合金的出现，突破了传统金属材料仅有 1 到 2 种主要组元的限制。主要组元数目的显著增加，带来了强烈的化学无序效应、显著的迟滞扩散效应以及晶态时剧烈的点阵畸变效应，使材料呈现出特殊的结构特征、相变行为与物理化学性能，构成了金属材料研究最前沿的部分。本课程的教学内容即围绕多主元合金热力学与动力学、块体金属玻璃与高熵合金的成分、结构、性能行为及其典型应用展开，体现了块体金属玻璃与高熵合金的最新研究成果，供修读过《材料科学基础》、《材料加工基础》、《材料性能》的材料和物理类专业的研究生选修。</p>			
*课程简介 (English) Course Description	<p>The emergence of bulk metallic glasses and high-entropy alloys breaks through the limitation of conventional metallic materials consisting of only one or two principal components. The significant increase in the number of principal components breeds a strong chemical disorder effect, a significant sluggish diffusion effect and a severe lattice distortion effect, so that the materials exhibit special structural characteristics, phase transition behaviors and physical and chemical properties, which constitute the most advanced part of metallic materials research. This course focuses on the structure, composition design theory, performance behavior and typical applications of bulk metallic glasses and high-entropy alloys, reflecting the latest research achievements in the field. The course is designed for graduate students who have taken undergraduate courses “Fundamentals of Materials Science”, “Fundamentals of Material Processing” and “Properties of Materials.</p>			

*教学大纲 (中文) Syllabus	(建议列表形式, 各列内容: 章节、主要内容、课时数、教学方式等)			
	教学内容		授课学时	教学方式
	绪论		2	课堂教学
	第一部分 多主元合金 形成理论	1.1 多主元合金热力学	2	课堂教学
		1.2 多主元合金形成动力学	2	课堂教学
	第二部分 块体金属玻 璃	2.1 块体金属玻璃的结构	4	课堂教学
		2.2 块体金属玻璃的成分设计	2	课堂教学
		2.3 块体金属玻璃的性能	4	课堂教学
		2.4 块体金属玻璃的强韧化	4	课堂教学
	第三部分 高熵合金	3.1 高熵合金的成分与结构	4	课堂教学
3.2 高熵合金的力学性能		4	课堂教学	
3.3 高熵合金合金的强韧化		4	课堂教学	
*教学大纲 (English) Syllabus	(须与中文一致, 翻译请力求信达雅。)			
	Content		Hours	Format
	绪论		2	In class teaching
	Part 1 Formation of multi-principal element alloys	1.1 Thermodynamics of multi-principal element alloys	2	In class teaching
		1.2 Kinetics of multi-principal element alloy formation	2	In class teaching
	Part 2 Bulk metallic glasses	2.1 Structure of bulk metallic glasses	4	In class teaching
		2.2 Composition design of bulk metallic glasses	2	In class teaching
		2.3 Properties of bulk metallic glasses	4	In class teaching
		2.4 Strengthening and toughening of bulk metallic glasses	4	In class teaching
	Part 3 High-entropy alloys	3.1 Compositions and structures of high-entropy alloys	4	In class teaching
3.2 Mechanical properties of high-entropy alloys		4	In class teaching	
3.3 Strengthening and toughening of high-entropy alloys		4	In class teaching	
*课程要求 (中文) Requirements	(课程考核方式、考核标准等; 不少于 50 字) 课程考核方式为论文结合口试。通过课程学习, 应该全面了解掌握以块体金属玻璃和高熵合金为代表的多主元合金的成分设计理论、结构与性能特点及其典型应用等, 加深对			

	金属材料的理解。
*课程要求 (English) Requirements	(须与中文一致, 翻译请力求信达雅。) Exam method: essay plus oral exam. Through the course study, the students should master the composition design theory, structure and properties, and typical applications of bulk metallic glasses and high-entropy alloys, so that their understanding of metallic materials could be greatly deepened.
*课程资源 (中文) Resources	(教材、教参、网站资料等。) (1) 块体非晶合金, 惠希东、陈国良著, 北京: 化学工业出版社, 2007 (2) 高熵合金-基础与应用, Michael C. Gao, Jien-Wei Yeh, Peter K. Liaw and Yong Zhang著, 瑞士: 斯普林格国际出版公司, 2016 (英文)
*课程资源 (English) Resources	(须与中文一致, 请力求信达雅。) (1) Bulk Amorphous Alloys, edited by HUI Xidong and CHEN Guoliang, Beijing: Chemical Industry Press, 2007 (in Chinese). (2) High-Entropy Alloys--Fundamentals and Applications, edited by Michael C. Gao, Jien-Wei Yeh, Peter K. Liaw and Yong Zhang, Switzerland: Springer International Publishing, 2016
备注 Note	