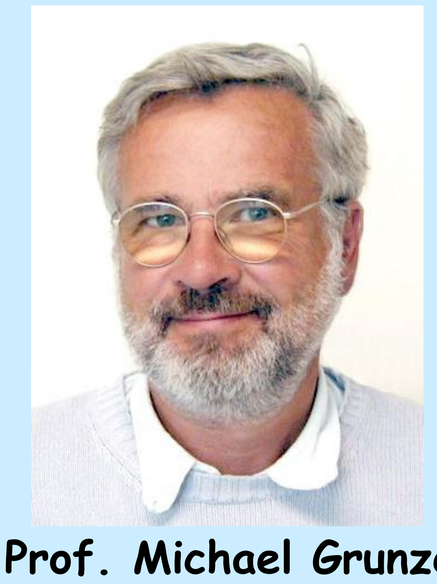
全英文课程《Materials Science of Interfaces》

主讲人：Michael Grunze 教授



Prof. Michael Grunze

Grunze教授是国际著名材料表界面物理化学家，他曾在德国马普所、美国缅因大学任教，随后在德国海德堡大学任应用物理化学系主任。他致力于研究超薄新材料的合成、制备与表征，并将材料体系应用于化学、生化、物理传感等领域。在*Science*、*Nature*、*JACS*、*Angew. Chem. Int. Ed.*等国际顶级期刊上发表学术论文400余篇，2003年获得国际著名马普研究奖（Max Planck Research Prize）。

课程介绍：

《材料表面科学(Materials Science of Interfaces)》是浙江大学首批全英文课程建设项目，也是高分子系课程教学改革的重要组成部分。课程引进国际先进教学模式：德国大学研究生课程教学模式，由德国著名大学—海德堡大学（德国排名第一，世界排名50）Grunze教授进行授课。

开课对象：

浙江大学在校硕士生、博士生、3-4年级本科生。

教学安排：

2015-2016学年，课程将小班化教学，分为两个时间段进行：2015年冬学期(11月23日—12月4日，2周)、2016年春或夏学期(2周)。学生将组队，与教授实时互动，进行讨论式教学。学生通过自主阅读、小组讨论、课题报告、教授点评、知识授课等方式得到有效的学习和锻炼。**通过本课程的同学将获得德国海德堡大学课程认证证书。**

- 10月15日—10月25日：报名注册
- 10月26日—11月15日：指定英文教材阅读（《Thermodynamics》HJ Kreuzer, I Tamblyn, World Scientific Co, 2010. 我们将提供电子版）；学习文献调研，递交课程作业。

  锻炼和提高自主学习能力（将对课程作业进行点评）！
- 11月23日—12月4日：第一阶段课程

  小测验；分组（2-4人/组）。

  锻炼和提高团队合作学习能力：组织团队式讨论、协调、合作和解决问题！

  5个专题讲座，进行课堂授课。

  学习和巩固理论知识：胶体材料及其界面的物理化学基本原理！

  5个课后时间段，与教授一对一（小组）进行讨论。

  锻炼和提高英语表达能力和专业讨论技巧！

（详细时间及教学内容可查阅课程表）

地　　点：玉泉校区　(具体开课前通知)

选课联系：高分子系沈通老师 shentong@zju.edu.cn

任科峰老师 renkf@zju.edu.cn

热忱欢迎广大师生参加！

Basic Physical Chemistry for Materials Science

Session I: Oct. 29 - Nov. 10 2014

Prof. Michael Grunze, University of Heidelberg and Karlsruhe Institute of Technology, Germany, michael.grunze@kit.edu

Class supervisor: Dr.Ren Kefeng, renkf@zju.edu.cn

This course "*Basic Physical Chemistry for Materials Science*" will cover the fundamental concepts underlying some selected areas in applied Material Science:

1) Inert Surface : Applications and Limitations,
2) Colloidal Particles as Sensors and Carriers
3) Colors: how to make products attractive by copying nature

The intense course will be taught in two sections, the first between Nov. 23 and Dec. 4, the second part will be in the spring of 2016 (to be announced.) Topic 1 and part of topic 2 will be covered in the first section, and student will have reading assignments to prepare for the two week course in the spring.
A major objective of the course is to prepare students to team work, which is required in any modern academic or industrial working environment. We will discuss in class how to learn and work in a team, how to develop joint strategies to study effectively, and how to organize tasks in a team.
The course is open to all students with a good background in Physical Chemistry, fundamental Physics, and Mathematics, but will require an entrance knowledge test. Students who want to attend the class will have to study selected chapters from the book " Thermodynamics" (H.J. Kreuzer and I. Tamblyn, World Scientific Pub Co, 2010) and solve some homework problems derived from the text. We will then meet on Nov.23 for a one hour "knowledge test", which has to be passed to be elegible to participate in the class. Students are encouraged to form teams of 3-4 from the very beginning and work together on the home work assignments.
Students will get a reading and homework assignment after each lecture. The homework problems are non-mandatory, but we will have- at the beginning of each lecture - a 15 min **quick test** on the last assignment, which will be graded to provide a feedback to students about their level of understanding. These **quick test** results and the final written exam will be combined (50% each) for the final grade. ***Students teams*** can also sign up for a voluntary 45 min. **oral** final exam with Prof. Grunze on Dec.4 in the afternoon.
The two-week intensive courses will require plenty of time for the 3 hour lectures (every second day), studying in the library, reading and solving homework assignments. *Students should plan their schedule accordingly.*

Schedule for the course ***Basic Physical Chemistry for Materials Science***

Oct 25:
Students who are interested in the course are asked to sign up with **Dr.Ren Kefeng.** Dr. Kefeng will hand out the reading assignments in the book *" Thermodynamics" (H.J. Kreuzer and I. Tamblyn, World Scientific Pub Co, 2010)* and the homework problems. The

homework problems should be returned individually by **Nov. 15** by e-mail to michael.grunze@urz.uni-heidelberg.de

The reading assignments for the lectures in the fall will be taken from:

H.J. Kreuzer and I. Tamblyn, **" Thermodynamics"** World Scientific Pub Co, 2010

Jacob N. Israelachvili **Intermolecular and Surface Forces,** Academic Press, 3rd edition

John C.Berg: **An Introduction to Interfaces and Colloids- The bridge to Nanoscience,** World scientific 2012

Terence Crosgrove, **"Colloid Science Principles, methods and applications"**, second edition, by Wiley

Physical Chemistry , by Peter Atkins, 9th edition.
Pages 1099-1321 are the basics for Colloid and Interface science. So please look up the respective chapters if you want to understand things in more detail.

Lecture Schedule:

Nov. 15: return of homework assignments by e-mail

Monday Nov.23
15:00-16:00 knowledge test
Students meet with Prof. Grunze and take their individual written knowledge test on the reading assignment (1 hour, closed books, no notes, calculator or computer allowed). Only students who pass with minimum of 50% correct answers are accepted for the course.

Tuesday Nov. 24
11:30-12:15 knowledge test is returned
15:00-17:00 Teams of students are finalized for the course (note: everyone has to have at least one partner, preferably 3 partners)
Lecture: Introduction and Overview : Why do we need Physical Chemistry as Materials scientists?

Thursday Nov. 26 :
11:30-12:15 office hour (by appointment)
15:00-18:00 Lecture
Basic theories of particle-surface interaction in solution, Steric Repulsion theory and experiments, where do they fail?

Friday Nov 27 :
11:30-12:15 office hour (by appointment)
14:00-17:00 Lecture
Non-polymeric Inert Surfaces in sensors and anti-fouling applications: How do they work? Where do they fail?

Tuesday Dec 1:
11:30-12:15 office hour (by appointment)
15:00-18:00 Lecture
Occurrence of Colloids in Nature and their Applications: What stabilizes a colloidal system to avoid aggregation? Classes of Colloids and their characterization

Thursday Dec 3:
11:30-12:15 office hour (by appointment)
15:00-17:30 Lecture : Summary and Review of the most important topics and final exam (1 hour)

Friday Dec 4:
13:15 – 14:00 office hour (by appointment)
14:00-16:00 : Return of final exam
Assignment of seminars to student teams, which will be given during the spring session.
How to stay in touch over the winter, outline and reading assignment for the 2nd part of the course in spring.

Students who passed the quick tests, presented in a team seminar, and pass the exams will receive a certificate for successful attendance of the course.

Nov. 23-Nov. 27

		Monday 23	Tuesday 24	Wednesday 25	Thursday 26	Friday 27	Saturday	Sunday	Time
Morning	1	Occupied		Occupied	Occupied	Occupied			8:00-8:45
	2								8:50-9:35
	3		Occupied						9:50-10:35
	4								10:40-11:25
	5		Return of knowledge test		Office hour				11:30-12:15
Afternoon	6		Occupied	Occupied	Occupied	Office hour			13:15-14:00
	7					14:00-17:00 Non-polymeric Inert Surfaces in sensors and anti-fouling applications: How do they work? Where do they fail?			14:05-14:50
	8	15:00-16:00 Knowledge test	15:00-17:00 Introduction and Overview: Why do we need Physical Chemistry as Materials scientists?		15:00-18:00 Basic theories of particle-surface interaction in solution, Steric Repulsion theory and experiments, where do they fail?				14:55-15:40
	9								15:55-16:40
	10								16:45-17:30

Nov. 30-Dec. 4

		Monday 30	Tuesday 1	Wednesday 2	Thursday 3	Friday 4	Saturday	Sunday	Time
Morning	1	Occupied		Occupied	Occupied	Occupied			8:00-8:45
	2								8:50-9:35
	3		Occupied						9:50-10:35
	4								10:40-11:25
	5		Office hour		Office hour				11:30-12:15
Afternoon	6		Occupied	Occupied	Occupied	Office hour			13:15-14:00
	7					14:00-17:00 Return of final exam Assignment of seminars			14:05-14:50
	8		15:00-18:00 Occurrence of Colloids in Nature and their Applications: What stabilizes a colloidal system to avoid aggregation? Classes of Colloids and their characterization						14:55-15:40
	9				15:00-17:30 Summary and Review of the most important topics Final Exam				15:55-16:40
	10								16:45-17:30