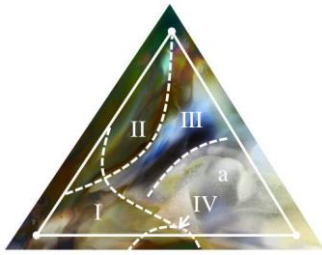
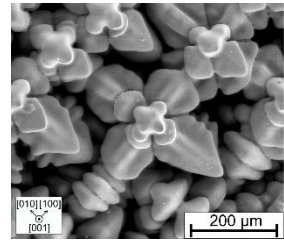


Fundamental Aspects of Materials Science and Engineering (FAMSE)



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



Tuesdays, 12:00 – 14:45 pm, Room IC 04/408

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. These topics are of general importance in materials science and engineering. 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 temperature where creep is an important deformation mechanism which governs high temperature strength. In the case of shape memory alloys, fracture mechanics concepts need to be reconsidered and structural and functional fatigue are equally important. Shape memory polymers also show the shape memory effect, but we will see that the elementary processes which govern shape recovery are different from what we have learned in metallic shape memory alloys.

I. Thermodynamic aspects of materials (Prof. Dr. Tong Li)

(1) 09. April 2023: Thermodynamics in materials science – fundamentals (TL)

II. Superalloy Single Crystals & Shape Memory Alloys (Prof. Dr.-Ing. Gunther Eggeler. Prof. Dr. Tong Li)

- (2) 16. April 2023: Advanced Catalytic materials (TL)
- (3) 23. April 2023: Catalytic function materials II (TL)
- (4) 30. April 2023: Classroom exercise (Bia He)
- (5) 07. May 2023: Basic aspects of high temperature strength (GE)
- (6) 14. May 2023: Superalloys: Processing, microstructure and properties (JF)
- (7) 21. May 2023: Pentecost break
- (8) 28. May 2023: Martensitic transformations and shape memory effects (GE)
- (9) 04. June 2023: Mechanical properties of shape memory alloys (GE)
- (10) 11. June 2023: Classroom exercise (Nico Paufler)

III. Phase diagrams, intermetallic phases and combinatorial materials research (Prof. Dr.-Ing. Alfred Ludwig)

- (11) 18. June 2023: Binary and ternary phase diagrams (ONLINE)
- (12) 25. June 2023: Intermetallic compounds (ONLINE)
- (13) 02. July 2023: Combinatorial materials research (LIVE)
- (14) 09. July 2023: Classroom exercise & Lab-tour (Rico Zehl)