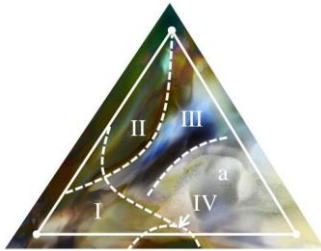


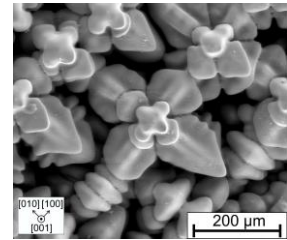
LECTURE ANNOUNCEMENT SS 2021

Fundamental Aspects of Materials Science and Microengineering



Prof. Dr.-Ing. Gunther Eggeler
Prof. Dr.-Ing. Alfred Ludwig

Self-study and zoom meetings.



The course “Fundamental Aspects of Materials Science and Engineering” builds up on basic materials science knowledge and introduces a few advanced topics. We discuss why an atomistic and thermodynamic understanding is important in materials engineering. We learn about ternary phase diagrams, intermetallic phases and how combinatorial materials research works. We then acquire specific knowledge about two material classes, which are in the focus of materials research in Bochum: Superalloy single crystals and shape memory materials. Superalloys have to withstand mechanical loads at high temperatures, where creep is an important deformation mechanism which limits component life. The basics of creep will be discussed and an introduction in the metallurgy of single crystal superalloys will be given. The fascinating class shape memory alloys, relies on the martensitic transformation. As far as fracture mechanics and fatigue are concerned, shape memory alloys differ from conventional engineering materials. We will learn about stress induced phase transformation in front of cracks and about the phenomenon of functional fatigue.

The present pandemia makes it impossible to meet in the lecture room. We regret this deeply. However, we have recorded all lectures, which can be watched as videos online. We recommend that you follow the schedule suggested below. Please also download the lecture material and work through it yourself. This is mandatory in order to benefit from the **Questions&Exercise** sessions (marked in **green** below). These will be held as ZOOM meetings and will start at 12:15. There is also room for questions in these ZOOM meetings. Additional information will be provided via Moodle.

	Date	Type	Topic
1	13.04.2021	Introduction and lecture (Prof. Eggeler)	Thermodynamics
2	20.04.2021	Lecture (Prof. Ludwig)	Phase diagrams
3	27.04.2021	Lecture (Prof. Ludwig)	Intermetallic phases
4	04.05.2021	Lecture (Prof. Ludwig)	Combinatorial materials science and high-throughput experimentation
5	11.05.2021	Questions&Exercise	Prof. Ludwig, part 1-3
6	18.05.2021	Lecture (Prof. Eggeler)	Basic Aspects of High Temperature Strength -Creep Fundamentals
	25.05.2021	free	Pfingsten / Whitsun
7	01.06.2021	Lecture (Prof. Eggeler)	Ni-base Superalloy Single Crystals
8	08.06.2021	Questions&Exercise	Prof. Eggeler, part 1-3
9	15.06.2021	Lecture (Prof. Eggeler)	Martensitic Transformations, Shape Memory Alloys
10	22.06.2021	Lecture (Prof. Eggeler)	SMA Fracture Mechanics and Basics of Structural Fatigue
11	29.06.2021	Lecture (Prof. Eggeler)	Structural and functional fatigue of NiTi SMA
12	06.07.2021	Questions&Exercise	Prof. Eggeler, part 4-6
13	13.06.2021	Discussion	All lectures
	16.08.2021	Examen	Most likely an online oral exam (details will communicated in due coruse)

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