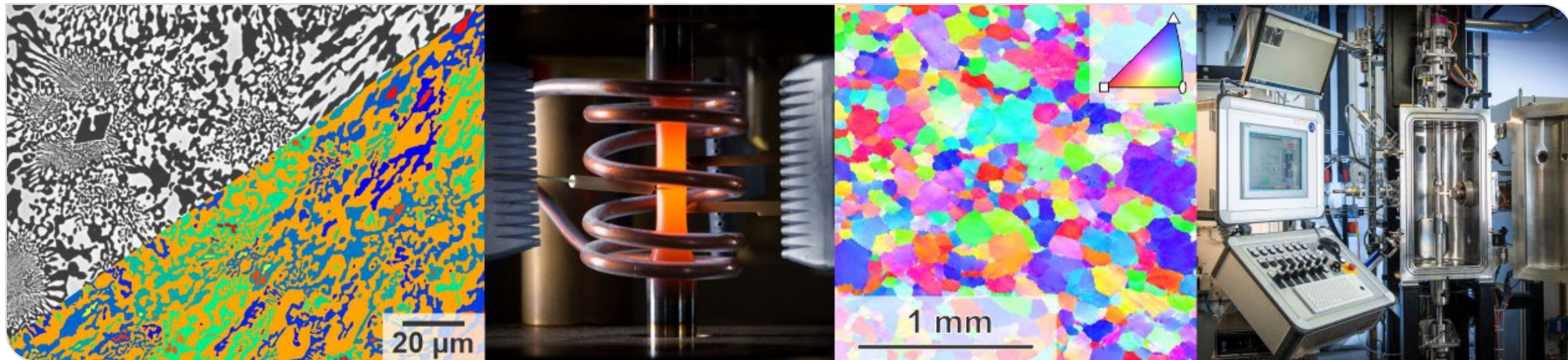


Plasticity

Lecture for “Mechanical Engineering” and “Materials Science and Engineering”
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Outline

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- Appointments
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■ Ch. 1: Introduction

- Relevance of Plasticity in Industry and Research

Outline

- Ch. 2: Macroscopic Features of Plastic Deformation
 - Stress-Strain Curve of Common Metallic Materials
- Ch. 3: Fundamentals and Interrelations to Other Lectures
Appointments
 - Fundamental Concepts of Elasticity
 - Macroscopic Strength and Strengthening/Hardening
 - Fundamentals of Crystallography
 - Fundamentals of Defects in Crystalline Solids

Outline

- Ch. 4: Dislocations
 - Fundamental Concept
 - Observation of Dislocations
 - Properties of Dislocations
 - Interaction of Dislocations
 - Motion of Dislocations
 - Multiplication of Dislocations
 - Dislocations in fcc Metals
 - Dislocations in bcc Metals
 - Dislocations in hcp Metals and Complex Intermetallics

Outline

■ Ch. 5: Single Crystal Plasticity

- General Stages of Plastic Deformation and Fundamentals of the Stress-Strain Curve (fcc Metals)
- Influence of Temperature, Orientation, Strain Rate, etc. (fcc Metals)
- Further Examples (Extension of the Results to bcc, hcp and Intermetallic Materials)
- Deformation Twinning in Single-Crystals

Outline

- Ch. 6: Plasticity of Polycrystalline Materials
 - Transition from Single Crystals to Polycrystals
 - Strength of Polycrystals
 - Solute Atoms
 - Dislocations (incl. Dislocation Patterning)
 - Grain Boundaries (incl. Homogenization of Critical Stress)
 - Precipitates and Dispersoids

- Ch. 7: Other Mechanisms of Plastic Deformation