



Monday, 17th of Januar, 4:30 p.m.
ICAMS Seminar room UHW 11/1102

Dr. Victoria Yardley

Ruhr-Universität Bochum, Lehrstuhl Werkstoffwissenschaft

Ferritic heat-resistant steels: microstructure and crack growth

Ferritic steels with a tempered martensite microstructure are used in the boilers, pipework and turbines of thermal power plant, where operating temperatures of 450-600C and pressures of up to 100 MPa are typical and components must be capable of resisting oxidation and excessive dimensional change or fracture due to creep or creep-fatigue over lifetimes of up to several decades. The microstructure, formed by quenching from the austenite phase and then tempering, contains a fine grain and subgrain structure, a high dislocation density and precipitations of carbonitrides. The combination of these features provides adequate creep resistance but microstructural degradation gradually occurs.

Electron backscatter diffraction (EBSD) in the SEM enables rapid and automatic sampling of crystallographic orientation data from arrays of points on the sample surface, allowing us to both study the aggregate and localised crystallographic properties of the microstructure. In this seminar, two applications of EBSD to the study of ferritic heat-resistant steels will be presented: (1) the effect of different thermomechanical treatments on the tempered martensite morphology and crystallography and (2) the relationship between microstructure and crack development in creep-tested specimens.