

Microstructure and micro-mechanics characterisation of W and W alloys

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INSTITUT FÜR MATERIALFORSCHUNG II

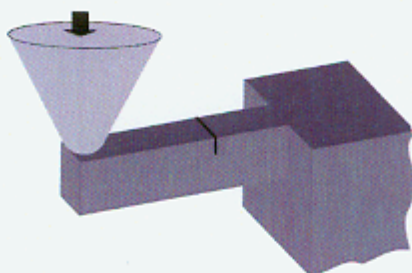
Activity 5: Plasticity, Materials Science and Modelling
Task: Microstructure and micro-mechanics characterisation of W and W alloys
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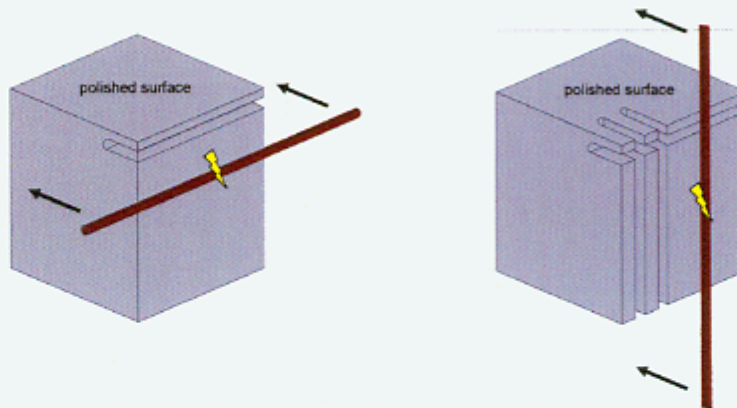
Objectives for Work Programme 2010

- Investigation of the fracture behavior of W and W alloys on the microscopic scale.
- Fracture mechanical test are conducted on notched microbeams using a nanoindenter:



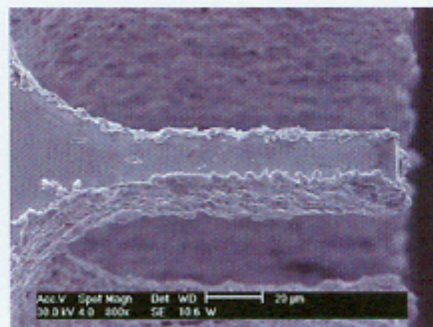
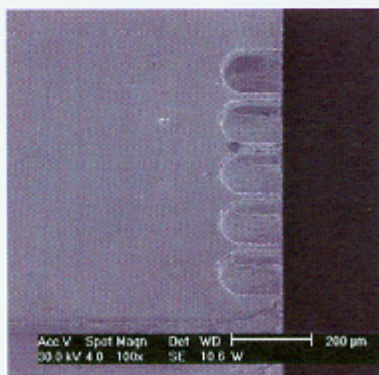
Specimen preparation

- Usually, specimens for micromechanical tests are produced by using focused ion beam machining.
- Drawbacks: Time and cost intensive, limited specimen sizes
- Development of an effective and convenient pre-preparation method for such microbeams based on Micro-electric discharge machining:



Specimen preparation

- Method was successfully applied for the production of single- and polycrystalline tungsten microbeams of various sizes.



Example:
20µm x 20µm x 120µm

- Multiple specimens can be produced in one preparation step
- Heat-damaged layer (1-3 µm) can be easily removed in a final preparation step by means of FIB

Main Conclusion of the Work Done

- *Development of a new method for the specimen preparation by combining μ -EDM and FIB*
- *Preparation of single- and polycrystalline W microbeams*

Work planned for the next period

- *Micro-fracture experiments on W specimens using nanoindentation*
- *Fractured specimens will be investigated by SEM and electron backscattering diffraction to gain insight into the responsible failure mechanisms*
- *Development of a new specimen holder for heating or cooling the specimens*