

SELECTED PROBLEMS OF MICROSTRUCTURE AND TEXTURE TRANSFORMATIONS IN DEFORMED METALS

(semester I, 10 h, exam)

Contents:

1. Plasticity and work hardening: 2 h
2. Instability of isotropic/anisotropic materials in tensile test and under biaxial stresses: 2 h
3. Softening mechanism: recovery, recrystallization and grain growth: 2h
4. Textural developments during thermo-mechanical processing. Deformation vs. recrystallization textures: 2 h
5. TEM and SEM methods of experimental investigations of texture changes in fcc metals after different deformation modes: 2h

A short description of the course

A series of lectures briefly recalls the basic description, definitions and elementary constitutive laws used to describe plastic deformation. Then it covers a description of work hardening at relatively low temperatures (where thermally activated processes do not play a key role) followed by the analysis of some important features of plastic deformation significant for large strains (Lecture 1 & 2).

Softening processes (recovery, recrystallization and grain growth) and associated microstructural changes will be discussed based on driving force and involved mechanisms. This part provides an overview of several essential parameters including: stored energy of deformation, surface energy and the movement of high-angle boundaries (Lecture 3).

Lecture 4 will be dedicated to the description and interpretation of crystallographic textures. After an introduction to the 'world' of graphical representation of texture data, a short survey of the most important cold deformation and recrystallization textures will be presented.

Lecture 5 will be dedicated to techniques of local orientation measurements based on TEM and SEM techniques. The influence of band like strain inhomogeneities of deformation, their crystallographic nature and role in texture transformation in fcc metals will be thoroughly discussed.